

Box-Ironbark Forests & Woodlands Investigation

Final Report

June 2001

Environment Conservation Council

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Environment Conservation Council.
Box-Ironbark Forests and Woodlands Investigation Final Report

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Council's Message

At the time of European settlement some 13% of Victoria was covered with extensive forests of box and ironbark trees with characteristic understorey vegetation. These forests provided a unique system of habitats for a highly diverse population of birds and other animals.

In the century-and-a-half since European settlement we have cleared the forests for agriculture and mining, continued to use them for mining and grazing, and harvest them for firewood, posts, sleepers and sawlogs. As a result, only about 17% of the original cover remains; most of this is on public land and is highly fragmented.

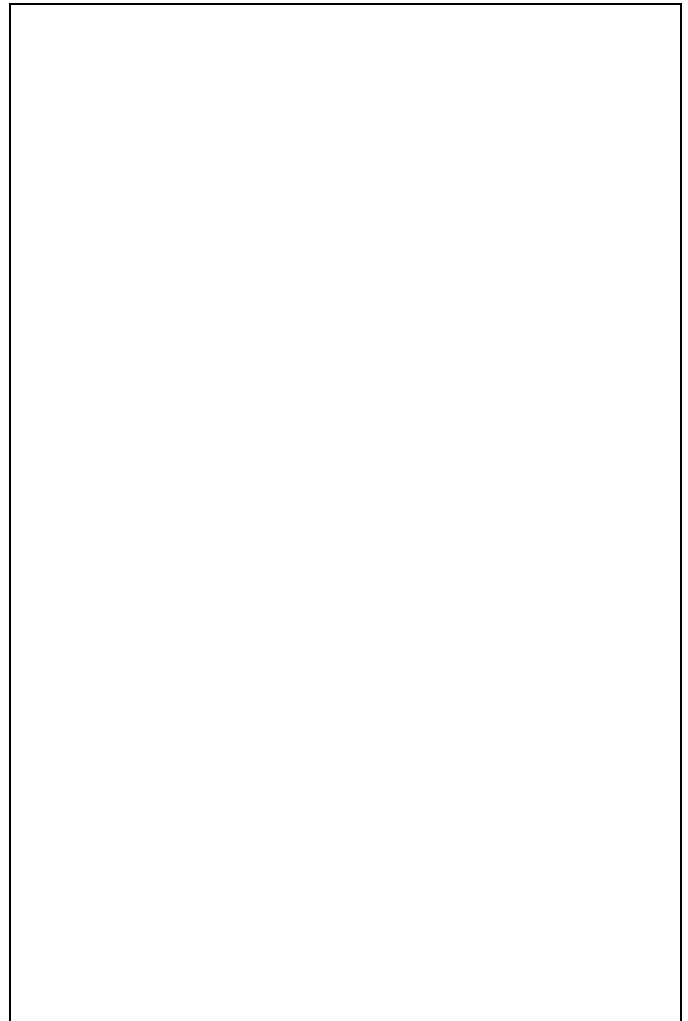
The Victorian Government gave the Environment Conservation Council (ECC) the task of proposing an appropriate system for the protection and management of Box-Ironbark forests and woodlands. The Government also required the ECC to consider the economic and social value of existing or proposed developments, land uses and resources.

Following the release of the ECC's Draft Report on the Box-Ironbark Forests and Woodlands Investigation in May 2000, the Council has considered around 1 500 written submissions received from the community, together with the views expressed in numerous community and stakeholder group meetings.

Many people drew attention to the drastic loss of biodiversity within the 17% of the original forest cover still remaining. Their major concerns focussed around the critical need to put in place a truly comprehensive, adequate and representative system of fully protected parks and reserves to ensure, at least, the partial restoration of the forests and their biodiversity. These people put the view very cogently that, as we had used and even abused these forests over 150 years, then perhaps it was high time that the needs of the forests should now be of paramount concern to us.

Concerns about restrictions on access and use were also strongly expressed by many people who use the forest for commercial or recreational activities. These people generally believed that their activities have little impact on biodiversity.

The ECC acknowledges that if we as a community, are serious about biodiversity conservation, we must also accept that there is a resource use cost.



ECC members Jane Cutler, John Lovering and Eda Ritchie at the base of a large, old red ironbark (126 cm diameter) along a roadside between Stawell and St Arnaud.

Having considered all these inputs it is clear to the Council that appropriate strategies must be put in place to halt the degradation of the Box-Ironbark forests and woodlands and the rate of species loss. Setting up a system of parks and reserves is essential but it is only one step in preventing further biodiversity loss. A change of management practice for the whole region, with an emphasis on biodiversity conservation and protection of threatened and other species, is also critical in reversing the present pattern of loss.

In completing this Final Report, the ECC has considered all views put to it (and the LCC) over the nearly six years that the investigation has been underway, along with the outcomes of a further social and economic assessment of the potential impacts of our final recommendations.

Significant changes have been made since the Draft Report on the basis of inputs arising from the total community consultative process.

On balance, the ECC considers that the likely environmental, economic and social outcomes from the Final Report will meet with general community acceptance, but opposition from those who are significantly affected is likely to remain. A necessary corollary is that if any serious economic or social costs can be demonstrated to fall directly and adversely on any individual or group, then the Government must develop a strategy to minimise any such effects.

It is now more than 100 years since Victoria's first national park was proclaimed at Wilsons Promontory. Since that time successive Victorian governments have established a system of national parks and conservation reserves covering about 16%

of the state, protecting some of our most precious natural areas.

The people of Victoria are justifiably proud of their national parks and understand the critical role they play in protecting the state's biodiversity. They are highly supportive of the fact that these parks are a haven for the protection of plants and animals all Victorians can enjoy, and which will always be available for the enjoyment, study and inspiration of future generations.

Let this generation have the wisdom to make the necessary changes to management practices in the region to reverse the pattern of biodiversity loss in this ecosystem, and create a system of highly protected areas for our unique Box-Ironbark forests and woodlands.

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Executive summary

Introduction

Few Victorian forest and woodland ecosystems are as poorly represented in parks and reserves as the distinctive Box-Ironbark ecosystems of northern Victoria. Since European settlement these forests and woodlands have been extensively cleared and fragmented for agriculture, urban development and gold mining, and cut for a variety of wood products. They once covered three million hectares of northern Victoria, but 83% of the original Box-Ironbark vegetation has now been cleared. Not only have the forests and woodlands been mostly cleared, but what is left is highly modified from its original structure and is also very fragmented. These remaining forests and woodlands are mostly on public land and these areas are ecologically important for a rich diversity of flora and fauna, many of which are rare or threatened.

Box-Ironbark forests and woodlands are highly accessible and the visitor is rewarded by a vibrant array of bird species, carpets of wildflowers in Spring, the rich aroma of eucalypt nectar, and many sites of historical and cultural interest. Despite their apparent uniformity, these forests actually have great diversity with around 1 500 species of higher plants and over 250 vertebrate species recorded in the region; many are largely restricted to Box-Ironbark forests and woodlands.

Some 297 Box-Ironbark plant species and 53 animal species are now classified as extinct, threatened or near-threatened (see Appendix 1). In addition, at least ten plant and animal species are known to have disappeared from the study area since the 1840s, and numerous others have become locally extinct. It is also clear and of great concern that many species, particularly birds, are known to be still declining.

Accordingly, a key feature of Box-Ironbark nature conservation is the promotion of ‘recovery’ for many species, rather than simply maintaining the *status quo*.

Many Australian animals are dependent upon large, old eucalypt trees which contain the hollows required for shelter and breeding. At least six of the threatened Box-Ironbark fauna species are strongly

dependent upon these trees. The massive loss of large old trees over the last 150 years is strongly implicated in the decline of these species and perhaps many others. It is therefore recommended that as well as protecting existing large old trees, additional measures be taken to ensure that there will, over time, be more large old trees in the forests.

As well as individual species, some entire ecological communities are also under threat. Recent work has identified 73 Box-Ironbark ecological vegetation classes (EVCs) present in the study area prior to European settlement (see Appendix 2).

By far the most extensive EVC prior to settlement was Plains Grassy Woodland (985 000 ha), with Grassy Woodland (534 000 ha) and Box-Ironbark Forest (411 000 ha) also widespread. Plains Grassy Woodland and Grassy Woodland, which were largely cleared for agriculture, are now among the most depleted EVCs, with less than 2%, and 7% respectively of their original extent remaining. In contrast slightly over 50% of the original extent of the Box-Ironbark Forest EVC remains (see Appendix 3).

As well as high nature conservation values these forests and woodlands have high values for various other uses. These are detailed later in this Executive Summary.

Terms of reference

The Victorian Government asked the ECC to:

- identify and evaluate the extent, condition, values and uses of the Box-Ironbark forests and woodland areas in northern Victoria;
- make recommendations on the balanced use of these areas;

having regard to:

- the matters to be taken into account in investigations as provided in Section 20 of the *Environment Conservation Council Act 1997*, including the economic and social value of any existing and proposed development or use of the land or resources; and

- the nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system, recognising that informal reserves and prescriptions will be established through the regional forest management planning processes.

The Box-Ironbark *Resources and Issues Report* published in December 1997 identified and evaluated the extent, condition, values and uses of public land in the study area.

The Draft Report published in May 2000 contained proposed recommendations on the balanced use of these areas, having taken into account the matters specified above.

This Final Report contains the full set of final recommendations developed after detailed consideration of matters raised in written submissions received (particularly the 1 500 received following the Draft Report); in public forums and meetings across the investigation area; and in meetings with various representative groups and individuals.

Consultation program

The recommendations conclude over five years of investigation, including two formal periods for public comment, as well as ongoing consultation with a broad range of community and industry groups, government agencies and interested individuals. An Advisory Group was established to provide input and advice regarding technical issues associated with the investigation.

Around 3 500 written submissions and letters have been taken into account in the preparation of this report of which almost 1 500 were received following the release of the Draft Report in May 2000. This is a huge resource of information and informed comment, which was enormously valuable in helping the ECC finalise its recommendations.

In addition to consideration of written submissions, the ECC has conducted numerous briefings and public meetings. Mirimbiak Nations Aboriginal Corporation was commissioned by the ECC to facilitate and coordinate the input of Aboriginal people (see Appendix 4).

Summary of area recommendations

Across the study area, land subject to the highest level of protection, in national and state parks and reference areas, is recommended to be increased from around 9% of public land to 23%; or from

about 1% of the original extent of Box-Ironbark forests and woodlands to about 3%. The total area of the conservation reserve system is recommended to be some 45% of public land.

Recommended national parks

- Chiltern–Pilot National Park (addition of the Mt Pilot Multi-purpose Park and part of Barambogie State Forest to the existing Chiltern Box-Ironbark National Park);
- St Arnaud Range National Park (enlargement and upgrading of the existing Kara Kara State Park, and the addition of state forest and uncommitted land);
- Greater Bendigo National Park (comprising adjacent blocks south of Bendigo, and linking and consolidating the existing Kamarooka and Whipstick State Parks to the north of Eaglehawk);
- Heathcote–Graytown National Park (comprising the existing McIvor Range Scenic Reserve, Mt Ida Flora Reserve, Mt Black Reference Area, Mt Black Flora Reserve, Graytown Historic Reserve and areas of Rushworth State Forest); and
- Terrick Terrick National Park.

Recommended state parks

- Kooyoorra State Park (addition of parts of the Wehla, West Brenanah and Glenalbyn State Forests to the existing state park);
- Broken–Boosey State Park (establishment of a new linear park alongside sections of these northern plains creeks);
- Warby Range State Park (addition of Killawarra Forest to the existing state park);
- Reef Hills State Park (previously Regional Park); and
- Paddys Ranges State Park (some small additions from existing state forest).

Recommended national heritage park

- Castlemaine Diggings National Heritage Park (a new park and a new category of park with a historic and cultural heritage focus, including the existing Castlemaine–Chewton Historic Area, state forest and township land).

Recommended regional parks

- Bendigo Regional Park (complements the Greater Bendigo National Park and comprises the existing Eaglehawk Regional Park, areas of state forest, water production area and historic area plus a number of smaller reserves);
- Ararat Regional Park (addition of Dunneworthy State Forest to the existing Ararat Regional Park);
- St Arnaud Regional Park (establishment of a new park from state forest and township land at St Arnaud); and
- existing regional parks at Maryborough, Mt Alexander, Hepburn and Beechworth (recommended to be retained with only minor changes).

Recommended nature conservation reserves

There are numerous nature conservation reserves (equivalent to current flora and fauna, or similar reserves) across the area. Many of the existing and recommended new reserves are small but of very high value for nature conservation. Currently there are only two reserves (Mt Bolangum and Inglewood) which are over 1 000 hectares.

Summary of area recommendations

Public land use category	Existing public land use		Recommended public land use	
	ha (rounded)	% of public land	ha (rounded)	% of public land
National park ¹	7 900	1.9	67 170	15.7
State park ¹	25 780	6.0	26 600	6.2
National heritage park ¹	-	-	7 440	1.7
Regional park ²	20 820	4.9	15 800	3.7
Reference area ¹	3 290	0.8	3 490	0.8
Nature conservation reserve ¹	20 730	4.9	59 040	13.8
Water production ²	25 770	6.0	23 580	5.5
State forest	205 500	48.1	120 950	28.3
Historic and cultural features reserve ²	9 990	2.3	5 880	1.4
Natural features reserve ²	37 400	8.8	31 510	7.4
Community use area	6 300	1.5	4 820	1.1
Plantation	920	0.2	920	0.2
Earth resources	1 880	0.4	2 440	0.6
Services and utilities	1 830	0.4	1 830	0.4
Land not required for public purposes	-	-	130	<0.1
Commonwealth land ³	42 670	10.0	42 670	10.0
Uncategorised public land and other ⁴ (approx.) ²	16 220	3.8	12 730	3.0
Total areas (approx.)	427 000	100	427 000	100

Notes: ¹ All land in these categories is included in the (conservation) reserve system (as discussed in the 'Conservation outcomes' section later in Executive Summary).

² Some land in these categories is also included in the (conservation) reserve system.

³ Commonwealth land is not public land as defined in the *Environment Conservation Council Act 1997*, however, it is included above and in analyses in the report, reflecting the agreement of the Commonwealth to participate in the investigation.

⁴ 'Other' comprises numerous, mainly small parcels not separately quantified in the following categories: natural features reserves (public land water frontages), community use areas, earth resources, services and utilities, and uncategorised public land.

The table at the end of the Executive Summary includes a full list of existing and recommended nature conservation reserves. Many of these are of considerable size and of major importance to the overall reserve system (e.g. Deep Lead, Wychitella and Whroo).

Recommended state forest

A total of 120 950 ha (or about 28% of public land) is recommended as state forest, with timber harvested for value-added products the preferred output, and also managed to protect nature conservation values. This would constitute a 39% reduction in state forest area in Bendigo FMA and 41% overall. The major areas of state forest are:

- St Arnaud & Pyrenees State Forests;
- Dunolly–Inglewood State Forests;
- Maryborough State Forests;
- Bendigo–Castlemaine–Maldon State Forests;
- Rushworth–Heathcote State Forests; and
- numerous small forests.

Other areas

Numerous historic and cultural features reserves, natural features reserves, and areas of public land for community use (recreation), earth resources, services and utilities are also recommended.

Summary of use recommendations

As well as having high natural values, Box-Ironbark forests and woodlands are widely used for resource extraction and other more passive purposes. These uses are detailed below.

Commercial gold production

The study area produces 99% of Victoria's gold, and much of the area is considered highly prospective. It is very important both to local communities and Victoria as a whole that exploration and mining continue. This report recommends continued access for exploration and mining to 77% of the public land in the study area (currently 91%). The recommended new or enlarged national and state parks generally do not contain areas of recognised goldfields. In most cases recognised goldfields do not have particularly high conservation values; this is probably at least partly attributable to heavy mining and associated activities in the past. A notable exception is around Bendigo where a 100 metre depth limit is recommended to enable mining to be carried out beneath the recommended national park. Existing exploration licences would continue in the new park areas, with any future mining subject to Government decision. There are recommendations that higher environmental standards should apply to all mining operations. Such standards are already being met by industry leaders.

The recommended new or enlarged parks or reserves (other than national and state parks) are generally to be 'restricted Crown land'. This means that approval for mining would be required from the Minister for Environment and Conservation as well as the normal approval from the Minister for Energy and Resources.

A recommended review of the approval mechanisms applying to restricted Crown land under Section 40 of the *National Parks Act 1975* would aim at timely and transparent processing of applications.

Extractive industries

Numerous, relatively small, approved stone extraction sites on public land would continue to operate. About 75% of the extraction sites in the study area are on private land with extractive material for a particular purpose generally located close to the site of use. Broad guidelines for extraction are recommended.

Honey production

Location of hives on public land for the production of honey and other apiary outputs would continue.

Wood products and forest management

Timber production will continue in the remaining state forest. The recommendations would enable the current level of sawlog harvest to continue, with, as far as practicable, the sawn timber being kiln-dried and used for value-added products, such as flooring, trims and furniture wood. The recommendations may in fact permit in time some increase in high value sawlogs, using sawlogs previously allocated to sleepers.

Fencing timber and firewood production would continue, at reduced production levels.

Following the 1998 Box-Ironbark Timber Assessment, the Department of Natural Resources and Environment (NRE) Forests Service modelled the potential timber harvest for various products. Since the ECC's Draft Report, the model has been reviewed, and revised estimates for the effects of the recommendations have been provided to the Council. After allowing for the withdrawal of productive forest areas under these recommendations, the model indicates that the current harvest levels could be maintained for sawlogs and posts, with a reduction in firewood. However, NRE has advised the ECC to interpret the modelled results conservatively. After considering this advice and the views of the Stage 3 social and economic consultants (see page xvi), the ECC has accepted the view that the likely scale of impact on the timber industry would be greater, comparable with the proportional reduction in forest area. For detail on these effects, see Box 8.1 (page 69) and page 210 in Chapter 17.

After Government consideration of these recommendations, NRE will prepare forest management plans for this area, which may result in some additional resources being withdrawn from harvesting.

Broad guidelines for forest management are also recommended in this report. These measures would enhance the measures currently in place to increase the number of larger trees in the forest and to ensure that there is ongoing recruitment into the large tree category.

Eucalyptus oil

The cessation of eucalyptus leaf harvesting is recommended from high conservation value areas such as malleefowl habitat around Wedderburn, to link the existing Whipstick and Kamarooka State Parks, and for orchid habitat areas near Whroo. Generally it is recommended that a phase-out occur over six years for areas being incorporated into parks. Success has been achieved with mallee plantations for eucalyptus oil on freehold land (both in Victoria and interstate).

Aboriginal traditional uses

The Box-Ironbark forests and woodlands have been used by Aboriginal people for thousands of years for a range of purposes including food, shelter, implements, tools and spiritual and cultural practices.

Aboriginal people live in the study area and still use the Box-Ironbark forests and woodlands for traditional cultural practices and the manufacture of some products. There are many sites within the study area that are of spiritual and cultural significance to traditional owners. This is discussed in detail in Chapter 5 and Appendix 4.

Recommendations in Chapter 5 aim to increase Aboriginal consultation and participation in public land planning and management, and support the *Protocol for the Negotiation of a Native Title Framework Agreement for Victoria*, signed by Mirimbiak Nations Aboriginal Corporation, the Aboriginal and Torres Strait Islander Commission and the Victorian Government in December 2000.

Recreation and tourism

The single largest recreation activity in the study area is metal detecting for gold. This accounts for up to 20% of visitor expenditure in the region. Under these recommendations, national parks and reference areas would not be available for prospecting (there are however some exceptions to this general principle in sections of Chiltern-Pilot and Greater Bendigo National Parks). Other areas would be available for prospecting in state and regional parks, nature conservation reserves and state forest (except in areas where particular natural or heritage values require protection). Under the recommendations, 83% (currently 94%) of public land in the study area would be available for prospecting.

Many forms of tourism and recreation would be encouraged in the recommended parks and reserves, and publicity relating generally to Box-

Ironbark forests and woodlands is likely to also increase visits to tourist and recreation sites in state forests.

Effects flowing from the recommendations

In summary:

- there would be a significant increase in the conservation reserve system with better representation of depleted vegetation communities (see Appendix 3);
- the new parks and reserves would assist in attracting additional visitors to the area;
- national and state park areas would be unavailable to new exploration and mining; however, no recognised goldfield has been closed and mining may be allowed (below 100 metres) beneath sections of one recommended national park, the recommended national heritage park and one recommended nature conservation reserve;
- existing mining and exploration licences in new park areas would continue;
- for recreational prospecting and commercial mining, 83% and 77% respectively of the public land in the investigation area would continue to be available;
- higher environmental standards for all mining operations are recommended;
- principles and guidelines for timber harvesting in state forest are recommended to ensure that over time there is a significant increase in the number of large trees in the forests;
- current volumes of sawlog timber are expected to continue to be available;
- there would be a significant reduction in available fencing timber and firewood from state forests and in time, firewood from firewood-only coupes should be replaced by firewood from sawlog and post-log coupes, thinning for ecological management and plantations;

- eucalyptus oil production would remain on approximately 77% of areas currently harvested, removed immediately from one key habitat patch and phased out (over six years) from other areas to be added to parks or reserves; and
- grazing would be excluded from some small areas.

Conservation outcomes

In terms of nature conservation, the aim is to at least meet the national forest (JANIS) criteria for a comprehensive, adequate and representative reserve system (Appendix 8). The recommendations would enlarge the Box-Ironbark reserve system from about 69 500 ha to 190 500 ha, an increase of some 121 000 ha.

The ECC recommended reserve system comprises:

- national parks
- state parks
- national heritage park
- regional parks
- reference areas
- nature conservation reserves, and
- natural features reserves other than public land water frontages and those wildlife reserves where hunting is allowed.

(See Chapter 4 for a detailed explanation of the reserve system.)

Of the 73 EVCs, the more extensive would be represented at levels ranging from 18% of pre-1750 extent for Box-Ironbark Forest EVC to above 40% for various other EVCs (see Appendix 3 for details of EVC representation).

Eight vulnerable EVCs have from nil to 10% representation. For the many rare or endangered EVCs, representation varies from nil to 49% of their pre-1750 extent. For most of these EVCs there is very little area remaining and many already have a high proportion (up to 100%) of their present public land extent in the reserve system.

Several of the most depleted EVCs, mostly on the northern plains, remain poorly represented. Their occurrence is generally restricted to numerous small land parcels, mostly less than 20 ha in size.

Large old tree sites would be protected, either in reserves or by zoning in state forests. Management of parks and reserves would aim to increase the relative numbers of large trees, with consequent benefits for fauna habitat.

Other conservation outcomes, including representation of threatened flora and fauna, are detailed in Chapter 4 and Appendix 9.

In areas where management for nature conservation is greatly constrained because very little indigenous vegetation or public land remains, the ECC is recommending Conservation Management Networks to involve, on a cooperative basis, all stakeholders with an interest in conserving the biodiversity that remains. This issue and the relevant recommendations are described in Chapter 4 and Appendix 12.

Social and economic effects

During this investigation, three social and economic assessments of the ECC's proposals or recommendations were commissioned. The most recent, referred to in this report as the Stage 3 study, reviewed the two earlier social and economic studies, and assessed the effects of the ECC's final recommendations. Appendix 5 is a detailed summary of the Stage 3 study. An outline of the social and economic effects follows.

The social and economic assessment indicates that the direct and indirect economic benefits are likely to substantially exceed the costs, but there will be job losses in particular industries, if the recommendations are implemented.

Employment effects

The estimated effects suggest that following implementation of the ECC's recommendations there could be a net loss of 14 full-time equivalent (FTE) jobs.

There would be approximately 35 new jobs, mainly in tourism with some in park management, but not all will be located in the region.

Possible job losses resulting from the recommendations are estimated to be as follows:

- 16 FTE jobs in mining companies (due to possible reduced exploration in national and state park areas) and amongst small miners (due to higher standards);
- for the sawlog, post-cutting and firewood industries there could be a reduction of 30 full-time equivalent jobs; and

- small job losses in eucalyptus oil production (approximately two persons) and grazing (less than one person).

Potential job losses would be felt in Bendigo and smaller towns. While employment loss would be small relative to total employment in the region, the areas most dependent on production from public land are those in the west of the study area which have relatively low incomes, high unemployment, and low population growth. However, few areas would experience large overall negative or positive impacts. Job losses are likely to be to some extent replaced by new opportunities, including establishment of plantations, enhanced tourism, and increased expenditure on public land management.

It is also recommended that the Government address industry structural adjustment issues arising from implementation of the ECC's recommendations. In particular, any affected communities in the study area should have levels of support assessed according to principles similar to those for affected communities within areas covered by Regional Forest Agreements.

Benefit cost analysis

The Stage 3 study estimates that implementation of the ECC's recommendations will result in a net benefit to Victorians of \$2.07 million each year. The benefit of increased protection for biodiversity and natural values resulting from the recommendations, although not easily quantified, is likely to be substantial. The main benefit estimated is the likely increased value of biodiversity protection (\$2.0M), with the increased value of tourism in new and expanded parks and reserves also estimated (\$0.97M). Tourism is currently the second largest industry in the study area and is likely to grow significantly. Estimated costs are predicted decreases in the values of timber harvest (\$0.18M) and mineral exploration (\$0.19M), and some costs to smaller industries (\$0.13M). There is also a substantial cost (\$0.4M—this actually translates to a benefit for local communities) in the expected increased expenditure on park and reserve management when the recommendations are implemented.

Outline of the Report

Part One:

- explains the stages of the Box-Ironbark Forests and Woodlands Investigation, and outlines the consultation program and social and economic studies.

Part Two:

- provides the background, principles and policies, and trends for the main uses of Box-Ironbark public lands;
- contains recommendations that apply generally to particular uses, providing context for the area-specific recommendations in Part Three; and
- establishes the relationship of Aboriginal people to Box-Ironbark public lands, and includes general recommendations relating to the protection and management of Aboriginal sites and places.

Part Three:

- introduces several recommended new national and state parks and park additions, a new category of national heritage park and also outlines recommendations for regional parks, nature conservation reserves and historic and cultural features reserves;
- covers state forest management and specific forest areas;
- describes recommendations for other public land use categories; and
- summarises the ECC's response to major issues raised in submissions and during consultation (summarised in Chapter 19 but also covered in area-specific recommendations).

References:

- provides full details of all references cited throughout the report.

Appendices and Maps:

- are at the back of the report. They provide supporting information for recommendations contained in the body of the report.

Major changes since the Draft Report

Following public consultation on the Draft Report, the ECC has made some significant changes to its recommendations plus a number of minor changes. The major changes between the Draft and Final Reports are summarised in the text below, followed by a table with a full list of area recommendations for the major land categories and showing all but minor changes. Many of the changes and the reasons for them are covered in more detail in the relevant sections of the report.

Greater Bendigo National Park (A4)

The recommended Greater Bendigo National Park is made up of what was formerly proposed as the Whipstick-Kamarooka State Park and parts of Bendigo Regional Park.

The changes to the recommendations in this area would lead to increased protection for, and would assist in promoting the appreciation of, the highly significant natural and recreational values in close proximity to Bendigo.

A net increase in area protected of 1 490 ha is recommended due to the addition of the western Whipstick eucalyptus oil production area. This addition however would be subject to the adoption of a six-year phase out for existing eucalyptus oil harvesting giving the opportunity for harvesters to relocate to plantations on freehold land.

It is recommended that new sections of the park be reserved to a depth of 100 metres only, meaning that the highly prospective gold reefs in the area would continue to be available for underground mining from outside the park. It is also recommended that prospecting be allowed in some sections of this park.

Heathcote-Graytown National Park (A5)

The recommended Heathcote-Graytown National Park is made up of what was formerly proposed as Mt Black State Park, Mt Ida Nature Conservation Reserve and parts of Heathcote Regional Park and Rushworth-Heathcote State Forests.

This change would give increased protection to a significant part of the largest remaining block of Box-Ironbark vegetation in Victoria and would add to the appreciation of the highly significant natural values in the area.

A net increase in protected area of some 1 700 ha is recommended. At the same time, the overall changes in the Rushworth-Heathcote forest would

reduce the impact on the eucalyptus oil and timber industries in the Whroo area near Rushworth (1 600 ha of state forest no longer proposed for the reserve system) and on the firewood and timber industries near Heathcote (negligible net change, but over 2 000 ha of the closest state forest areas to Heathcote no longer recommended for the reserve system).

Castlemaine Diggings National Heritage Park (NHP1)

This recommended upgrading of the formerly proposed Castlemaine Regional Park to Castlemaine Diggings National Heritage Park would give improved recognition and protection for one of the most significant cultural landscapes in Australia.

The recommended net increase in protected area of 1 450 ha since the Draft Report is due to the addition of new areas with high natural values near Guildford. However this increase is offset against the removal of areas with lower values north-west of Castlemaine which would reduce the impact on timber harvesting.

The park is recommended to be reserved to a depth of 100 metres only, providing continued access for underground mining from outside the park.

Broken-Boosey State Park (B2)

A net decrease in park area of 2 058 ha is recommended due to the re-categorisation of areas west of Wunghnu and south-east of Tungamah as Nature Conservation Reserves. Black Swamp and Moodies Swamp, which are popular hunting areas, are to be retained as natural features reserves – wildlife areas, available for hunting.

The areas removed from the formerly proposed park are generally lower conservation value areas and there would be a reduced number of adjacent landholders with concerns about the park. There would also be a reduced impact on recreational hunters.

There is clarification of a number of issues raised by local landowners, mainly related to access issues and control of pest animals.

State forest area changes

Compared to the Draft Report there has been a net increase in the recommended area of productive state forest of 4 980 ha. This net figure is the result of a large number of major and minor changes (additions and reductions) to the recommended areas of state forest.

Generally the additions are to reduce the impact on the timber industry (including firewood cutters) either locally or across the area, and reductions are to protect areas with high natural values that were not included in the Draft Report.

Changes since the Draft Report are detailed elsewhere (see Chapter 17), but the most significant are:

- increased areas of state forest at Heathcote, to reduce the impact on domestic firewood supplies;
- increased areas at Whroo, to reduce the impact on eucalyptus oil harvesting and the timber industry;
- increased areas of state forest near St Arnaud and Tarnagulla, to provide for increased wood production and recreational access; and
- reduced areas in the Whipstick-Kamarooka link to reflect the high value of this important link area between existing parks.

Forest management

While the establishment of a comprehensive, adequate and representative system of reserves is a key feature of responsible long-term management of the Box-Ironbark forests and woodlands, an equally important feature is the appropriate management of those areas where extractive uses would continue.

Particularly critical is the management of areas of state forest. There is no doubt that the Box-Ironbark forests and woodlands that we see now are vastly different from those that existed before the land was settled and largely cleared. The remaining areas have, historically, been subjected to initial clearing during the mining boom 150 years ago, and most of the last century they were heavily cut for timber, in particular sleepers and firewood. It is only in recent years that there has been a concerted effort to improve the structure of the forests and particularly to increase the number of higher value large trees.

There were a number of proposals in the Draft Report with respect to ongoing forest management and these were premised on improving the forest structure so that, in time, it would more closely resemble the original structure. The most important element is to ensure that there are more large trees in the forest. The larger trees have the dual advantage of providing improved conservation values but also providing a much more valuable timber product.

The ECC's earlier proposals have been reviewed and a number of significant changes made that would ensure there is a significant increase in large trees within a reasonable time frame, and that ongoing flexibility would be available to manage the forests in the optimum manner. These changes are detailed in Chapter 17.

Mining

It is recommended that the Deep Lead Nature Conservation Reserve (see D2 in Chapter 16) be reserved to a depth of 100 metres only, which would give the existing Stawell gold mine access to highly prospective underground gold reefs in the area. A similar depth limit is recommended for sections of the Greater Bendigo National Park. The recommendations for this park (page 124) clarify the process for approval of limited infrastructure for underground mining (mainly ventilation shafts).

The economic test for miners (previously in the Draft Report), which required them to demonstrate the likelihood of an economic return from mining, is now to be less formal.

There has also been clarification on the issue of land compensation provisions (see Chapter 7).

Firewood

Recommendations to encourage establishment of plantations for firewood have been strengthened (see R7 in Chapter 3). The ECC's view is that, as firewood becomes available from plantations and as the structure of the forest is gradually improved with more medium and large trees, the use of firewood-only coupes should be reduced, with commercial firewood coming primarily from the heads of trees cut for sawlogs and posts. This would align Box-Ironbark forest management with the remainder of Victoria where harvesting for low-value products such as firewood or woodchips occurs only from coupes also harvested for high-value products such as sawlogs. In the short to medium term, thinning, applied as an ecological management tool in parks and reserves, would be likely to render some firewood available (see R12 in Chapter 4).

Clarification of land managers' discretion

A number of submissions especially from beekeepers and prospectors expressed concern about decisions taken by land managers in the past and consistency in the application of their discretion to restrict activities. There is a new recommendation addressing decision-making processes related to transparency, consultation and grievances (see R9 in Chapter 3).

Eucalyptus oil

There are several changes with respect to eucalyptus oil harvesting. Except for one key patch of 7 ha which is recommended to go into a reserve immediately on approval of the relevant recommendation, other areas which are recommended for cessation of harvesting would be subject to a six-year phase out, to allow time for establishment of plantations on private land (see R54 in Chapter 12).

In the Whipstick-Kamarooka link, further areas have been added to the new national park but these areas would be subject to the six-year phase out, whereas previously there would have been an immediate cessation of harvesting. Around the Whroo area near Rushworth, there has been a reduction in the area removed from harvesting.

Recreation activities

Various changes are recommended to clarify or facilitate recreation activities:

- car rallies are to be allowed in the Killawarra section of the Warby Range State Park (see B3 in Chapter 15), and areas of Chiltern-Pilot National Park (see A1 in Chapter 15), by arrangement with the land managers;
- in response to prospector concern, camping is now allowed in many nature conservation reserves (see D(j) in Chapter 16);
- the proposal to ban raking associated with metal detecting is no longer recommended;
- provisions for orienteering and rogaining are clarified;
- gemstone seeking has been specified in various land use categories; and
- Black and Moodies Swamps remain available for hunting, and provisions allow for organised hunts (or drives) for pest animals in parks or reserves (see R4 in Chapter 3).

Other changes

There are a large number of detailed area-specific changes, many of which are summarised in the following tables. Other changes are detailed in relevant section of the report.

Some of the more significant of these changes are as follows:

- review of existing reference areas and possible additional areas;
- deletion of the recommendation related to placement of bee sites on private land;
- many additional small public land parcels were considered, in townships and isolated blocks in farmland, using new information from NRE, submissions and inspections, resulting in:
 - recommendations for numerous natural features reserves – bushland areas;
 - additions to adjoining parks, reserves, and state forest; identification of public land water frontages, community use areas, services and utilities areas, uncategorised public land, and land not required for public purposes;
- review of existing natural features reserves – bushland areas;
- new recommendations for protection of remnant roadside vegetation (see M2 in Chapter 18);
- a full listing of water production areas, and clarification of relevant provisions.

Many changes have resulted in notes added to recommendations for large and small parcels, throughout the report.

There are several new appendices, including the Miriambiak Nations report on the outcomes of consultation with Aboriginal Communities, a list of all submitters, ECC's criteria for national and state parks, a list of extractive industry areas of interest around Bendigo, and a schedule of roads identified as being of conservation significance.

List of changes to specific area recommendations since the Draft Report

National parks

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
A1 Chiltern-Pilot National Park	addition of areas near Eldorado, Woolshed Valley and Chiltern—a net area increase of 201 ha provision for car rallies in parts of Mt Pilot Range	updated mapping and improved biodiversity conservation opportunity for controlled use of a limited resource
A2 St Arnaud Range National Park	no change	
A3 Terrick Terrick National Park		
A4 Greater Bendigo National Park (formerly Whipstick-Kamarooka State Park and parts of Greater Bendigo Regional Park)	upgrade of proposed state park to national park and addition of the western Whipstick eucalyptus oil production area, and areas south of Bendigo—a net area addition of 4 513 ha adoption of six-year phase-out for existing eucalyptus oil harvesting recommended additions to cease at 100 metres below ground	increased protection and appreciation of highly significant natural and recreational values in close proximity to Bendigo more opportunity for harvesters to shift to freehold plantations continued access for underground mining
A5 Heathcote-Graytown National Park (formerly Mt Black State Park, Mt Ida Nature Conservation Reserve and parts of Heathcote Regional Park and Rushworth-Heathcote State Forests)	upgrade of proposed state park to national park and addition of parts of proposed Mt Ida Nature Conservation Reserve, Heathcote Regional Park and Rushworth-Heathcote State Forest—a net area increase (relative to the proposed state park) of 7 415 ha	increased protection of a large area in the largest block of box-ironbark vegetation and appreciation of highly significant natural values

State parks

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
B1 Kooyoora State Park	no change (but see Kingower Reference Area, G4, below)	
	B2 Whipstick-Kamarooka State Park in Draft Report – now part of Greater Bendigo National Park (see A4 above)	
	B3 Mt Black State Park in Draft Report – now part of Heathcote-Graytown National Park (see A5 above)	
B2 Broken-Boosey State Park (formerly B4)	areas west of Wunghnu and south-east of Tungamah excluded—net area decrease of 2 058 ha Black Swamp and Moodies Swamp excluded	reduced impact on adjacent landholders and recreational hunters reduced impact on recreational hunters
B3 Warby Range State Park (formerly B5)	provision for car rallies in Killawarra forest	opportunity for controlled use of a limited resource
B4 Reef Hills State Park (formerly B6)	no change (but see Reef Hills Reference Area, G9, below)	
B5 Paddys Ranges State Park (formerly B7)	no change	

National heritage park

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
NHP1 Castlemaine Diggings National Heritage Park	upgrading of proposed Castlemaine Regional Park to Castlemaine Diggings National Heritage Park park to cease at 100 metres below ground addition of area near Guildford, and area northwest of Castlemaine excluded—a net area increase of 1 448 ha	improved recognition and protection of one of the most significant cultural landscapes in Australia continued access for underground mining additional values identified and reduced impact on timber harvesting, more precise mapping

Regional parks

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
C1 Bendigo Regional Park	One Tree Hill, Mandurang South and Big Hill areas transferred to Greater Bendigo National Park; several small blocks within urban areas re-categorised—a net area decrease of 3 296 ha	improved protection of biodiversity values (especially endangered species) in national park areas; remaining park retained for various uses
C2 Castlemaine Regional Park in Draft Report—now mostly part of Castlemaine Diggings National Heritage Park (see NHP1 above)		
C2 Ararat Regional Park formerly C3)	no change	
C3 St Arnaud Regional Park (formerly C4)	addition of the Wax Gardens area	notable feature for park visitors
C4 Maryborough Regional Park (formerly C6)	no change	
C5 Mt Alexander Regional Park (formerly C7)		
C5 Heathcote Regional Park in Draft Report—now divided into Spring Plains Nature Conservation Reserve (see D46 below), parts of Heathcote–Graytown National Park (see A5 above) and Rushworth–Heathcote State Forests (see F5 below)		
C6 Hepburn Regional Park (formerly C8)	no change	
C7 Beechworth Regional Park (formerly C9)		

Nature conservation reserves (NCRs)

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
D1 Existing NCRs	see D50 Mangalore NCR, below	
D2 Deep Lead	reserve to only extend to 100 metres below the surface surface mining not permitted	to provide access for underground mining to protect highly significant vegetation
D3 Wychitella	addition of areas on eastern boundary—a net area increase of 20 ha	consolidation of appropriate adjacent small parcels
D4 Whroo	areas east and north of Whroo excluded—a net area decrease of 1 598 ha	reduced impact on timber and eucalyptus oil harvesting
D5 Lonsdale	addition of area on northeast corner—a net area increase of 22 ha	consolidation of appropriate adjacent small parcels
D6 Illawarra	no change	
D7 Jallukar		
D8 Morrl Morrl		
D9 Joel Joel		
D10 Navarre		
D11 Big Tottington		
D12 Little Tottington NCR in Draft Report—now recommended to remain state forest (see F1 below)		
D12 Landsborough Hill (formerly D13)	addition of area to south boundary—a net area increase of 87 ha	refinement of study area boundary
D13 Landsborough (formerly D14)	no change	
D14 Stoney Creek (formerly D15)	areas on west, north and east sides excluded—a net area decrease of 995 ha	reduced impact on domestic firewood availability and timber harvesting
D15 Stuart Mill (formerly D16)	no change	
D16 Redbank (formerly D17)	southern linear area re-categorised as L1 Earth Resources—a net area decrease of 17 ha	recognition of current mining operation
D17 Dalyenong (formerly D18)	no change	
D18 Tunstalls (formerly D19)		

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
D19 Wehla (formerly D20)	no change	
D20 Moliagul (formerly D21)		
D21 Lexton (formerly D22)		
D22 Bung Bong (formerly D23)		
D23 Talbot (formerly D24)		
D24 Caralulup (formerly D25)		
D25 Dunach (formerly D26)		
D26 Timor (formerly D27)		
D27 Havelock (formerly D28)	central, western and eastern parts reduced—a net area decrease of 3 380 ha	reduced impact on timber harvesting and domestic firewood availability
D28 Waanyarra (formerly D29)		
D29 Mt Korong (formerly D30)	no change	
D30 Mysia (formerly D31)		
D31 Bells Swamp (formerly D32)		
D32 Leichardt (formerly D33)		
D33 Wilsons Hill (formerly D34)		
D34 Shelbourne (formerly D35)	excision of a pistol range club	provide for specific recreation use
D35 Muckleford (formerly D36)	no change	
D36 Kaweka (formerly H66)	upgrade of proposed H66 Bushland area to Kaweka Nature Conservation Reserve (3 ha)	additional biodiversity values identified requiring improved protection
D37 Upper Loddon NCR in Draft Report—now recommended as part of Castlemaine Diggings National Heritage Park (see NHP1 above)		
D37 Fryers Ridge (formerly D38)	no change	
D38 Taradale (formerly D39)		
D39 Pilchers Bridge (formerly D40)		
D40 Salomon Gully (formerly D41)		
D41 Jackass Flat (formerly D42)		
D42 Whipstick (formerly D43)		
D43 Mt Sugarloaf (formerly D44)	addition of adjoining state forest—an area increase of 204 ha	small state forest areas unmanageable; also correction of previous inaccurate area statement
D44 Axedale	upgrading of uncategorised public land (3 ha)	improved protection of biodiversity values adjacent to City of Greater Bendigo 'Flora Reserve'
D45 Eppalock NCR in Draft Report—now recommended to remain state forest (see F4 below)		
D45 Crosbie (formerly D46)	no change	
D46 Spring Plains (formerly part of C5 Heathcote Regional Park)	southern part of proposed Heathcote Regional Park recommended as Spring Plains Nature Conservation Reserve (1 315 ha)	recognition of important biodiversity values
D47 Tooborac (formerly D48)	no change	
D48 Spring Creek (formerly D49)		
D49 Murchison-Rushworth Disused Railway (formerly part of D50)	area between Rushworth and Gigarre excluded—a net area decrease of 42 ha	excluded areas of lesser significance
D50 Mangalore (formerly D1)	addition of land-compensation parcel—a net area increase of 8 ha	updated mapping, incorporating changes as a result of Goulburn Valley Highway duplication
D51 Arcadia	upgrading of H8 Bushland Area (8 ha)	additional biodiversity values identified requiring improved protection
D52 Gum Swamp (formerly D53)	no change	

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
D53 Tamleugh	upgrading of H8 Bushland Areas (22 ha)	additional biodiversity values identified requiring improved protection and consolidation of parcels
D54 Shire Dam Swamp	no change	
D55 Gowangardie (formerly D1 and H8)	addition of H8 Bushland Area (1 ha) to existing D1	additional biodiversity values identified requiring improved protection and consolidation of parcels
D56 Caniambo	upgrading of H8 Bushland Area (11 ha)	additional biodiversity values identified requiring improved protection
D57 Baddaginnie	upgrading of H8 Bushland Area (15 ha)	additional biodiversity values identified requiring improved protection
D58 Nathalia (formerly D51, and areas of proposed Broken-Boosey State Park)	increase in area	consolidation of proposed Nathalia Nature Conservation Reserve (35 ha) and parts of Broken-Boosey State Park (132 ha) and some small adjacent areas of value
D59 Numurkah (formerly D52, and areas of proposed Broken-Boosey State Park)	increase in area	consolidation of proposed Numurkah Nature Conservation Reserve (35 ha) and parts of Broken-Boosey State Park (584 ha)
D60 Yabba South	upgrading of H8 Bushland Area (31 ha)	additional biodiversity values identified requiring improved protection
D61 Wattville (formerly D56)	addition of E1 Boxwood Historic Reserve (52 ha)	additional biodiversity values identified requiring improved protection and consolidation of parcels
D62 Boxwood	upgrading of E1 Boxwood Historic Reserve (52 ha)	improved conservation of newly recognised biodiversity values
D63 Youarang (formerly D57, Youarang West NCR, Waggarandall NCR and parts of Broken-Boosey State Park)	area increase to 217 ha	consolidation of proposed Youarang (28 ha), Youarang West (16 ha) and Waggarandall (37 ha) NCRs and parts of Broken-Boosey State Park (136 ha)
D64 Tungamah (formerly D61, plus former Tharanbegga NCR and parts of Broken-Boosey State Park)	area increase to 883 ha	consolidation of proposed Tungamah (36 ha) and Tharanbegga (6 ha) Nature Conservation Reserves and parts of Broken-Boosey State Park (841 ha)
D65 Mt Meg (formerly D62)	no change	
D66 Wangaratta Common	upgrading of township land (74 ha)	improved conservation of newly recognised biodiversity values
D67 Cookinburra (formerly D63)	no change	
D68 Fell Timber Creek (formerly D64)	no change	

Historic and cultural features reserves (HCFRs)

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
E1 Existing HCFRs	Bristol Hill—excluded (see E3 below)	not previously recommended as a historic and cultural features reserve
	Simson Historic Reserve included	assessed as significant but not previously recommended.
	Boxwood—upgraded to nature conservation reserve (see D62 above)	substantial area of Grassy Woodland EVC requiring improved protection.
E2 Alma Lead Cyanide Works	no change	
E3 Bristol Hill	now recommended as a new HCFR	not previously recommended as a historic and cultural features reserve
E4 Pickpocket Diggings	no change	

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
E5 Janevale Monier Bridge	formerly E3—no change	
E6 South Frederick the Great	formerly E5—no change	
E7 Deborah Company	formerly E6—no change	
E8 North Deborah	formerly E7—no change	
E9 Central Deborah Tourist Mine	formerly E8—no change	
E10 Victoria Hill	formerly E9—no change	
E11 Pearl, Pearl East and Stanfield Mine Workings in the Draft Report—excluded from the Final Report because only a relatively small area contains historic features, which can be protected through other means		
E11 Royal George Company	formerly E10—no change	
E12 Comet Shaft, KK Shaft and Comet Diggings	no change	
E13 Johnsons Nos. 1 & 2 and Golden Age Mine		
E14 Chinese Diggings		
E15 Echuca & Waranga Trust Irrigation Pump and Channel (formerly E17)		
E16 Dysart Military Siding in the Draft Report—excluded from the Final Report because it is not public land		
E16 Days Mill (formerly E18)	no change	
E17 to E30 Historic and cultural features sites in state forest	previously proposed as HCFR zones to be used in accordance with the ECC's general recommendations for HCFRs.	now recommended that NRE take these sites into account during the forest management planning process NRE has an existing process to protect such sites
E31 Various other historic features in state forest—no change		

State forest

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
F1 St Arnaud & Pyrenees	Little Tottington: 480 ha increase due to change for previously proposed NCR Stoney Creek: 995 ha increase due to a reduction in the NCR area from 1 600 ha to 605 ha (see D14 above)	increased timber availability for St Arnaud
F2 Dunolly-Inglewood	Waanyarra: 3 380 ha increase due to reduction in the NCR area from 6 307 ha to 2 927 ha (see D28 above)	increased timber availability for Dunolly/Tarnagulla
F3 Maryborough	no change	
F4 Bendigo-Castlemaine-Maldon	Castlemaine: 418 ha net decrease, made up of an increase of 748 ha north-west of Castlemaine and a decrease of 1 166 ha at Guildford (Note: the change of Upper Loddon NCR to National Heritage Park has no effect on state forest area) West Whipstick eucalyptus oil area: 839 ha area decrease Eppalock: 160 ha increase due to change for previously proposed NCR	improved nature conservation in Guildford area and increased timber availability near Castlemaine increased nature conservation in important link area between existing parks. Six year phase out of eucalyptus oil harvesting recommended to allow time for plantation establishment increased timber availability

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
F5 Rushworth-Heathcote	Whroo: 1 598 ha increase due to a reduction in area of the NCR from 3 896 ha to 2 298 ha (see D5 above)	increased timber availability to Rushworth and reduced impact on eucalyptus oil harvesting
	Heathcote-Graytown: 23 ha increase overall, made up of an increase of 1 743 ha north-west of Heathcote and 555 ha north of Costerfield (2 298 ha total); and a decrease of 2 175 ha between Mt Ida and Mt Black and 100 ha east of Mt Black (2 275 ha total)	increased areas are adjacent to or near Heathcote to provide ready access to firewood; improved nature conservation protection near Mt Ida and Mt Black
F6 Existing state forests	minor boundary changes	clarifying boundaries

Reference areas

Final Report Recommendations	<i>The change</i>	<i>The reasons</i>
G1 Mt Separation		
G2 Korong Vale	no change	
G3 Kooyoora		
G4 Kingower	new	contains Metamorphic Slopes Shrubby Woodland EVC which is poorly represented in the reference area system
G5 Terrick Terrick (formerly G4)	no change	
G6 Sandhurst (formerly G5)	area decreased from 690 ha to 425 ha	boundary refined to provide for adjacent water supply, utility and recreation uses
G7 Kamarooka (formerly G6)		
G8 Mt Black (formerly G7)	no change	
G9 Reef Hills	new	contains Plains Grassy Woodland/Gilgai Wetland Mosaic EVC which is currently not represented in the reference area system
G10 Warby Ranges (formerly G8)		
G11 Killawarra (formerly G9)		
G12 White Box (formerly G10)	no change	
G13 Pilot Range (formerly G11)		

Note: that the above tables provide a summary of the significant changes only. Numerous small changes are not listed here, and the extent and reasons for changes are not always described fully. For details of changes, readers should refer to the specific chapter of the full report.

Part One

The investigation

(insert page from A3 provided)

1 The investigation

Few Victorian forest and woodland ecosystems are as poorly represented in parks and reserves as the distinctive Box-Ironbark ecosystems of northern Victoria.

1.1 Box-Ironbark forests and woodlands today

Victoria's Box-Ironbark forests and woodlands are a major component of the once vast belt of temperate woodlands that covered much of south-eastern Australia between the arid interior and the mountain forests of the Great Dividing Range.

Since European settlement, Box-Ironbark forests and woodlands have been extensively cleared and fragmented for agriculture, gold mining, urban development and wood products. Box-Ironbark forests and woodlands once covered three million hectares of northern Victoria, prior to European settlement. Since then, 83% of the original Box-Ironbark vegetation has been cleared. Today only 496 000 ha remains—most of that (372 000 ha) is on public land. Note that an additional 55 000 ha of public land in the study area are cleared, waterbodies, or are not recorded as having box-ironbark vegetation. The remaining forests are highly fragmented, and contain many threatened plant and animal species. Conservation values in many Box-Ironbark areas are high, because of the scarcity of what remains and the risks of further degradation.

Box-Ironbark may lack the spectacular scenic backdrops of some of Victoria's tall forests, but the sombre stands of mugga and red ironbark have their own understated charm. The visitor is rewarded by a vibrant array of bird species, carpets of wildflowers in Spring, the rich aroma of eucalypt nectar, and many sites of historical and cultural heritage interest. The sparse understorey scattered with wildflowers, shrubs, herbs and grasses over gentle terrain provide a forest readily accessible to all. The commanding dark ironbark trunks make a striking contrast against their grey-green canopy. Yet despite their apparent uniformity, these forests actually take a great diversity of forms. Grey mallee shrubland skirts the northern fringes. Patches of

heath and treeless granite outcrops intersperse the forests.

Around 1 500 species of flowering plants have been recorded in this region, many of which, like some greenhoods, spider- and leek-orchids, are highly endangered. Entire communities in the Box-Ironbark forests and woodlands are under threat. There are 73 ecological vegetation classes present in the Box-Ironbark study area. By far the most extensive types prior to European settlement were Plains Grassy Woodland (985 000 ha) and Grassy Woodland (534 000 ha) of which only 1.9% and 7.4% respectively remain.

Not surprisingly, the Box-Ironbark forests and woodlands are ecologically important for a rich faunal diversity, much of which is also rare or threatened. Over 250 vertebrate species have been recorded in the Box-Ironbark study area. Many of these, like the squirrel glider and woodland blind snake, are largely restricted to Box-Ironbark forests and woodlands. At least 10 plant and animal species have disappeared from the area since the 1840s, and numerous others have become locally extinct. At least 297 Box-Ironbark plant species and 53 fauna species are now considered extinct, threatened or near-threatened. Many species, particularly birds, continue to decline. Unless these declines are reversed, it is inevitable that formerly more common species will become threatened, and many threatened species will become extinct. It is precisely this scenario, repeated at the continental scale, which has led to predictions that Australia will lose half its terrestrial bird species in the 21st century.

Accordingly, a key feature of Box-Ironbark nature conservation is the promotion of 'recovery' for many species—a return, even partially, to former numbers and distribution—as opposed to simply maintaining the *status quo*.

The Box-Ironbark forests and woodlands that exist today are dominated by very high densities of small trees resulting from heavy cutting of the original

forests that were dominated by large, wide-crowned, hollow-rich, and widely-spaced trees. This very substantial change in forest structure and large tree abundance has significant ramifications for the biodiversity, landscape, timber production, and recreational values of Box-Ironbark forests and woodlands.

Many Australian animals are dependent upon large, old eucalypt trees. Large trees generate a taller, more open and structurally more complex forest. They provide abundant and reliable nectar, a variety of foraging sites, such as dead branches, peeling bark and fallen timber and, importantly, have more hollows. Hollows are required by many species for shelter and breeding. Only large trees have large hollows suitable for certain species. At least six threatened species in the Box-Ironbark study area are dependent upon large trees—the brush-tailed phascogale, squirrel glider, swift parrot, powerful owl, barking owl and regent honeyeater. The loss of large old trees is strongly implicated in the decline of these species and perhaps many others.

Box-Ironbark forests and woodlands have a long history of land use. Much of Victoria's commercial and recreational gold production originated and continues from these forests. Box-Ironbark forest woods make handsome furniture timbers, durable structural timbers, and excellent firewood. Nectar from Box-Ironbark forests and woodlands is sought by beekeepers. The mallee trees of the region are the source of Victoria's eucalyptus oil production. The forests are highly accessible to many towns, and local communities use them for recreation, nature observation and domestic firewood collection.

Box-Ironbark forests and woodlands arouse passionate responses from those using or interested in these areas. While in the mid-19th century these forests were seen as wastelands of little value unless used or removed for agriculture, or in the search for gold, it is now recognised that the forests and woodlands themselves have value for habitat conservation reasons, as well as providing many key resources and many highly significant sites of historical and cultural interest.

1.2 Investigation process and terms of reference

The Victorian Government asked the Environment Conservation Council to carry out an investigation of Box-Ironbark forests and woodlands in northern

Victoria. The investigation builds on work begun by the Land Conservation Council.

The Land Conservation Council, which was established under the *Land Conservation Act 1970*, commenced an investigation of Victoria's Box-Ironbark forests and woodlands in northern Victoria in 1996, under terms of reference provided by the Government.

In June 1997 the *Land Conservation Act 1970* was repealed and replaced by the *Environment Conservation Council Act 1997*. Under this Act the Land Conservation Council ceased to exist and the ECC was established to respond to specific references from the relevant Minister.

Table 1.1 is a flow chart which outlines the investigation process of the LCC and the ECC, highlighting formal opportunities for public input over the past five years. In addition, the LCC and the ECC have received substantial informal input outside these periods. In total, the investigation has received around 3 500 written submissions and letters.

Addressing the terms of reference

In 1997, the Minister for Conservation and Land Management provided terms of reference to the ECC for the investigation of Victoria's Box-Ironbark forests and woodlands in northern Victoria. In particular, the terms of reference (quoted fully in Table 1.2) required the Council to:

- address the extent, condition, values and uses of these forests and woodlands;
- make recommendations on the balanced use of these areas; and
- have regard to the nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system, while recognising that informal reserves will be established through the forest management planning process; and
- take into account a number of other matters as required under Section 20 of the *Environment Conservation Council Act 1997* (also quoted in Table 1.2).

The ECC has produced two reports:

- *Box-Ironbark Forests and Woodlands Investigation Resources and Issues Report, December 1997*

- *Box-Ironbark Forests and Woodlands Investigation Draft Report, May 2000.*

The Resources and Issues Report (1997) addressed the extent, condition, values and uses of the Box-Ironbark forests and woodlands, using existing information.

The Draft Report (2000) built on the ECC's Resources and Issues Report. It took into account new forest information, changes to the study area boundary, the effects of the West and North East Regional Forest Agreements, and the nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system. Recommendations were made (for public comment) on the balanced use of the Box-Ironbark forests and woodlands and the potential social and economic effects were also discussed.

About 1 500 written submissions were received commenting on the Draft Report, including about 120 letters received after the closing date.

In December 2000 the Minister approved a six month extension (until 30 June 2001) for the Final Report to incorporate new forest information, conduct further consultation with stakeholders on some revised recommendations, and to complete a thorough assessment of the social and economic effects of the ECC's final recommendations.

1.3 Major changes since the Draft Report

As a result of input received from the community and additional information made available since the release of the Draft Report in May 2000, significant changes have been made to the recommendations.

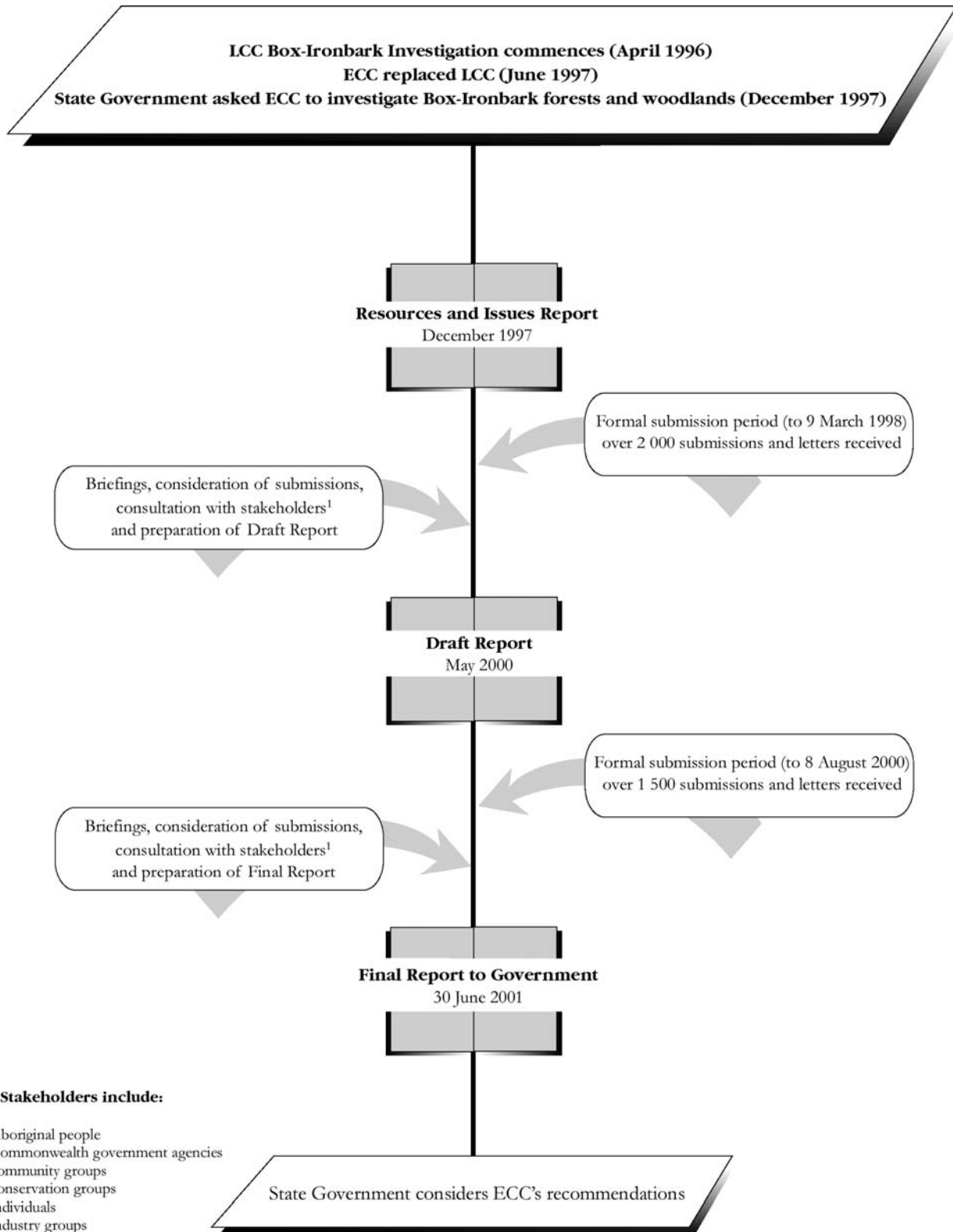
The main recommended area changes are summarised in tables at the end of the Executive Summary.

Changes in response to public input are highlighted throughout the Final Report but include:

- an expanded discussion, and recommendations, related to Aboriginal interests and non-indigenous cultural heritage;
- an expanded discussion, and recommendations, in relation to land managers' discretion and other land management issues;
- a new Greater Bendigo National Park, a new Heathcote-Graytown National Park, and a new Castlemaine Diggings National Heritage Park;
- provisions to minimise the effect of recommended new parks on mining and prospecting;
- an increase in the area recommended to remain as state forest, especially in key areas near Heathcote, Rushworth, Dunolly and St Arnaud;
- several new nature conservation reserves and the addition of numerous small blocks to the reserve system and other categories;
- a large number of changes to park boundaries to reduce impact on industries, to improve habitat representation, and to address user issues;
- guidelines for road reserve management and a schedule of road reserves with significant conservation value;
- forest modelling has been thoroughly reviewed and available volumes of timber re-assessed;
- better definition of forest management prescriptions; and
- a further social and economic study has been completed, assessing impacts on particular industries, sectors, and on towns which may be significantly affected by the ECC's final recommendations.

Major issues raised in submissions received on the Draft Report and Council's responses are discussed in Chapter 19.

Table 1.1 The investigation process



¹ Stakeholders include:

- Aboriginal people
- Commonwealth government agencies
- community groups
- conservation groups
- individuals
- industry groups
- local government
- recreational groups
- researchers
- State government agencies

Table 1.2 Terms of reference and requirements for the Environment Conservation Council's Box-Ironbark Forests and Woodlands Investigation

Terms of reference
<p>The Minister, under Section 17 of the <i>Environment Conservation Council Act 1997</i> requires the Environment Conservation Council to carry out an investigation of Victoria's Box-Ironbark forests and woodlands occurring on public land in northern Victoria. The area to be investigated is the Box-Ironbark ecosystem stretching from the Grampians in the west to Wodonga in the north-east. The investigation area is shown on the attached map.</p> <p>In accordance with Section 23 of the Act the Environment Conservation Council is required to present a written report on the outcome of its investigation in the prescribed form by 30 June 2001.¹</p> <p>Having regard to the matters to be taken into account in investigations as provided in Section 20 of the Act, including the economic and social value of any existing and proposed development or use of the land or resources, the investigation must:</p> <ul style="list-style-type: none"> • identify and evaluate the extent, condition, values and uses of the Box-Ironbark forests and woodland areas in northern Victoria; • make recommendations on the balanced use of these areas; and • in making recommendations on the balanced use of Box-Ironbark forest and woodland areas the Council should have regard to the nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system recognising that informal reserves and prescriptions will be established through the regional forest management planning processes. <p>¹ Originally 31 December 1998</p>

What is the ECC required to consider in its investigations?
<p>Under Section 20 of the <i>Environment Conservation Council Act 1997</i>, the Council must have regard to:</p> <ul style="list-style-type: none"> • the ability of any existing or proposed development or use of the land or resources to be ecologically sustainable and economically viable; • the economic and social value of any existing or proposed development or use of the land or resources; • the existence of and the need to conserve and protect any areas of ecological, historical, cultural or recreational value or areas of landscape significance on the land; • the need for the creation and preservation of a comprehensive, adequate and representative system of parks and reserves within the State; • any international obligations entered into by the Commonwealth and any national agreements entered into with or obligations undertaken in conjunction with the Commonwealth and the other States and Territories which relate to the subject matter of the investigation; and • the need to protect and conserve biodiversity.

1.4 Study area boundary

The terms of reference for this study included a generalised investigation area of approximately 5.9 million hectares, within which the ECC was to investigate public land with Box-Ironbark vegetation.

The study area boundary, shown on Map A (at the back of this report), outlines the approximate area (2.95 million hectares) which supported Box-Ironbark vegetation at the commencement of European settlement.

The ECC’s view was that the Box-Ironbark study area should include Box-Ironbark forests and woodlands on the inland hills and on the elevated terraces of the northern plains, but should not include native grasslands on the elevated terraces, or river red gum and black box forests and woodlands on the lower elevation floodplains. Box 1.1 provides further clarification of the land included in the study area.

After publication of the ECC’s Resources and Issues Report (1997), the study area boundary was modified to reflect new information on the original extent of Box-Ironbark vegetation types. This resulted in boundary changes in the north-west (from Ledcourt near Stawell to Charlton), north (Charlton–Rochester–Wyuna), south-west (from Ararat to Avoca and near Guildford) and other minor changes. This has had little effect on whether public land is included in the study, except as follows:

- Ledcourt Forest, the southern Pyrenees Forest, small parcels on the northern plains around Dinglee and north of Rochester do not and/or did not carry Box-Ironbark vegetation and have been excluded; and

- Glynwylln Forest, parts of Morrl Morrl and Big Tottington Forests and Bolangum Flora and Fauna Reserve, land at Mt Deboobetic, and small parcels around Calivil have been included.

The modified study area in total covers 2 950 000 ha, comprising 384 000 ha of ‘true’ public land, 43 000 ha of Commonwealth land, and 2 523 000 ha of freehold land. Note that freehold land is outside the ECC’s terms of reference.

1.5 Public land use categories

The Victorian system of public land use categories, established over many years in previous Land Conservation Council investigations, is familiar and well understood by groups and individuals interested in public land planning and actual land use. In this report the ECC is using the simplified public land use category system established in the Land Conservation Council’s *Melbourne Area District 2 Review* in 1994 (see page 293). Some provisions for land use have been modified to reflect particular needs in the Box-Ironbark area. Table 1.3 summarises permitted uses in each of several major public land use categories. These are relevant when considering recommendations in later chapters of this report.

Box 1.1 THE INCLUSION OF FORESTS AND WOODLANDS

A misconception which emerged, among some sections of the community, after publication of the Draft Report was that the ECC had included the woodlands of the northern plains in its study area in order to artificially inflate the need for reserve system additions in the forests of the inland hills. That is, the ECC had included the more extensively cleared woodlands in order to increase the average level of vegetation loss across the study area, and hence the need for reserve system additions throughout the study area. This is incorrect on three counts.

1. The terms of reference for the Box-Ironbark investigation—developed by the Victorian Government without input from the ECC—clearly stipulate the inclusion of woodlands, and imply it in the map of the broader investigation area. In several years of detailed study of Box-Ironbark forests and woodlands, at no stage has the ECC had reason to think that including both forests and woodlands in the investigation was inappropriate. The characteristics linking the forests and woodlands are quite clear; for example, a third of all Box-Ironbark threatened species are dependent on both areas, and grey box is the most abundant tree in both areas.
2. As is clear throughout this report, the ECC has not considered the forests and woodlands of the study area as a single unit (or as two units) when developing the recommended reserve system. Indeed, the ECC’s approach has gone well beyond just recognising the forests and woodlands as two distinct components—no less than 73 EVCs have been delineated and treated separately according to their level of depletion and other factors affecting their conservation.
3. Although not as severely depleted as the northern plains, the forests of the inland hills are also greatly reduced—to around 25% of their original extent, with an extensive history of mining and timber harvesting in those remaining areas. This is still a grave situation, given that scientists report significant declines in biodiversity when less than 30% of the natural extent of an ecosystem remains, and generally classify such ecosystems as vulnerable or endangered.

Table 1.3 Permitted uses in major public land categories

	National park	State park	Regional park	Nature conservation reserve	State forest
Recreation and tourism activities					
Nature observation	3	3	3	3	3
Picnicking and barbecues	3	3	3	3	3
Camping	3 ¹	3 ¹	3 ¹	3 ¹	3
Bushwalking or short walks	3	3	3	3	3
Car touring, four wheel driving and trail bike riding ²	3	3	3	3	3
Dogs	7	3 ^{3,4}	3 ⁴	7 ³	3
Visiting historic features	3	3	3	3	3
Orienteering and rogaining ⁴	3	3	3	3	3
Car rallies ⁴	7 ³	7 ³	7	7	3
Horse riding ⁵	7 ³	3 ⁴	3 ⁴	7 ³	3
Hunting	7 ⁶	7 ⁶	7 ⁶	7 ⁶	3 ⁶
Prospecting / metal detecting					
Metal detecting	7 ⁸	3 ⁷	3	3 ⁷	3
Gold panning	7 ⁸	3 ⁷	3	7	3
Gemstone fossicking	7 ⁸	7	3	7	3
Resource industries					
Mineral exploration	7 ⁹	7 ⁹	3 ¹⁰	3 ¹⁰	3
Mining	7 ⁹	7 ⁹	3 ¹⁰	3 ¹⁰	3
Sawlog and post production	7	7	7	7	3
Firewood	7 ¹¹	7 ¹¹	7 ¹¹	7 ¹¹	3
Apiculture	3 ¹²	3 ¹²	3	3 ¹²	3
Eucalyptus oil production	7	7	7	7	3 ¹³
Other uses					
Environmental education	3	3	3	3	3
Approved research	3	3	3	3	3
Water production/distribution	3	3	3	3	3
Stone extraction	7 ¹⁴	7 ¹⁴	7 ¹⁴	7 ¹⁴	3
Grazing ¹⁵	7	7	7	7	3
Utilities	7 ¹⁶	7 ¹⁶	7 ¹⁶	7 ¹⁶	3

Note: This table provides an overview of the recommendations in this report in terms of the key uses normally permitted in the major public land categories. The numbered notes in the table indicate the significant variations (some pre-existing) from the standard uses. This table is not intended as a comprehensive or detailed account of the relevant recommendations—readers should always refer to the detailed recommendations for particular areas or activities. Also for many areas, detailed management planning may lead to further changes to cater for local requirements. A process for resolving disputes arising from the discretion provided to land management agencies is recommended (see Recommendation R9 in Chapter 3 of this report).

- Depending on the park, camping may be at designated campsites only. Camping may be excluded from some smaller reserves.
- Only on roads and tracks formed for the passage of four-wheel vehicles. Tracks may be subject to seasonal or permanent closure.
- Some exceptions.
- Subject to certain conditions.
- Only on formed roads or specially designated tracks.
- Where deemed necessary by the land management agency, organised shooting drives may be conducted to assist in control of feral animals.
- Some areas may be excluded in management plans. Generally not permitted in this public land use category elsewhere in Victoria.
- Permitted along Reedy Creek (recommended Chiltern-Pilot National Park).
- Existing exploration or mining licences continue in national and state parks. The Government may approve specific mining proposals following exploration under existing licences. Note that parts of the recommended Greater Bendigo National Park, the Castlemaine Diggings National Heritage Park and the Deep Lead Nature Conservation Reserve are recommended to extend only to 100 metres below the surface, allowing new exploration and mining tenements under these areas.
- Restricted under Schedule 3 of the *Mineral Resources Development Act 1990*.
- Some firewood may continue to be available from ecological management operations in parks and reserves. Transitional arrangements will be put in place to allow collection of previously felled firewood from newly established parks and reserves.
- Permitted where an existing use.
- Confined to areas used since 1995.
- Extraction for local management use only.
- Only small areas of Box-Ironbark state forests are suitable for grazing. Light grazing for ecological management may continue in limited areas in some parks or reserves.
- Some existing utilities are within recommended parks and reserves. These will continue, where appropriate.

1.6 Social and economic information

As part of its task of making recommendations on the balanced use of public land and resources, the ECC must take into account economic and social values. The ECC must also balance local, regional, state and national interests as well as those of present and future generations.

While there are a number of ways to assess the social and economic impacts of the ECC's recommendations, most methods have limitations. In particular, the social and environmental impacts are very difficult to incorporate in most analyses, and there is a tendency to focus on readily identifiable impacts, which are more likely to be short-term financial losses or gains. For example, how costs and benefits of particular decisions are distributed among different groups within society is an important consideration, but is not easily assessed.

Most cost-benefit analyses also struggle with 'pricing' environmental values although there is no doubt that, as a society, we place a high value on them. While socio-economic analyses are useful ways of structuring the assessment of resource issues, no single technique can express, aggregate, weigh and compare the values of all the costs and benefits associated with alternative uses of land, water or resources.

Although there is continual development of techniques to inform and assist policy-makers, there is no generally accepted methodology available at present that eliminates the need for governments to interpret community values and goals when making final judgements about resource use options.

The ECC commissioned consultants to conduct social and economic studies at three stages of the investigation. The consultants prepared appraisals of the effects of the ECC's draft and final recommendations and met many potentially affected individuals and groups.

When developing its recommendations, for the Draft Report the ECC commissioned Read Sturgess and Associates and Essential Economics Pty Ltd to carry out a baseline study to describe Box-Ironbark industries and the social setting (referred to as Stage 1), and an assessment of the social and economic effects of initial proposals (referred to as Stage 2). These studies assessed, as far as possible, the benefits and costs that could arise from the

proposals, and the estimated social effects, including employment gain or loss.

Following the release of the ECC Draft Report (May 2000) and analysis of submissions received, the ECC commissioned Midas Consulting to review the earlier social and economic work and conduct a further stage of assessment (referred to as Stage 3). The objectives of the study (see Appendix 5) were to identify and assess the potential social and economic effects of the ECC's revised recommendations on individuals and communities. Midas Consulting's assessment was based on the following approach:

- a review of the Read Sturgess and Associates and Essential Economics Stages 1 and 2 studies;
- a review of submissions made following the release of the ECC Draft Report;
- a review of the ECC's revised recommendations;
- analysis of a survey of potentially affected individuals;
- assessment of the impacts on economic activity, including employment effects, in the region; and
- an appraisal of the likely social benefits and costs of the revised recommendations.

Midas Consulting's interviews focussed on those primary producers likely to be adversely affected by the ECC recommendations including timber cutters, eucalyptus oil producers, and small-scale gold prospectors and miners. Several representatives from industry were also interviewed for background information on industries.

Midas Consulting's work builds on the two previous studies, updates statistical data, includes discussion of the implications for biodiversity conservation, commercial industries, recreational prospecting and tourism, and provides an assessment of the extent to which these impacts are likely to flow on to towns and communities. Assistance measures to mitigate any negative impacts on individuals and communities are also considered.

Part Two of this report discusses the costs and benefits, and Appendix 5 contains a summary of the Stage 3 report on social and economic effects resulting from the ECC's revised recommendations. Full reports from all consultancies are available from the ECC's office.

Information on other social and economic impacts of the recommendations in this report has been gained through discussions with community groups and individuals, local government, and other government agencies. This information, although generally qualitative rather than quantitative, has been extremely useful in developing and refining recommendations.

1.7 Recent forest information

The work of the ECC is based on the best available information, obtained through collation of existing data and commissioned research. During the course of this investigation, there have been a number of developments that have had an impact upon the way in which the ECC Box-Ironbark investigation has been conducted and the way in which information has been gathered. These developments are described below.

Mapping ecological vegetation classes

The Department of Natural Resources and Environment (NRE) completed modelling and mapping of the original (pre-1750) extent of ecological vegetation classes for inclusion in the Draft Report. This mapping (see Map B at the back of this report) has been a key input to the ECC's recommendations, as it provides the basis for developing the recommended reserve system. Detailed descriptions of the ecological vegetation classes are in Appendix 2 and they are also discussed in Chapter 4.

Box-Ironbark Timber Assessment

The Box-Ironbark Timber Assessment (BITA), published by NRE in 1998, was the first comprehensive timber assessment of Box-Ironbark forests in the Bendigo Forest Management Area for many years. It was a major undertaking, involving assessment of some 1 480 plots and felling of over 600 trees to check predicted volumes and to determine growth rates. It provided a detailed record of these forests, with data on standing timber, growth, species, origin, stocking, potential products, productivity, habitat characteristics and forest management.

The detailed information contained in the BITA on current timber volumes and tree growth rates was used by NRE to develop a model to predict future sustainable harvest rates. This modelling was an important input in assessing the social and

economic impacts of recommendations related to timber production.

Following publication of the Draft Report there was some criticism of the approach used and whether in fact the predicted volumes of wood products were actually available. This concern was also expressed in submissions and during the stakeholder consultation program. Subsequently, the model was reviewed, and available timber volumes reassessed, with NRE doing considerable additional work. In addition, the ECC commissioned further work on the social and economic impacts of the resultant changes. Chapters 8 and 17 provide detail in relation to these issues and relevant ECC recommendations.

Large old tree site mapping

Studies commissioned by NRE, and by the ECC for the Draft Report assessed large old trees (with a diameter at breast height of more than 60 cm) on Box-Ironbark public lands. Assuming average growth rates of 3.5 mm diameter per year, these trees were seedlings before pastoral settlement of Victoria. The importance of large old trees is detailed in Chapter 4.

1.8 Effects of the Regional Forest Agreement process on the investigation

The National Forest Policy Statement (1992) put forward the Regional Forest Agreement (RFA) process to resolve the conflicting demands, on forests, of conservation and industry. In Victoria, two forest regions, North East and West, intersect with the Box-Ironbark study area. The Central Highlands region overlaps only a small part of the study area south of Seymour, which has no forested public land.

Originally, most of the Box-Ironbark study area was covered by the West region but, in March 1999, the West region boundary was modified and now overlaps with only the western part of the study area, including The Pyrenees, Morrl Morrl, and other blocks to the west. The objectives of the RFA process were similar to the terms of reference for the Box-Ironbark investigation, and this change reduced the potential for confusion between two similar studies occurring at the same time.

This boundary modification had several other consequences. The Commonwealth ceased funding projects within the Box-Ironbark study area that were outside the West and North East regions.

Other effects of the West region boundary change included:

- Box-Ironbark industries affected by forest land use changes in most of the study area were no longer eligible for Commonwealth funding for industry restructure;
- forests in the eastern and western parts of the Box-Ironbark study area were included in two forest processes, while the remainder were only affected by the ECC investigation; and
- Clunes and Tooborac Forests and other small areas were excluded from both processes.

RFAs have been signed for the North East and West regions, and subsequent forest management area planning initiated. Regarding forest areas included in both the North East region and the Box-Ironbark study area, the effects of the ECC's recommendations on forest industries are similar to the outcome of the forest zoning, although the recommended public land use categories differ. The similarity between the two processes reflects their similar aims for appropriate representation of ecological vegetation classes and protection of habitat for threatened species.

The forest management zoning in the RFA regions is generally similar to the ECC's recommendations, for forests subject to both processes. Lonsdale, Illawarra (part), Jallukar, The Ironbarks, Dunneworthy (part) and Morrl Morrl Forests, and parts of the Pyrenees Ranges and Barambogie are designated as Special Protection Zones. Differences in the Dunneworthy Forest should be addressed in the implementation process so that the ultimate outcome of both is consistent.

The Mid-Murray Forest Management Area, while primarily considering river red gum forests along the Murray, Goulburn and Ovens Rivers, also includes some Box-Ironbark vegetation associations, including Killawarra and areas fringing river red gum forests.

In the Mid-Murray Proposed Forest Management Plan, released in February 2001, Killawarra has been included as available forest, within a Special Management Zone. However, recognising ECC's recommendations for the inclusion of this forest as part of Warby Range State Park, timber harvesting will not be permitted in the period prior to the Government making any decisions on the ECC's recommendations. For other forests, the proposed

plan states that forest management planning will be reviewed after the Government's decisions on the ECC's recommendations.

Industry restructure

Under the Forest Industry Structural Adjustment Package (FISAP) component of the Regional Forest Agreement process, within RFA regions, the Commonwealth may provide funding to:

- promote development in the native forest timber industry; and
- assist those businesses and employees in the industry who are directly and adversely affected by the outcomes of the RFA processes.

The Box-Ironbark study area was originally included in the 1995 Deferred Forest Area process. The ECC has been advised that the FISAP program does not extend to impacts resulting from recommendations made by the ECC, as the Box-Ironbark study area was excluded from the West RFA region. Businesses in the Box-Ironbark area are however able to participate in the Industry Development Assistance component.

The West region boundary change means that forest industries in most of the Box-Ironbark study area may be treated differently from similar industries within RFA regions. This appears inequitable. The ECC's view is that business and employees in the timber industry, which may be affected by the recommendations in this report, should be treated equitably with those in adjacent RFA areas. Comparable treatment should apply regardless of whether they are inside or outside the Box-Ironbark study area, including assessment of impact and selection criteria for adjustment assistance (see Recommendation R1 in Chapter 3).

Effect of the RFAs on Commonwealth land

The Commonwealth initially agreed to participate in the ECC's investigation, to assist with the funding of projects, and to include the Puckapunyal, Mangalore and Longlea Defence Areas in the investigation. With the change to the West RFA region, the Commonwealth ceased funding projects, although cooperation with the Department of Defence has continued. Proposals for Puckapunyal, Longlea and Mangalore are outlined in Chapter 13. Commonwealth land is not 'public land', but was included in the vegetation analysis and is in the 427 000 ha total.

2 Consultation and information

Throughout the investigation process, the ECC sought and received extensive input from community groups, industry, State and Commonwealth government agencies and interested individuals.

2.1 Consultation program

The recommendations in this report conclude a five-year process, which has included two formal periods for public comment and ongoing consultation with a broad range of stakeholders.

The ECC has taken into account around 3 500 written submissions and letters made to the present Council and the former Land Conservation Council (LCC). This huge resource of information and informed comment has been enormously valuable in helping the ECC finalise its recommendations.

The ECC established an Advisory Group for the investigation to provide input and advice regarding technical issues associated with developing its recommendations (see Appendix 7). The Advisory Group was an expertise-based group (not a representative group), whose members included people from relevant industry sectors (such as mining, apiculture and timber), recreational users, rural communities, biological research organisations, conservation and government agencies.

In addition to inviting submissions, the ECC, throughout the investigation, briefed and met with individuals and groups in local communities, Aboriginal groups, local government, specific industry groups, recreational user groups, conservation groups, as well as Members of Parliament and government agencies. Numerous field inspections were conducted and input sought from a wide range of stakeholders in an effort to better understand the ‘big picture’ as well as the fine detail of the Box-Ironbark region.

Following the release of the Draft Report (May 2000), a series of briefings was conducted with key stakeholder groups, government agencies and Members of Parliament. Public consultation forums were advertised and held in nine different locations in the study area, and ECC members and staff also attended a number of meetings organised by peak

groups or by local Members of Parliament. In addition, the ECC met with peak organisations to discuss their submissions. The ECC’s response to major issues raised during the investigation can be found in Chapter 19 of this report.

Mirimbiak Nations Aboriginal Corporation was commissioned by the ECC to facilitate input from Aboriginal groups on the recommendations in the Draft Report. A summary of their report, prepared with the participation of all Victorian Aboriginal groups in the study area, is included at Appendix 4.

2.2 Economic and employment information

The ECC employed consultants to carry out a series of social and economic studies as part of this investigation. The main objective of the Stage 1 study¹ was to characterise the area, establishing a regional social and economic profile. The Stage 2 study² assessed the effects of the ECC’s Draft Report, building on the Stage 1 study.

In written submissions and consultative meetings, there were some concerns about the Stage 2 outcomes; chiefly that the estimated tourism benefits and (input) data on available timber volumes may have been overstated, such that overall benefits were elevated, and impacts understated. Accordingly, the ECC initiated a review of the Stage 2 outcomes, and an assessment of changes under consideration by ECC prior to the Final Report, in the Stage 3 social and economic study³. The Stage 3 study also included interviews with stakeholders to collect economic and social information and their views on the effects of the Draft Report, and a specific survey of timber cutters to determine what constituted a ‘full-time equivalent’ post cutter or firewood cutter.

The results of the Stage 3 study are outlined below, and summarised in more detail in Appendix 5 of this report. The review of the Stage 2 report

indicated that the basic economic approaches and much of the data were correct, but that some estimates required changing and new data had to be worked in. Appendix 5 explains methodologies used to establish costs and benefits, and extra work done on stakeholder views, social impacts and estimating full-time equivalent jobs.

Economic effects

The primary purpose of these social and economic studies was to determine whether there will be a net benefit to Victoria of the ECC’s recommendations. The results of the Stage 3 study indicated that the direct and indirect economic benefits are likely to substantially exceed the costs. The consultants provided ‘optimistic’, ‘conservative’ and ‘pessimistic’ estimates. The ECC adopted the ‘conservative’ case as the most appropriate; it indicates that the net economic benefit of the recommendations would be about \$2 million per year.³

The summary of the benefit–cost analysis below indicates that the estimated value of increased tourism—reduced from the Stage 2 study estimate—balances anticipated losses in the timber, mining, eucalyptus oil and grazing industries, but that an expected \$2M in increased biodiversity benefits will provide a significant net benefit.

The increased biodiversity protection benefit resulting from the proposals, although not easily quantified, was estimated. The Stage 3 study reviewed several willingness to pay (contingent valuation and choice modelling) studies relating to comparable forest areas, for example, conservation of East Gippsland forests, and protection of remnant Box-Ironbark bushland on private land. Results from those studies indicated a willingness to pay \$43.50 and \$52 per household per year to conserve East Gippsland forests (2 studies), and \$5 per household per year to conserve remnant Box-Ironbark bushland. The consultants adopted the very cautious figure of \$1.50 per household per year as their conservative case for the benefit of the ECC’s recommendations. Applied to the 1.35 million households in Victoria, that suggests Victorians are willing to pay around \$2M per year to protect the Box-Ironbark forests and woodlands. The basis for this expected biodiversity benefit is explained in more detail in Appendix 5.

The expected increase in the value of tourism in new and expanded parks and reserves was also estimated. Tourism is currently the second largest

industry in the study area and is likely to grow, bringing economic activity and employment to certain locations. The Stage 3 study predicted that there will, however, be decreases in the economic contribution of the timber industry, with 39% of the now-available Bendigo FMA forest to be included in parks and reserves, and in the mining industry, with some new areas exempt from mining. There would also be other minor costs. A significant economic cost (which actually translates to a benefit for local communities) would be the expected increased expenditure on park and reserve management.

The consultants’ ‘conservative’ estimates for annual benefits and costs are as follows³:

Benefits	
Increased biodiversity and natural values	\$2.0M
Increased value of tourism and recreation	\$0.97M
Total benefits	\$2.97M
Costs	
Additional park management	\$0.4 M
Reduction in timber harvest	\$0.18M
Reduction in minerals exploration	\$0.19M
Reduction in eucalyptus oil production	\$0.05M
Reduction in grazing income	\$0.08M
Total costs	\$0.90M
Net economic benefit to Victoria	\$2.07M

Employment effects

The largest economic benefit would result from biodiversity conservation. However, as this benefit would accrue to all Victorians rather than specifically to those who live in the region, it would not necessarily create jobs across the region.

To some extent it would be fair to say that the benefits would accrue to all Victorians (including those who live in the investigation area) but the costs would be borne almost exclusively by those who live in the area.

The Stage 3 study’s ‘conservative’ case estimated that following implementation of the recommendations there could be a net loss of 14 jobs in current Box-Ironbark industries.

There would be approximately 35 new jobs, 31 in tourism and 4 in park management, but not all will be located in the region.

Possible job losses resulting from the recommendations are estimated to be as follows:

- around 16 jobs in mining companies (due to possible reduced exploration in recommended national and state park areas) and amongst small miners (due to higher standards);
- for the sawlog, post cutting and firewood industries there could be a reduction of up to 30 full-time equivalent jobs; and
- small job losses in eucalyptus oil production (approximately two persons) and grazing (less than one person).

The expected 30 FTE job losses in the timber industry would be likely to affect a larger number of part-time workers.

Potential job losses would be felt in Bendigo and smaller towns. While employment losses would be small relative to total employment in the region, the areas most dependent on production from public land would be those in the west of the study area which have relatively low incomes, high unemployment, and low population growth. However, few areas would experience large overall negative or positive impacts.

Job losses would be likely, to some extent, be replaced by new opportunities, including establishment of plantations, increased expenditure on public land management and enhanced tourism.

Use of social and economic data in this report

Most chapters in Part Two include information on the economics and employment associated with current and possible future uses. To facilitate comparison between industries, this information is presented as the number of full-time job equivalents and the annual dollar value of production ‘at the stump’ or ‘at the farm gate’—that is, the dollar value to producers—and does not include other factors such as multiplier effects. However, comparison of industries using these figures needs to be made with caution; important information may not be reflected in the simplified figures. Accordingly, other information, which more fully characterises social and economic aspects of each industry, is also provided where appropriate.

Unless otherwise stated, information on the economics and employment of each industry is derived from the Stage 3 social and economic study.

2.3 Other sources of information

As well as input provided through written submissions and the consultation program, the work of the ECC is based on the best available information, obtained through collation of existing data and specially commissioned research.

Scientific information and research

Several studies were commissioned by the LCC and the ECC, and other research projects have also provided valuable information. The key information sources, which contributed to the development of the recommendations, are referenced throughout the report. A full list of references is provided commencing on page 281, and key information sources are outlined on pages 294–296.

Other information sources are referenced with numbers and short citations at the end of each chapter. Full citations are provided at the end of the report in the References section.

Technical and operational information

The ECC worked closely with a number of different NRE divisions in developing the recommendations in this report. In particular there was considerable interaction with, and information provided by Aboriginal Affairs Victoria; Forests Service; Forestry Victoria; Minerals and Petroleum Victoria; and Parks Flora and Fauna Division. NRE regional staff were also extensively consulted.

Other State and local government agencies provided information including Parks Victoria, local councils, regional Catchment Management Authorities and water authorities. Relevant Commonwealth agencies such as: the Department of Prime Minister and Cabinet; Environment Australia; Agriculture, Fisheries and Forests Australia; and the Department of Defence also provided valuable information and assistance.

Information sources

- ¹ Essential Economics and Read Sturgess Associates (1998).
- ² Read Sturgess and Essential Economics (2000)
- ³ Midas Consulting (2001)

Part Two

Framework for future uses of Box-Ironbark public land

3 General recommendations across the study area

This Chapter deals with issues that apply broadly across the study area, and are therefore relevant generally to land managers and other stakeholders.

3.1 Introduction

Part Two of this report sets out the context for the future of each major current use of Box-Ironbark public lands, in twelve chapters:

- general recommendations across the study area
- nature conservation
- Aboriginal interests
- non-indigenous cultural heritage
- mining
- wood products
- apiculture
- recreation
- tourism
- eucalyptus oil production
- Commonwealth land, and
- other uses.

In each chapter, there is a brief description of the use, discussion of the major issues, community views and recommendations broadly applicable to Box-Ironbark public land.

The recommendations in Part Two all commence with the prefix ‘R’ and have application across the investigation area. Recommendations specific to particular areas of public land are included in Part Three of this report (e.g. recommendations for a park or for mining in a particular area).

3.2 General recommendations for application across the study area

In addition to its significance for particular uses, public land also plays a vital role in meeting broader objectives which operate across entire landscapes

and are important to the whole community. These general issues are often large, important and inherently difficult to manage or resolve. All public land users and land managers must coordinate their efforts to improve public land management in a cost-effective manner.

Adjustment issues and compensation

These recommendations have been designed to provide for a net benefit to all Victorians, and to minimise the impacts on current users of resources from Box-Ironbark forests and woodlands.

Where individuals or communities are disproportionately affected, it is appropriate for the community to contribute to adjustment schemes on the grounds of broader environmental or social objectives. For example, if changes leave a particular community or individual socially or economically disadvantaged, it is appropriate to use public funds for retraining or relocation of displaced industry participants in order to reduce the long-term costs.

There are a number of methods to assist in structural adjustment and different methods may be applicable in different cases.

Irrespective of the recommendations in this report, some industries are likely to require some structural adjustment. For example in some areas a reduction in the number of timber cutters is already required. These current requirements will also need to be considered in any adjustment package. The processes that have been adopted as part of the Regional Forest Agreement structural adjustment packages provide a useful approach.

RECOMMENDATION

- R1** Government establish a process to evaluate mechanisms and levels of adjustment that may be required, where individuals or local communities are directly and adversely affected as a result of the implementation of recommendations in this report. In particular, it is recommended that timber industries should be treated comparably whether they are inside or outside Regional Forest Agreement areas.

Resources for implementation

The ECC stresses the importance of appropriate resources being allocated for the implementation of recommendations.

Most public land in Victoria is managed, directly or indirectly (through delegation), by NRE. Additional resources will be required where the intensity of management needed increases as a result of the ECC's recommendations. Note that a land status change does not necessarily imply a greater level of management.

In particular, the Stage 3 social and economic study commissioned for the Final Report (see Appendix 5) reinforces the need to promote the recommended parks and reserves, and other Box-Ironbark resources and values, in order to increase tourism and achieve part of the anticipated economic benefits to the regional community, and to Victoria. That is, the long-term benefits of the recommendations ensure that resources invested in their implementation will be resources well spent.

RECOMMENDATION

R2 Government allocate adequate resources for implementation to ensure that the objectives of this report are achieved.

Enhancing public land management

Throughout the consultation process following the release of the Draft Report, a frequent issue raised in submissions, briefings and meetings was the perceived need for more expenditure on public land management. Some of the issues raised as needing more resources include:

- pest animal control, particularly foxes and feral cats;
- weed control;
- fire protection;
- forest management e.g. young coppice removal and thinning;
- regulation of domestic firewood collection;
- fencing and signage;
- presence of Parks Victoria rangers and NRE forest officers;
- installation of artificial hollows e.g. nest boxes;
- provision and servicing of recreation facilities and interpretation; and
- track maintenance.

These comments applied to parks, reserves and forests. They included matters that affect biodiversity conservation in these areas, but also that affect adjoining landowners. A key issue was foxes, which threaten ground fauna such as the antechinus, brush-tailed phascogale and bush stone-curlew, and livestock on adjoining farms.

The ECC's view is that these concerns result from genuine public observation about what these public lands require, and that Box-Ironbark forests and woodlands are in real need of more resources for management. This is not a criticism of current management or managers; it is recognition that the community perceives there have been substantial cuts applied to public land management expenditure over the last decade, and the effects of these cuts are being felt by local communities.

Additional funding would need to be carefully targeted to priority areas identified by NRE. In Council's view, pest animal control and better regulation of firewood collection are priorities. Specific recommendations for pest plant and animal control, and fire protection, are set out below.

RECOMMENDATION

R3 Government allocate additional resources to address current public land management needs in Box-Ironbark forests and woodlands, with priority given to pest plant and animal control and regulation of firewood collection.

Pest plants and animals

In the highly fragmented Box-Ironbark public land estate, with complex boundaries with private land, pest plants and animals pose potentially severe problems in land management. Foxes and feral cats are of concern because of their impacts on wildlife, and foxes are a serious agricultural pest. Rabbits and feral goats are pests in some locations.

In such landscapes, a range of control methods is required, including cooperative arrangements with adjacent landholders, as in Good Neighbour programs. Organised drives for foxes have been effective in some reserves. Continuing research, and resources to implement control programs on public and private land, are required.

RECOMMENDATION

R4 Government (through NRE, in partnership with Landcare groups, Catchment Management Authorities, and other community groups) continue to provide and improve pest plant and animal control in Box-Ironbark public lands, and fund appropriate research.

Fire protection

Wildfire is a serious potential hazard in these dry forests. Although leaf litter build-up is relatively slow and, in many forests, firewood collection reduces fallen wood, numerous townships lie within or close to forest. Fragmentation and the existing road network do, however, mean that the forests are very accessible for fire-fighting. Adverse fire effects on biodiversity can include the local extinction of particular species, and reduced abundance of habitat features such as fallen timber, dead standing trees and hollow-bearing trees.

In the long term however, as with almost all eucalyptus forests, fire is an important element in the ecology of these forests and is a factor in hollow-development in trees.

Fire prevention and suppression on public land—in parks, reserves and state forests—is the responsibility of NRE’s Fire Management Branch.

While major fires are infrequent in Box-Ironbark forests, the 1985 Maryborough fire, which burned over 50 000 ha of private and public land, and many smaller fires, underline the necessity on all public land for adequate fire prevention and suppression measures.

RECOMMENDATION

R5 NRE, in partnership with the Country Fire Authority and other relevant agencies or groups, continue to provide and improve fire management in Box-Ironbark forests and woodlands.

Salinity and land degradation

Salinity and land degradation are major hazards requiring management across the landscape, including on public land. Dryland salinity is a major and increasing problem in much of the study area, with small public land parcels in discharge areas at particular risk.

Salinity associated with irrigation and water channels also threatens remnant Box-Ironbark vegetation in parts of the northern plains. Soils in parts of the region are subject to sheet, tunnel and gully erosion, and damage from 19th and 20th century mining is still evident in some areas. Public land management needs to address these issues.

RECOMMENDATION

R6 Government (through NRE, in partnership with Landcare groups, Catchment Management Authorities, salinity management groups, and other community groups) continue to provide and improve programs to address salinity and land degradation threats on and to public land and identify priority public land areas for particular landscape-scale action to ameliorate salinity and land degradation.

Private land

Because around 86% of the Box-Ironbark study area is private land, many objectives which contribute to achieving balanced public land use, such as reversing biodiversity loss or increasing the value of timber production, are more likely to be achieved if supported by sympathetic management of private land where possible.

While the ECC cannot make recommendations applying directly to private land, it would be remiss not to acknowledge and support initiatives which foster sympathetic management of private land. Government can and does play a pivotal role in nurturing cooperative programs operating across a variety of land tenures and involving a diverse range of landholders and other stakeholders, particularly through improving communication and coordination between the stakeholders. In recent years, cooperative approaches such as management agreements and Good Neighbour programs have demonstrated the valuable role to be played by Government.

Protection and restoration of Box-Ironbark remnants on private land across the region and programs such as Bushcare and the Land for Wildlife scheme are important components of biodiversity conservation. Effective programs to facilitate cooperation of landholders in retaining, protecting and restoring remnant Box-Ironbark vegetation should continue to be funded.

As well as protection of remnants, revegetation (with indigenous species), plantation establishment, and planting for farm forestry woodlots (indigenous or otherwise) on private land in the Box-Ironbark region can have several benefits, according to the intended purpose. They can provide alternative sources for wood products, habitat, salinity control and/or land care benefits. In recent years, plantations have been established over large areas in other parts of Victoria, and parts of the study area dominated by private land have been identified as suitable for commercial plantations. Planting for indigenous revegetation, plantations, and farm forestry enterprises should be encouraged through new and existing programs.

RECOMMENDATION

R7 Government continue to encourage protection and restoration of indigenous Box-Ironbark vegetation and planting for indigenous revegetation, plantations, and farm forestry woodlots on private land.

Research and new information

New information will continue to be obtained and new discoveries will be made regarding appropriate management of the forests. Monitoring of current activities may identify new management needs. Research and monitoring will be most valuable

when targeted at addressing issues which are most likely to lead directly to significant improvements in land management, such as research to identify the best way to improve the structure of Box-Ironbark forests (see Chapter 4).

RECOMMENDATION

R8 Land managers continue with and further develop adaptive management research and monitoring programs, develop targeted new programs and apply the results where appropriate.

Land managers' discretion

Land managers appropriately have wide discretionary powers to manage public land. They are required, in some cases by legislation, to protect certain values of the areas under their control, to enable recreation opportunities, and to provide, for example, for public safety, fire protection, and pest plant and animal control. These are important

responsibilities, which must continue. However there has been frequent mention in submissions and at consultative meetings that land managers sometimes appear to change access for some public land users without sufficient consultation or in a non-transparent manner, and with no apparent process for resolving grievances.

RECOMMENDATION

R9 In relation to the discretion of land managers to allow or disallow certain activities, NRE establish and implement a process such that:

- (a) relevant stakeholders are consulted prior to proposed changes;
- (b) reasons are given for making particular changes; and
- (c) there is a grievance process in place to resolve significant disagreements on the exercise of land managers' discretion;

and:

- (d) where a temporary or holding decision is made with limited or no consultation (see note below), the formal process recommended above is initiated as soon as possible afterwards.

Note: None of these provisions should be seen as inhibiting the land manager in making temporary decisions, pending a final decision. Such temporary decisions could be required, for example, for issues related to public safety, possible damage to roads or tracks, or new discoveries of threatened species.

Education and awareness

The public profile and appreciation of Box-Ironbark forests and woodlands have increased markedly in recent years, and there is no reason why they should not continue to increase. In particular, there is a clear need for education to improve public understanding of the many aspects of natural ecology, such as the size and abundance of mature trees before European settlement, and how they have been, and are continuing to be, affected by historical and continuing human use.

Awareness-raising, promotion, interpretation and community education need not be limited to materials or services provided at feature sites, such as parks. For instance, NRE, community groups and some municipalities have provided posters, books, displays, courses, field days and talks to increase awareness and understanding of Box-Ironbark forests and woodlands in general. The Box-Ironbark Ecology Course organised each year by NRE provides a prime example of the form and content which such services and materials may take.

RECOMMENDATION

R10 Government support and resource measures to increase awareness, appreciation, community education, interpretation and promotion of Box-Ironbark forests and woodlands.

Management of Box-Ironbark public land during the implementation process

Where the Government approves the ECC's recommendations, land managers should manage the land in accordance with those recommendations until it is formally reserved. Boundaries of areas recommended for particular public land use

categories have not been surveyed and may be subject to minor modifications.

The ECC has recommended that many small parcels be managed as new reserves, and it is recognised that land managers will need to determine priorities for expenditure on implementation.

RECOMMENDATION

R11 Upon Government approval of ECC recommendations:

- (a) relevant land be managed in accordance with those recommendations;
- (b) subsequent implementation of recommendations and land management allow flexibility for minor boundary adjustments; and
- (c) priorities be determined for expenditure on implementation of the numerous new small reserves referred to above.

3.3 Naming parks and reserves

Throughout the ECC's consultation and formal submission processes, many people suggested different names for proposed parks and reserves. The view was expressed that more appropriate names be given to areas, particularly where there is a strong Aboriginal connection. One example is the Bendigo area where the ECC has recommended a national park and a regional park with very similar names.

The ECC's view is that when Government is considering the recommended parks and reserves in this report, consultation with local communities (including Aboriginal groups) and tourism groups about appropriate names is warranted. This, and involvement in the development of interpretation and promotional material, would assist in giving communities greater ownership of these areas.

4 Nature conservation

The loss of biodiversity is a significant concern for Australia.¹ Nature conservation aims to prevent biodiversity loss. In many cases, this necessitates reversal of the losses of recent decades.

Nature conservation can be achieved in many contexts and by many means, including both government and non-government endeavours. In public land use planning (as distinct from public land management), nature conservation is principally achieved by establishing a system of protected areas—a conservation reserve system, or simply ‘reserve system’—through the identification and designation of appropriate public land areas.

While the establishment of a reserve system is by no means all that is required, it is widely accepted, including by successive State and Commonwealth Governments, as central to the conservation of biodiversity.^{2,3,4} Insufficient representation of some ecosystems in the reserve system is one of the major threats to biodiversity in Australia.¹

The addition of appropriate public land is the highest priority in enhancing the reserve system because other options are generally more costly and administratively complex.⁵

Public land is particularly important in regions such as the Box-Ironbark study area where it supports more than 70% of remaining indigenous vegetation. Giving priority to public land in the selection of areas for nature conservation also demonstrates the commitment of the Government and the public to the reserve system, and encourages awareness among owners or managers of other land of high nature conservation value.

In addition, areas of special natural value are often popular for nature-based tourism and recreation on public land.

Box 4.1 BIODIVERSITY

Biological diversity, or ‘biodiversity’ includes all organisms, species, and biological populations; their genetic variation; and all their complex assemblages of communities and ecosystems. It also refers to the inter-relatedness of genes, species, and ecosystems and their interactions with the physical environment.²

Biodiversity is an essential element of life as we know it, providing humanity with food, shelter, medicine, clean air and water, fertile soils, recycling of organic matter, and emotional, psychological, and spiritual well being. Biodiversity is also intrinsically valuable; humans have an important responsibility as stewards of the rest of the world’s living organisms.

Australia is a ‘megadiverse’ nation—one of 12 nations which collectively contain over 60% of the world’s biodiversity.⁶ Australia has the highest proportion of endemic species among the megadiverse nations.⁶

Loss of biodiversity is now one of the world’s greatest problems. Many biologists believe that as a result of human activities, the global rate of species extinctions now rivals that of the five mass extinctions of the geological past, such as that which coincided with the extinction of dinosaurs 65 million years ago. They believe that if present trends continue, between one and two thirds of the world’s species will become extinct in the second half of the 21st century, and that it would take tens of millions of years of evolution for the number of species to again approach the current number.^{7,8} The flow-on effects of species loss are unknown.

4.1 Box-Ironbark biodiversity

Box-Ironbark forests and woodlands support a large and distinctive component of Australia's biodiversity. Excluding aquatic species, around 1 500 species of higher plants and 250 species of vertebrate animals have been recorded in the Box-Ironbark study area; the total number of lower plants (mosses, lichens, etc.) and invertebrates will be appreciably higher.^{9,10} Many of these species are largely restricted to Box-Ironbark forests and woodlands. Some key elements of Box-Ironbark biodiversity are described in the following sections.

Ecological vegetation classes (EVCs)

The distribution of plants across the landscape varies according to environmental variables such as soil moisture, fertility and acidity, slope and aspect, frequency of fire, and the occurrence of other species. Species with similar requirements tend to co-occur, leading to distinctive associations which, in Victoria, have been described as ecological vegetation classes (EVCs).

The ECC's Resources and Issues Report (1997) identified 22 EVCs which collectively characterise Box-Ironbark forests and woodlands. Since then, the major focus of studies of Box-Ironbark vegetation has been determining and mapping the extent of each EVC prior to European settlement; the 'pre-1750 extent' of each EVC. Essentially, this involves deducing the nature and distribution of EVCs in areas that are now cleared. The pre-1750 extent of each of the 116 EVCs found in the study area prior to European settlement is shown in Map B of this report.

Appendix 3 lists the 73 Box-Ironbark EVCs, and Appendix 2 gives descriptions for many of them. The substantially increased number of EVCs since the Resources and Issues Report (1997) includes many that have been almost completely cleared and were not recognised in earlier studies. In addition, in many areas (especially extensively cleared areas) it has not been possible to accurately map boundaries between different EVCs. This problem has been overcome by mapping mosaics or complexes of more than one EVC in these areas (see Appendix 2 for definitions of 'mosaic' and 'complex' as they apply to EVCs). Although, strictly speaking, these units are not EVCs, for convenience they are treated as EVCs in this report. These 'new' mosaics and complexes make up a large number of the additional EVCs. The terms and methods associated with EVCs and their mapping are also explained in Appendix 2.

Appendix 3 summarises the key statistics on the occurrence of each EVC. By far the most extensive EVC prior to European settlement was Plains Grassy Woodland (985 000 ha); other widespread EVCs include Grassy Woodland (534 000 ha) and Box-Ironbark Forest (411 000 ha). Although originally widespread, Plains Grassy Woodland and Grassy Woodland are now among the most depleted EVCs, with 1.9% and 7.4% respectively of their original extent remaining.

Threatened and declining species

Since the arrival of Europeans, Box-Ironbark forests and woodlands have been extensively cleared and fragmented for various purposes including agriculture, settlement, and gold mining, and felled for a variety of wood products. This history, along with competition and predation from introduced species, has had a major impact on the region's biodiversity, which is now noted for its high proportion of threatened species and others known to be in decline.

Loss of Box-Ironbark biodiversity is difficult to quantify with confidence because virtually no records were kept prior to the dramatic changes wrought by the gold rushes of the 1850s. Nonetheless, at least ten plant and animal species are known to have become extinct in the study area, and numerous others are known to have declined significantly, becoming locally extinct in many areas.^{9,10} At least 297 Box-Ironbark plant species and 53 fauna species are now classified as extinct, threatened or near-threatened. Appendix 1 lists the common name, scientific name and conservation status of each species named in this report.

The number of threatened species has nearly doubled since publication of the Draft Report in 2000. This is primarily the result of a recent systematic assessment by NRE (the first for many years) which uncovered many threatened plant taxa not previously recognised as occurring in the study area. The conservation status of Box-Ironbark fauna was better known when the Draft Report was published, and the number of newly recognised threatened taxa is more modest. These revisions and updates also identified about 20 species which have been removed from the Draft Report list because they are no longer considered threatened or to occur in the study area. The net effect of these updates, though, is to underline the importance of urgent action to conserve Box-Ironbark biodiversity.

Box 4.2 THE DECLINE OF BOX-IRONBARK BIODIVERSITY: EVIDENCE AND CAUSES

The loss of approximately 83% of the original extent of Box-Ironbark forests and woodlands has contributed to significant declines in species populations and ranges throughout the region. These declines are obvious at a range of scales and include extinctions at a national, regional and local level for an alarming number of species. Three Box-Ironbark species, the eastern hare-wallaby, white-footed rabbit-rat and robust greenhood, are extinct. Several others are extinct in the study area or in Victoria, including rufous bettong, eastern quoll, Australian bustard, magnificent spider-orchid and purple eyebright (*Euphrasia collina speciosa*). Malleefowl and regent honeyeater are typical examples of species formerly widespread that have undergone extensive local extinctions and are now close to regional extinction.

The pattern of local extinctions currently taking place throughout the Box-Ironbark landscape is cause for concern. Declines are documented for some populations, however limited information on historic abundance and distributions masks the level at which this is occurring. Recent evidence is extremely worrying. In Chiltern forest, seven species have become locally extinct, including the crested bellbird, which was observed to decline rapidly from the 1970s, before the last record in 1991.¹⁴ A further ten species have exhibited marked declines. Similarly, at Bendigo three species have vanished (malleefowl, blue bonnet and emu) and at least 11 are documented to have undergone substantial declines including grey-crowned babbler, hooded robin, barking owl, regent honeyeater and crested bellbird.¹⁵

Removal of a given proportion of natural vegetation, such as has occurred in the study area, is likely to result in the loss of a similar proportion of individuals from populations over time, with extinction rates expected to increase markedly when greater than 70% of habitat is lost.¹⁶ Such conditions probably account for the declines in most species, however declines are continuing to accelerate despite the cessation of widespread habitat clearance. Although a 'time lag' on species responses to past clearing operates, fragmentation processes and continued habitat degradation compound population declines.

Despite recent improvements in management, a long history of mining and timber harvesting has resulted in a loss of large trees and associated hollows, and the removal of maturing trees before formation of such large old tree features.¹⁷ This is particularly evident in timber producing areas, exemplified by the greater proportion of larger trees in many remnant patches on freehold land or in other areas not targeted for timber production.^{17,18,19} The loss of tree hollows has been shown to negatively affect species such as powerful owl and barking owl,²⁰ and the loss of hollow-bearing trees has been associated with species declines and is considered a continuing threat to wildlife.^{17,21,22} The loss of large trees and associated nectar resources has been identified as a threat to several species, including the nationally threatened regent honeyeater and swift parrot.¹⁰

Firewood collection has also been implicated in the decline of fauna.^{18,23,11,22} For example, sites deficient in fallen timber contain fewer individuals and species of birds.²⁴ The RFA process identified 6 mammal, 18 bird and at least 7 reptile species occurring in Box-Ironbark areas that are likely to be adversely affected by firewood collection, including crested bellbird, grey-crowned babbler, tree goanna and common dunnart.²⁵ Similarly, harvesting of mallee eucalypts for oil production is a key threat to Broombush Mallee EVC and associated fauna, and is a likely factor in the local extinction of malleefowl populations.

Other potentially degrading factors contributing to fauna declines in Box-Ironbark woodlands include grazing, particularly in Plains Grassy Woodland associations.¹¹ Associated removal of ground vegetation and disturbance to ground litter layer threatens ground dwelling and foraging species such as bush stone-curlew, speckled warbler and woodland blind snake.¹⁰ Degradation of drainage lines and associated gullies is a further factor in declines as these areas may act as essential source areas for surrounding populations, and provide optimum resource conditions and refuge during times of environmental stress.^{26,27}

That species declines are evident in large intact areas of Box-Ironbark forest, such as Rushworth-Heathcote forests,²⁸ is of major concern. The combined effect of fragmentation and degradation processes is pushing species and communities toward extinction. Such fragility is apparent in responses to the 1982-83 drought: near Rushworth, formerly common species were still rarely observed five years after this event,²⁸ and at Big Hill near Bendigo the drought corresponded with the last records of crested bellbird.¹⁵ Such random, but natural events deplete species populations and it will require a major conservation effort to address local species extinctions, to ensure communities and associated habitats are resilient enough to respond to such stresses in the future.

Although difficult to demonstrate, it is clear that many species continue to decline (see Box 4.2 for more details). Perhaps the most notable of these declines is that of the regent honeyeater, which, even within the four years since publication of the ECC's Resources and Issues Report (1997) has continued to decline to the point where it is now rarely recorded in Victoria. Research is now revealing many other declining species (particularly birds) not just in Box-Ironbark forests and woodlands but across the wheat–sheep belt of south-eastern Australia,^{11,12} leading to predictions that Australia will lose half its terrestrial bird species by the end of the 21st century.¹³

Because of these declines, a key feature of Box-Ironbark nature conservation is the importance of recovery for many species—a return, even partially,

to former numbers and distribution. Indeed, small population size is in itself a threat for some species (malleefowl, for example), which are unlikely to survive without a significant increase in numbers.

Large old trees

One of the most distinctive features of Box-Ironbark ecosystems is the high proportion of wildlife dependent upon large old eucalypts. Compared to small trees, large trees produce more reliable and abundant nectar and provide a greater variety of foraging sites, such as dead branches, peeling bark and fallen timber. Large trees generate a taller, more open and structurally more complex forest, and have more, and larger, hollows.¹⁰ Only large trees have hollows of sufficient size for some species such as larger possums and owls.

Box 4.3 THE ORIGINAL BOX-IRONBARK FORESTS

The largest living Box-Ironbark trees in the study area are in excess of 135 cm dbh (diameter at breast height, measured over bark). These trees grow in diameter at around 0.35 cm per year,²⁹ or about a centimetre every three years, making them at least 400 years old. If their growth rate slows as they age, they may be much older, given that few of the living large trees show signs of dying in the near future. As well as having large trunks, these trees are also taller, have wider crowns, more hollows, and produce more and larger fallen timber than younger trees.

Prior to European settlement—with little to threaten them once established—large trees such as these would generally have persisted for many decades and would have come to dominate most Box-Ironbark landscapes in terms of wood volume. Competition for resources would have constrained the density of these large trees to the order of 30 per hectare,^{30,31} with the canopy foliage of the large trees generally not in contact with that of other trees. The spaces between the large trees probably provided the main opportunities for a relatively small number of small and medium-sized trees to establish from seedlings, and ultimately replace the large trees as they died. Of course, there would have been some areas where large trees would not have been generally dominant; EVCs such as Broombush Mallee and Heathy Woodland, for example, where factors such as poor soils limit tree size.

The largest trees are now mostly restricted to small areas: usually along roadsides, public land water frontages, or on private land. They are very rare in state forest where 99.6% of trees are below 60 cm dbh,²⁹ less than half the size of the largest trees. Clearing for agriculture, and heavy cutting for wood or silvicultural treatment from the 1850s gold rushes until at least the 1960s, removed nearly all large trees.

The large trees have been replaced by much smaller stems, growing at massively higher densities (an average of 500 stems per hectare²⁹) leading to a very different forest structure (see photographs, page 31). Some of these stems actually belong to the same individual trees which were previously the large trees dominating the forest. Multiple stems have grown on from the initial coppice regrowth generated when the original large trees were first cut.

In summary, the Box-Ironbark forests and woodlands that exist today are dominated by very high densities of small trees resulting from heavy cutting of the original forests that were dominated by large, wide-crowned, hollow-rich, and widely spaced trees. This very substantial change in forest structure and large tree abundance has significant ramifications for the biodiversity, landscape, timber production, and recreational values of Box-Ironbark forests and woodlands.

Large old trees were much more abundant prior to European settlement (see Box 4.3), and many species must have adapted over many thousands of years to environments dominated by large old eucalypts. Accordingly, large old trees are important for many Box-Ironbark fauna species including at least six threatened species—brush-tailed phascogale, squirrel glider, swift parrot, powerful owl, barking owl, and regent honeyeater. The loss of large old trees is strongly implicated in the decline of these species, and perhaps many others.¹⁰ Landscapes with relatively abundant large old trees are also likely to be important for many plant species.

The significance of large old trees is much greater than the usual measures of conservation significance, such as the diversity or scarcity of the species supported, or the habitat diversity provided in a landscape dominated by younger forests. Places with abundant large trees and intact forest structure are of particular value for their resemblance to the natural, or pre-European, state of Box-Ironbark forests and woodlands and hence their ecological integrity. That is, their ecological relationships are less likely to include artificial factors than those in more disturbed areas. As well as the intrinsic value in maintaining natural ecological relationships, such forests are of great practical value in providing a framework or target to guide the management of land for nature conservation, and to inform ecological research.

As well as their nature conservation values, places with relatively abundant large trees and intact forest structure have high cultural and aesthetic values. Their cultural values stem from their great age, which inspires a strong sense of spirituality and wonder, both of itself and by evoking the vast pristine Box-Ironbark forests and woodlands of pre-European Australia. There is an intrinsic value in ecological integrity that is related to less tangible values such as ‘naturalness’. Together, their antiquity and similarity to undisturbed forests gives them considerable existence value; gratification in merely knowing that they exist. Similarly, places featuring numbers of large old trees provide landscape diversity, as well as having high scenic value in their own right, especially as a result of the open and diverse forest structure and the grandeur of the large trees.

Gullies

While the topography of Box-Ironbark forests and woodlands is mostly quite gentle, there are nonetheless recognisable drainage lines or gullies throughout the forests. The major drainage lines contain permanent rivers and streams. The more common, smaller gullies and depressions, however, rarely contain flowing water but their soil is moister, deeper and richer than that of nearby slopes. These differences may result in distinct EVCs, such as Creekline Grassy Woodland or Alluvial Terraces Herb-rich Woodland, but even within the same EVC differences in the flora and fauna are usually distinct.

Key differences in the flora and fauna include more species and individuals, higher reproductive rates, different mixes of species, and possibly higher levels of nectar production in the gullies.¹⁰ Because of their higher moisture levels, gullies are thought to act as refuges from drought and fire. They are often the last refuge of declining species¹⁰ and frequently have high densities of large old trees. Gullies are important for many threatened species, such as powerful and barking owls. Overall, gullies support a much higher proportion of Box-Ironbark biodiversity than the 2% of land that they occupy.

However, gullies have also been disproportionately disturbed. Because of their higher productivity they are more likely to have been cleared for agriculture and grazed by domestic stock, and are often more severely affected by weed invasion than adjacent slopes. They have also been targeted by shallow alluvial gold-miners from the 1850s to the present, particularly in the forests of the Dunolly–Inglewood area.

Protection and management of gullies for nature conservation is an important priority for Box-Ironbark forests and woodlands.

Landscape fragmentation

In all parts of the study area, the majority of indigenous vegetation has been cleared, and the remaining vegetation is generally highly fragmented. However, the loss of indigenous vegetation to clearing varies greatly across the study area, with the areas most suitable for agriculture much more severely affected than others, leaving less than 10%, sometimes much less, remaining in many areas.

This high degree of fragmentation and loss of indigenous vegetation has severe impacts on biodiversity,¹⁰ increasing the imperative to conserve

as much as possible of what remains. At the same time, however, the small and fragmented extent of public land in these landscapes greatly constrains options for nature conservation. In particular, the option of protecting values in relatively large consolidated parks and reserves is precluded. Consequently, the significance for biodiversity conservation of freehold land, which often supports a high proportion of biodiversity in these areas, is greatly increased.

In many areas owners of adjacent freehold land are already involved in the management of significant public land areas, especially roadsides and water frontages. In addition, local communities have a keen interest in land management in general and biodiversity conservation in particular, and for this reason alone are key stakeholders. Not surprisingly, the most successful nature conservation programs in highly fragmented landscapes have been led by local community groups, in co-ordination with other stakeholders in local land management. The work of local people near Nathalia in assisting the recovery of the nationally vulnerable superb parrot is an excellent example of the success of this approach.

In regional areas where many issues and stakeholders are involved, there is increasing recognition of the value of innovative approaches to land management problems by linking related conservation and land protection measures within catchments, and working with local communities.

4.2 The conservation reserve system

In the 1990s, a more sophisticated and systematic consideration of reserve systems arose from the recognition of their central role in biodiversity conservation. International thinking has been led by the World Conservation Union,⁶ which has developed definitions and classifications for protected areas; that is, areas managed primarily for nature conservation.³²

In terms of terrestrial reserve systems, developments in Australia have largely come under the auspices of the National Reserve System (NRS)³³ and Regional Forest Agreement (RFA) processes, both of which have been strongly supported by all State and Commonwealth Governments since the inception of each process in 1992.

The RFA process (see Chapter 1 for a broader description) has focussed on forest ecosystems in designated regions. The last two Victorian RFAs

were signed in March 2000. The NRS is less formal, covering terrestrial ecosystems other than those considered under the RFA process, with particular emphasis on adding poorly reserved environments to the national reserve system, using a bioregional approach.

The inclusion of areas in the NRS is determined using the IUCN definition of a 'protected area'.³² The RFA process uses other criteria (detailed below) and, as emerged in response to the ECC's Draft Report, the differences between the two approaches lead to some small but significant differences in the reserve systems they generate.

To resolve these differences properly requires a national perspective, well beyond the ECC's brief. As a result, the reserve system used here remains essentially the same as that used in the RFA process (in accordance with the terms of reference), with some adjustments to incorporate elements of the NRS approach.

The JANIS criteria

A key product of the RFA process has been the development of nationally agreed criteria for the establishment of a forest reserve system for Australia, widely known as the JANIS criteria.⁴ Through successive RFAs, these criteria have been the benchmark for region-based assessment and establishment of forest reserve systems. The terms of reference for the Box-Ironbark investigation specify that the ECC is to consider these nationally agreed criteria.

Recognising that the reserve system should in the first instance be selected from public land, the JANIS criteria identify three public land components of the reserve system, in decreasing order of preference:

dedicated reserves: reserves established by legislation for conservation purposes and for which a Parliamentary decision is required to revoke their status;

informal reserves: areas reserved under other secure tenure or management arrangements, where it is not possible or practical to include conservation values in dedicated reserves; and

protection by prescription: values protected by prescription where protection in reserves is impracticable because of the nature of the value.



A forest dominated by a high density of small stems.

In Victoria, as indicated in the terms of reference for the Box-Ironbark investigation, the second and third of these components are generally the responsibility of public land managers. Informal reserves, mostly Special Protection Zones, will result from forest management planning undertaken by NRE in most Box-Ironbark state forests in the study area after the completion of the ECC investigation. Accordingly, the ECC does not include any state forest in the reserve system. Other measures taken by NRE, such as Special Management Zones and prescriptions for timber harvesting,³⁴ give a level of protection to natural values and complement the reserve system but, similarly, are not included as part of the reserve system.

NRE (through Parks Victoria) is responsible for management of nearly all dedicated reserves in Victoria.

The ECC's reserve system

Table 4.1 lists the major Box-Ironbark public land categories and identifies those which are included in the ECC's reserve system for Box-Ironbark forests and woodlands.

As explained above, this reserve system differs from that adopted in the Draft Report in that it incorporates elements of the NRS approach to defining reserve systems. Most significantly, it excludes those areas which are not specifically managed for nature conservation. Advice from NRE is that many existing regional parks are available for timber harvesting or are not managed for nature conservation,³⁵ Consequently, it is generally not appropriate to include existing regional parks in the reserve system. In contrast, the ECC is recommending that timber harvesting be generally excluded from Box-Ironbark regional parks and that they be managed for nature



A forest with relatively intact structure; widely spaced, very large trees with abundant hollows and fallen timber.

conservation (along with recreation). As a result, existing regional parks are now generally not included in the ECC's reserve system, whereas the regional parks recommended in this report are generally included in the ECC's reserve system.

In summary, then, the ECC reserve system is composed of:

- national parks,
- state parks,
- national heritage park,
- recommended regional parks,
- reference areas,
- nature conservation reserves, and
- natural features reserves other than public land water frontages and those wildlife reserves where hunting is allowed.

There are various specific exceptions to this list, such as Special Protection Zones which may be designated in state forest after the completion of the Box-Ironbark investigation, with state forests in general remaining outside the reserve system.

Dedicated reserve status of land in the categories included in the reserve system is conferred by one of three Parliamentary Acts. National, state and national heritage parks are scheduled and managed under the *National Parks Act 1975*, nature conservation reserves, regional parks, and natural features reserves are reserved and managed under the *Crown Land (Reserves) Act 1978*, and reference areas are proclaimed and managed under the *Reference Areas Act 1978*. The details of four exceptions—the existing Beechworth Park, Reef Hills Park, Deep Lead Flora and Fauna Reserve, and Sandhurst Reference Area—are provided in the relevant sections of Chapters 15, 16 and 18.

Table 4.1 Summary of ECC's reserve system status of public land use categories

Public land use category	Level of protection ¹	Management priority ²	ECC reserve system
National park	high	high	3
State park	high	high	3
Reference area	high	high	3
Nature conservation reserve	moderate	high	3
National heritage park	moderate	high	3
Regional parks existing	moderate	low	7
recommended	moderate	moderate	3
Natural features reserves			
Wildlife reserves	low	moderate	7
Public land water frontages	low	low	7
Other natural features reserves	moderate	moderate	3
Historic and cultural features reserve	moderate	low	7
Community use areas	low	low	7
Water production	moderate	low	7
State forest	low	moderate	7
Earth resources	low	low	7
Services and utilities	low	low	7
Commonwealth land	moderate	low	7

¹ Formal constraints on major potentially threatening uses (timber harvesting, grazing, mining, hunting).

² Management priority given to nature conservation.

³ Generally included in the reserve system.

⁷ Generally not included in the reserve system.

Note: Full explanations of levels of protection and management priority in relation to reserve system status are provided in Appendix 8. The ECC is not proposing to change the uses generally permitted in the various public land use categories. This table is applicable to existing and recommended public land use categories, with the exception of regional parks as specified in the table and explained in the text. It is important to understand that these assessments apply to categories in general, and that there are many exceptions. For example, some existing wildlife reserves where hunting and grazing are not allowed provide a moderate level of protection and, therefore, come within the ECC's definition of reserve system.

CAR – comprehensive, adequate and representative

Recent thinking on reserve systems has recognised the importance of an ecological basis for designing reserve systems.³³ Establishing reserve systems without a systematic ecological basis almost invariably leads to imbalances. Typically areas most intensely subject to human use, and consequently often in most need of protection, are poorly represented in reserve systems. This situation is well illustrated by the proportion of the Box-Ironbark study area currently in conservation reserves (3%), compared to Victoria as a whole (15%).³⁶

To address this problem, the JANIS criteria specifically focus on the establishment of a comprehensive, adequate and representative (CAR) reserve system. In terms of Box-Ironbark forests and woodlands, these terms may be defined as follows (see JANIS 1997⁴ for full definitions):

Comprehensive: includes examples of the full range of ecosystems within each Victorian bioregion that contains Box-Ironbark forests and woodlands

Adequate: of sufficient size and number, and appropriate shape, to ensure the maintenance of

ecological viability and integrity of biological populations, species and communities

Representative: areas selected for inclusion in reserves should reflect the diversity of the flora and fauna within each of the protected habitats and biological communities.

In short, the reserve system should contain examples of all types of ecosystems (comprehensive). For each ecosystem the examples should be of sufficient size to maintain the integrity of its biodiversity (adequate) and sufficiently large and widely distributed to cover the range of biological variation in the ecosystem (representative). The terms of reference for the Box-Ironbark investigation require the ECC to have regard to the nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system.

To provide a framework for the establishment of a CAR reserve system at the national scale, 80 terrestrial biogeographic regions have been identified and mapped across Australia.⁴⁹ Subsequent work has refined these regions in Victoria to develop bioregions,³⁷ five of which overlap with the study area—Goldfields, Victorian Riverina, Northern Inland Slopes, Wimmera, and Central Victorian Uplands (see Map 4.1 below).

Biodiversity criteria

To assist in calibrating reserve system protection of biodiversity, old growth and wilderness values, JANIS provides criteria for appropriate levels of representation of these values in a CAR reserve system. There is no Box-Ironbark wilderness, and only very small areas of old-growth have been identified, although large old trees and sites where they are abundant are particularly important (as explained earlier in this section).

The JANIS biodiversity criteria (summarised in Appendix 8) specify appropriate minimum representation levels for ecosystems in each bioregion according to the status of each ecosystem.

More threatened or depleted ecosystems require higher levels of reserve system representation. The most widely known JANIS biodiversity criterion is inclusion of 15% of the pre-1750 extent of each ecosystem in the reserve system. In Victoria, EVCs have generally been used as surrogates for ecosystems when establishing and assessing reserve systems.

When interpreting the JANIS biodiversity criteria for Box-Ironbark forests and woodlands, the ECC was conscious of two key points:

Flexibility: the need for flexibility in the application of the criteria, ‘to ensure that the CAR reserve system delivers optimal nature conservation outcomes as well as acceptable social and economic outcomes’, is strongly emphasised in the explanation of the criteria and their application.⁴

Context: in the RFA process, the JANIS criteria have been applied to forest landscapes with a relatively large proportion of off-reserve areas supporting substantially intact indigenous vegetation, whereas indigenous vegetation has been cleared from 83% of the Box-Ironbark study area, and nearly all the remaining 17% has been substantially altered, and is highly fragmented.

The emphasis on flexibility has a similar effect to the requirement in the *Environment Conservation Council Act 1997* (and terms of reference for this investigation) to make recommendations for ‘balanced’ use and development of public land.

The Box-Ironbark context—a high level of depletion of native vegetation—is both a reason for establishing a proportionately larger reserve system than in other regions where more native vegetation remains, and a major constraint on doing so. That is, the remaining extent of many Box-Ironbark EVCs on public land is insufficient to meet the JANIS criteria or, many of the public land units supporting highly depleted Box-Ironbark EVCs are small (less than 10 ha) and largely cleared or severely degraded. Such blocks would be very expensive to manage, with generally little reason to expect a significant contribution to the conservation of Box-Ironbark biodiversity.

Box 4.4 CURRENT RESERVE SYSTEM

Representation of Key Values

The existing Box-Ironbark reserve system, with a total area of about 69 470 ha, is composed of 8 national and state parks, 1 regional park, 11 reference areas, 35 nature conservation reserves, and numerous natural features reserves.

EVCs

Detailed statistics on the representation of EVCs in the existing Box-Ironbark reserve system are provided in Appendix 3. Fifty-nine out of 73 Box-Ironbark EVCs satisfy JANIS criteria for rare, endangered or vulnerable ecosystems. These criteria (summarised in Appendix 8) are based on the spatial extent of each EVC, so an EVC can be well represented in the reserve system but still classified as rare, for instance.

Representation of these 59 threatened EVCs in the existing reserve system is below the JANIS criteria. Representation of the 14 other EVCs in existing parks and reserves varies considerably. EVCs which occur on rocky hilltops not favoured for agriculture or timber production are well represented. For example, 25.5% of pre-1750 extent of Granitic Hills Herb-rich Woodland is represented in reserves. In comparison, Box-Ironbark Forest, which is characterised by durable timber eucalypts, is poorly represented in reserves (3.6% of pre-1750 extent).

Of the 14 EVCs which are not rare, endangered or vulnerable, ten have less than 15% of their pre-1750 extent in the current reserve system.

Threatened species

Appendix 9 summarises the current reserve system representation (percentage of known locations in the reserve system) for a selection of key threatened species—those which are most dependent upon reserve system protection or are most threatened.

For fauna, estimates of representation vary from around 17% for the wide-ranging swift parrot, to 77% for the turquoise parrot which occurs predominantly in the north-east of the study area where the existing reserve system is most extensive.

For plant species, variations in representation percentages are much greater because many species are found only in a small number of populations, all of which may be within or outside the reserve system. For example, the only populations of large-fruit fireweed and long-tail greenhood are, respectively, entirely within and entirely outside the current reserve system.

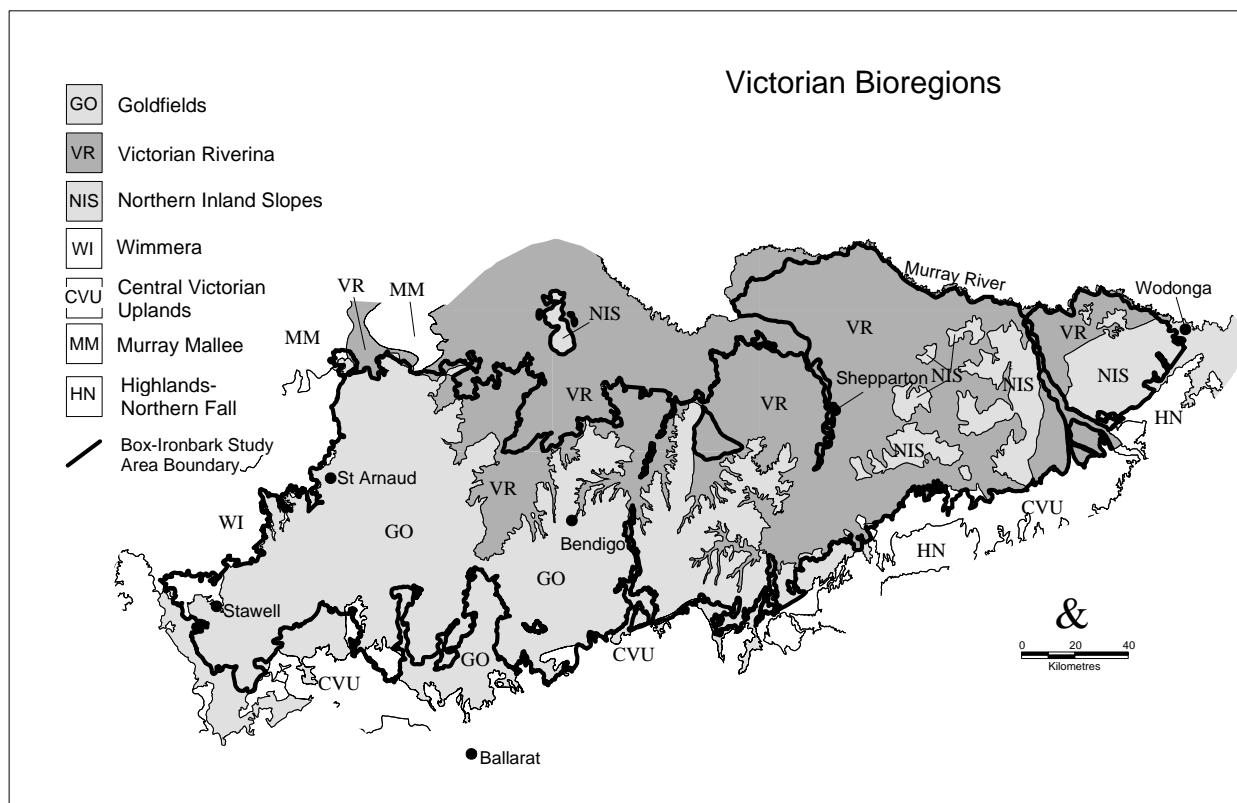
Large old trees

Box-Ironbark public land has been comprehensively surveyed to identify sites with the greatest abundance of large old trees (greater than 60 cm dbh).^{38,19} These surveys identified 126 sites covering 26 279 ha, or 7% of the total public land estate. Of these sites, 17 (13% by number, 27% by area) are in the current reserve system. Nearly all the sites outside the reserve system are in state forest.

Gullies

The study area has also been comprehensively surveyed for 'fauna refuges', essentially gullies which are thought to be important for fauna in times of drought.^{19,39,40} Of the 255 sites identified in these studies, 49 (19% by number, 30% by area) are in the existing reserve system.

Map 4.1. Victorian bioregions in the Box-Ironbark study area



4.3 Community views

Public consultation following the Draft Report re-affirmed the strong support for the conservation of Box-Ironbark biodiversity, and the critical role of public land in achieving it. Consultation also re-affirmed the divergent views on the best method to conserve biodiversity—that is, the alternative approaches of larger reserve system additions, versus tighter controls on existing uses. Some considered nature conservation and utilisation of forests and forest resources to be compatible. Similarly, many saw pest plants and animals as the only significant threat to Box-Ironbark biodiversity and, therefore, the main issue to be addressed, as opposed to reserve system protection.

Some doubts were raised about whether or not Box-Ironbark biodiversity was still in decline and, if so, about the causes of this. The inclusion of woodlands in the investigation was also challenged. These issues are considered in Box 1.1 and Box 4.2.

Several people also questioned the ECC's interpretation of the original structure of Box-Ironbark forests, dominated by around 30 large

trees per hectare (as presented in Box 4.3), although little evidence was provided to support these doubts. Note that there would have been many areas (such as Broombush Mallee EVC) with a different structure, and there would have been varying densities of smaller trees interspersed within the large trees—although the large trees would have dominated the forest, in terms of appearance and wood volume, for instance.

The importance of involving local stakeholders in biodiversity conservation on public land was also re-affirmed particularly in relation to the proposals for the Broken-Boosey Creeks system.

4.4 Achieving a balance

Recognising the importance of, and substantial community support for, Box-Ironbark biodiversity protection and the pivotal role which conservation reserves play in its conservation, the ECC has recommended a significant increase in the Box-Ironbark reserve system to bring it to a level which reflects its significance and susceptibility to threats, and which is comparable with the extent of the reserve system in other regions of Victoria.

The ECC strongly supports the crucial role of the reserve system in Box-Ironbark conservation. While other factors, such as pest plant and animal control, are certainly a major threat to Box-Ironbark biodiversity, there are many other threats and all of these need to be addressed if the urgent need to improve Box-Ironbark conservation is to be achieved. Contrary to some views, there is little quantitative evidence that the pest plant and animal problem is worse in parks and reserves than in other public land use categories and, even if it was, the appropriate reaction would be to improve control, rather than not establish more parks and reserves. The ECC is recommending measures targeting pest plant and animal control across all public land (see Recommendations R3 and R4 in Chapter 3).

The recommended reserve system additions have been carefully chosen to maximise inclusion of those values which are most dependent on reserve status for their protection, and to minimise the constraints placed on other uses. Large areas of public land remain outside the recommended reserve system and are generally available for existing uses. To complement this expanded reserve system, the ECC is also recommending measures to improve management for nature conservation in the substantial areas of public lands that are recommended to remain outside the reserve system.

Numerous changes relevant to nature conservation have been made to the proposals in the Draft Report. A very large number of these are small but significant modifications to reserve boundaries or reserve system additions based on the detailed local knowledge of the many people with a keen interest in particular areas of Box-Ironbark. These recommendations have been greatly improved as a result of this information, and the ECC is grateful to those who went to great trouble to provide it.

There have been other changes in the ECC's perspective following public consultation. Most notably, around 5 000 ha proposed in the Draft Report as reserve system additions, are now recommended to remain mostly as state forest. These changes are coupled with a new recommendation to guarantee large tree recruitment in timber harvesting operations.

Ecological vegetation classes (EVCs)

The ECC is recommending that a Box-Ironbark reserve system be established which essentially meets the nationally agreed criteria (JANIS) for a

comprehensive, adequate and representative reserve system (see Box 4.5).

Recommended representation levels for 11 of the 14 EVCs that are not vulnerable, rare or endangered, are greater than 15% of their pre-1750 extent. Recommended representation levels for the various vulnerable, rare or endangered EVCs vary widely, but many are poorly represented. Typically, each of these poorly represented EVCs occurs in a large number of widely scattered small patches, which are neither practical nor desirable as dedicated reserves. Some poorly represented EVCs occur in small, scattered pockets within large state forest blocks. Forest management zoning, to be undertaken after the Government decision on the ECC recommendations, will provide further opportunity for reserve system additions and potentially significant improvement in representation.

However, regardless of forest management planning, several of the most depleted EVCs will remain poorly represented in the reserve system. The occurrence of these EVCs on public land is now restricted to isolated small units of public land (mostly less than 20 ha), and mostly on the northern plains. Where these units contain natural values of high significance, the ECC is recommending that they be added to the reserve system as nature conservation reserves, or in one particularly significant and more consolidated area, as the Broken-Boosey State Park. Many of the remaining small units with native vegetation in reasonable condition are recommended as natural features reserves—the current category for many of them.

Nonetheless, many small blocks without high values other than the presence of threatened EVCs, often in relatively poor condition, remain outside the reserve system. There are several thousand such blocks. Adding them all to the reserve system, and attempting to manage them in an appropriate manner, would be much less practical, less cost-effective and less likely to succeed than the cooperative management arrangements with local stakeholders recommended below (see Recommendation R13).

Threatened species

A substantially increased reserve system is needed to arrest the decline and initiate the recovery of Box-Ironbark biodiversity, and threatened species in particular. However, it is recognised that 'reserve system' status places constraints on some users.

The keys to minimising potential conflict are:

- to give priority to those species which are most threatened and most dependent on reserve system protection;
- to match species as closely as possible to the most appropriate public land category for their conservation; and
- to select areas where values overlap.

For example, the superb parrot, which occurs at the southern limit of its distribution along roadsides near Nathalia, requires sensitive management and revegetation of these roadsides, rather than a change in land status. On the other hand, the pink-tailed worm-lizard occurs only in a single small population near Bendigo, where parts of its habitat are potentially threatened by surface mining and eucalyptus oil harvesting, and where active management of its habitat may be required. Changing the status of land where the pink-tailed worm-lizard occurs, to a category which protects it from these threats and provides impetus for improved habitat management, is a high priority for its conservation.

The ECC is recommending significantly increased reserve system protection for many threatened species for which reserve system protection is a high priority (see Appendix 9 for more detail).

Large old trees

The ECC's broad vision for Box-Ironbark forests on public lands sees extensive landscapes dominated by conspicuously fewer, wider-spaced and much larger and older trees than is currently the case. This original forest structure would optimise biodiversity, landscape and timber production values. Relatively small volumes of selectively harvested large trees would then be available from state forests. Because the highest value timber is produced from large trees, small volumes have the potential to support a sawlog-focussed industry generating more employment and wealth than the existing timber industry (see Chapter 8 for more detail).

Although restoration of the original forest structure will take many decades, this vision provides both the impetus to implement the actions required without delay, and the framework in which to do so.

Increasing the number of large old trees throughout Box-Ironbark public lands entails:

- protection of existing large old trees, particularly in places where they are most abundant;
- protection of medium-sized trees—the large old trees of the future; and
- thinning of areas with high stem densities to increase the growth rate of retained trees.

To this end, the recommended reserve system contains 69% of the total number, and 89% of the total area of sites, identified as containing high numbers of large old trees. Because of the need for a high level of long-term protection, many of the large old tree sites selected for incorporation into the reserve system are included in recommended state and national parks.

The ECC is also recommending in Chapter 17 that:

- identified large old tree sites recommended to remain in state forests be made informal reserves;
- no cutting of large trees 60 cm dbh or larger permitted; and
- nature conservation be an important use along with timber production throughout state forests (the largest single public land use category recommended).

Currently, thinning is used as a silvicultural treatment in state forests to reduce the number of small diameter stems, and allow relatively few retained stems to grow more quickly, without competition stunting their growth. The primary objective of this management in state forest is, ultimately, to produce trees of sawlog size for harvest.

For habitat and landscape purposes, there is also a need in parks and reserves to maximise the number of large trees as quickly as possible, without compromising other considerations such as maintaining an appropriate balance of juvenile, intermediate and mature trees. This might be best achieved by removing some smaller diameter stems in those parts of parks and reserves where competition is significantly constraining the development of larger stems. Such 'ecological thinning' (as opposed to silvicultural treatment) should be driven only by ecological needs, not by commercial timber production needs, and managed

at the discretion of the park or reserve manager. It must be adequately researched, tested, and planned before being applied on a broad scale.

Thinning to meet ecological objectives could be quite different from silvicultural thinning. A range of techniques may be required, including ongoing management to limit and control coppice regrowth. In addition, research is required in relation to other factors, such as the appropriate balance between leaving wood on the ground as fauna habitat and fire suppression requirements. Research to date has

focused on silvicultural objectives,^{41,42} and research to identify the most appropriate thinning regimes for ecological objectives is a high priority (see Recommendation R12).

Other ecological management techniques could involve the use of fire, or injuring trees to stimulate hollow growth. Preparation of an ecological management strategy to coordinate research and implementation of these initiatives would greatly assist their effectiveness.

Box 4.5 RECOMMENDED RESERVE SYSTEM

Representation of Key Values

EVCs

The existing Box-Ironbark reserve system area is about 69 470 hectares. As shown in Appendix 3, the ECC has recommended enlarging this by approximately 121 020 hectares, taking the total reserve system area to about 190 490 hectares. This is more than doubling the size of the existing system.

For the main 11 EVCs that are neither vulnerable, endangered nor rare, recommended representation at the study area level varies from about 18% of the pre-1750 extent for Box-Ironbark Forest to some 68% for Alluvial Terraces Herb-rich Woodland/Heathy Dry Forest Mosaic. The recommended representation of these EVCs at the study area level is greater than that advocated in the JANIS biodiversity criteria.

Eight EVCs are vulnerable, with representation levels for those with more than 100 hectares on public land varying between 2% for Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic, and around 10% for Creekline Grassy Woodland/Red Gum Wetland Mosaic and Heathy Woodland. Of the remaining 51 rare or endangered EVCs, representation varies from zero for a number of generally very restricted EVCs to 49% for Sedge-rich Woodland. However, many of the rare or endangered EVCs have a high proportion of their public land extent (up to 100%) in the reserve system.

Threatened species

Appendix 9 summarises the recommended reserve system representation for a selection of key threatened species—those which are most dependent upon reserve system protection or are most threatened. Except for seven species with a high proportion of locations on freehold land, all threatened species in Appendix 9 have recommended representation levels above 50%, whereas few species have current representation levels above 50%. Significantly higher reserve system representation is recommended for species dependent on large old trees, such as the brush-tailed phascogale, powerful owl, barking owl, and for the highly threatened pink-tailed worm-lizard, bald-tip beard-orchid, long-tail greenhood, lowly greenhood, tick indigo and whorled zieria.

Large old trees

The ECC is recommending that 87 of the 126 identified large old tree sites,^{38,19} be included in the reserve system. These sites cover 89% of the total area of large old tree sites, an increase of 62% on current representation. Over 90% of the sites outside the recommended reserve system are in state forest; the rest are in Puckapunyal military area.

Gullies

The recommended reserve system encompasses all or part of 150 of the 255 fauna refuge gullies identified in the study area,^{19,39,40} or 56% by area.

Gullies

As with many EVCs with small, fragmented distributions, gullies are not readily encompassed in large consolidated parks and reserves. In addition, gullies may be less threatened by some land uses than other areas, reducing the imperative for reserve system protection. For example, values dependent on the fertile soils of gullies may be unaffected by timber harvesting, unlike future and existing landscapes of large old trees.

The ECC's recommended reserve system doubles the total area and triples the number of identified fauna refuge gullies^{19,39,40} represented in the reserve system.

Fragmented landscapes

The ECC has a limited role, and cannot make specific recommendations, pertaining to freehold land. At the same time, the importance of integrating freehold and public land management, and involving local communities in the management of public land, is keenly appreciated.^{43,44}

Accordingly, the ECC is recommending the establishment of 'Conservation Management Networks' to coordinate and facilitate communication between stakeholders with an interest in biodiversity conservation in appropriate parts of the Box-Ironbark study area (see Recommendation R14). It is not the ECC's role to be prescriptive about the form that these networks might take; it is important that, from the very start, local stakeholders develop approaches which reflect their particular circumstances and aspirations. However, some suggestions as to the format of the recommended Conservation Management Networks are provided in Appendix 12. Much can also be learnt from Conservation Management Networks which have recently formed in other parts of south-eastern Australia.⁴⁵

The main prerequisites for appropriate areas are approximately equivalent distribution of significant biodiversity values on freehold and public land in the area, and a pre-existing interest in local biodiversity conservation in the local community. Good candidate areas may centre on:

- the recommended Wychitella Nature Conservation Reserve (see Recommendation D3);
- the Newstead area, south of Maldon;
- roadsides and other small remnants in the Picola district;

- clusters of significant roadsides and streamsides in the area broadly between Dookie and Euroa;
- the Chesney Vale Hills around the recommended Mt Meg Nature Conservation Reserve (see Recommendation D65);
- the Lurg Hills south of Wangaratta;
- the Boorhaman Plains between Rutherglen and Wangaratta; and
- areas adjacent to the recommended Broken-Boosey State Park (see Recommendation B2) and nearby nature conservation reserves.

In some of these areas, there is already interest in cooperative conservation measures along the lines of the recommended Conservation Management Networks. Indeed, the Picola and District Superb Parrot Foraging Habitat Project could serve as a model for other networks. This project, involving over 20 local landholders, has been running for nine years, in which time over 40 000 trees have been planted in the area to assist recovery of the nationally vulnerable superb parrot. As with other similar successful networks, this project owes much of its success to the strong and consistent commitment of key individuals in the early years of the project. Consistent institutional support, from agencies such as public land managers and Catchment Management Authorities, can be of great assistance in maintaining constancy in the critical initial stages.

Rather than attempt to establish Conservation Management Networks in all of these areas at the outset, the ECC is recommending a pilot Conservation Management Network for the area around the recommended Broken-Boosey State Park (see Recommendation B2).

However, the consequences of failing to arrest and reverse the loss of biodiversity in these landscapes may be very serious, and action taken sooner rather than later will be more cost-effective and less likely to fail. Catchment Management Authorities, in partnership with public land managers, where appropriate, are ideally placed to identify appropriate locations, and provide the impetus for the establishment of networks operating at the landscape scale as part of their overall strategies for native vegetation management and biodiversity conservation. They have already undertaken many important initiatives to this end, particularly with the assistance of the Natural Heritage Trust.

RECOMMENDATIONS

Several recommendations to improve Box-Ironbark nature conservation apply to specific public land use categories and, accordingly, are formally documented elsewhere:

- the reserve system itself is recommended in a series of recommendations for individual national and state parks (in Chapter 15), regional parks, nature conservation reserves, and some historic and cultural features reserves (in Chapter 16), and reference areas and some natural features reserves (in Chapter 18);
- as part of a long-term vision to achieve a reserve system which more closely resembles pre-European forests, implementation of an ecological management strategy including ecological thinning in the reserve system is recommended in Chapters 15 and 16;
- protection for large old tree sites on Commonwealth land is proposed in Chapter 13; and
- incorporation of large old tree sites in informal reserves, retention of large old trees, and nature conservation as an important use in state forest, are recommended in Chapter 17.

R12 The Department of Natural Resources and Environment initiate an ecological management strategy to achieve a reserve system that more closely resembles the pre-European forests, with an appropriate balance of juvenile, intermediate and mature trees, and specifies the nature of any ecological thinning, as defined above.

R13 The managers of the recommended Broken–Boosey State Park (Recommendation B2) and adjacent nature conservation reserves (Recommendations D58 to D64), together with the Goulburn Broken Catchment Management Authority, establish and support a pilot ‘Conservation Management Network’ to complement public land nature conservation in the Broken–Boosey Creeks system.

R14 The Goulburn Broken, North Central and North East Catchment Management Authorities, in partnership with appropriate public land managers, investigate and pursue opportunities to establish Conservation Management Networks at suitable locations in their regions.

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- | | |
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5 Aboriginal interests

Aboriginal people in the Box-Ironbark study area are today largely concentrated in the Shepparton–Mooroopna, Echuca–Barmah, Ballarat, Bendigo and Maryborough areas, however Aboriginal associations within the study area and in Victoria as a whole date back many thousands of years. Chapter 6 discusses non-indigenous cultural heritage issues.

5.1 Background

The relationship of Australia's indigenous people to our land and waters is different to that of other Australians. It is based on a long tradition of ownership, stewardship, utilisation and cultural significance, a tradition that continues in many parts of Australia.

The cultural associations and concerns of Aboriginal peoples for the land and its resources remain strong, even in areas where they have been historically dispossessed. The contemporary cultural importance of the land and its resources to Aboriginal peoples stem from their strong, continuing sense of belonging to and responsibility for particular tracts of country, including both land and water areas within their traditional estates.

Aboriginal associations with the Box-Ironbark study area are strong and Aboriginal communities continue to assert their association with all of their ancestral areas. For Aboriginal people, their cultural heritage is enmeshed with their spiritual, ecological, and economic connection with the land and water.

There are several Aboriginal groups who strongly associate with the Box-Ironbark investigation area, including the:

- Dhuudhoroa
- DjaDjaWurung
- Taungurung
- Wotjabaluk
- Yorta Yorta.¹

Evidence of early Aboriginal occupation can be found throughout the study area. This is demonstrated by hundreds of places or sites of archaeological, cultural and spiritual significance. For example,

skeletal remains from Kow Swamp, outside the study area but near Terrick Terrick, have been dated to 13 000 years before present, and a carbon date from Lake Tyrell, a little further distant but still adjacent to the Box-Ironbark region, suggests more than 23 000 years of human occupation.

Impact of European contact on communities

Aboriginal peoples and their culture within the study area were very significantly affected by the arrival of Europeans, and European settlement. With the arrival of European settlers came disease, massacres, dispossession and the forced removal of Aboriginal peoples from their land to missions and reserves.

There are numerous massacre sites and mission and reserve sites within the study area. These sites are extremely significant to Aboriginal peoples; for many this is where their families and ancestors lost their lives. Protection of these places is vitally important to Aboriginal communities.

More detailed information on Aboriginal associations, and European contact and post-contact with Aboriginal communities in the study area is provided in Chapter 2 of the ECC's Resources and Issues Report (1997).

Traditional Aboriginal uses

Woody plants were basic materials for much of Victorian Aboriginal culture. The majority of utilised woody plants were trees; a small number of vines were also used. Box-Ironbark forests and woodlands provided very popular wood and plants for:

- food and shelter
- medicinal purposes
- canoes

- spears, shields, nulla nullas (clubs) and boomerangs
- tools, dishes and other implements.

Examples of these uses, many still practised today, are provided below.

Different Aboriginal groups utilised the Box-Ironbark forests and woodlands for different purposes. Some groups gathered the flower of the eucalyptus blossom and soaked them in ‘coollomuns’ (a Aboriginal word for round/oval bark bowls usually cut from the knobs or elbows of trees). Sugary pellets of dried sap were often eaten as a sweet. Eucalyptus oil was used for the treatment of colds.

The bark of ironbark trees was often used for constructing shelters and huts. The bark was also used for drawings illustrating events and stories and tribal markings.

There are hundreds of scar trees, varying in size, located in the study area. Most of these trees are found near streams, rivers and lakes. Box species are especially good for making canoes because of their durability and strength. Box-Ironbark species were also used extensively to make implements and tools.

Box-Ironbark species were commonly used for making shields. Shields represent the strong ongoing relationship and connection with the land and environment. Shields were incised with bands of chevron and herringbone patterns. Most shields were used in combat. Broad and thin shields were used to carry spears and narrow shields were used to deflect blows and clubs. The colours, carvings and lines on shields tell Aboriginal people who they are and most importantly where they come from.¹

Saplings of ironbark were used for making spears and the limbs were used for making returning boomerangs. Boomerangs were sometimes used for killing birds and small animals, and recreational purposes. Nulla nullas (clubs) were made from Box-Ironbark species due to the density and strength of the wood. Nulla nullas were used to club animals; they vary in size and pattern. Some may have a pointed bulbous head, cylindrical shaft and a pointed handle. Many of the heads of nulla nullas are decorated with incised zig-zag patterns or a series of dashes. Once again, these patterns represent the people and where they come from.

More detailed information on traditional uses is provided in Chapter 2 of the ECC’s Resources and Issues Report (1997).

5.2 Aboriginal cultural sites and places

There are thousands of Aboriginal cultural sites and places located throughout the study area. Aboriginal cultural sites and places include:

- art sites;
- corroboree sites;
- meeting places;
- ceremonial sites;
- rock wells;
- grinding rocks;
- burial mounds;
- middens;
- scar trees;
- artefacts and tools;
- massacre sites; and
- missions and reserves.

An Environment Australia data audit² carried out in 1996 reviewed the extent and results of various surveys of Aboriginal archaeological and historical places. The 1996 audit indicated that about 4 200 Aboriginal archaeological places were recorded in the wider Box-Ironbark investigation area. Of these, over 1 300 occur on Box-Ironbark public land.

There are well known rock paintings near Stawell, and at Mt Pilot. Rock shelters are found in the Kooyoora Range and at Terrick Terrick. Scar trees, the most common archaeological type in Victoria, are found throughout the region, particularly along streams and around lakes and swamps. Other archaeological sites recorded contain isolated artefacts, artefact scatters, fish traps, grinding rocks, hearths and quarries.

Officially recorded Aboriginal historic places are places dating from the period of initial contact between Aboriginal and other, primarily European, cultures in the early 19th century, and from the post-contact period. These places have been identified from historical records, oral history and surveys.

Quite a few Aboriginal historic places in the study area are recorded on Aboriginal Affairs Victoria’s register.³ They include places involving Aboriginal interactions (including massacre sites) with explorers

and settlers, government protectorates and honorary correspondents' depots, and mission stations and reserves, and other interactions. Recognition of the history of cultural contact, subsequent resistance and adjustment, and awareness of places reflecting that history, are important for understanding our shared past.

Many historic Aboriginal places in the Box-Ironbark area have no physical remains, though place names can often indicate the location of these events. Many more have not been surveyed. Such places are significant because of their association and importance for local Aboriginal communities. They also provide an opportunity to inform all Australians about poorly documented aspects of their history.

Once located, it is important to be aware however that some of these sites and places are spiritually and culturally sensitive and Aboriginal communities want to be consulted about any development or interpretation of sites, and in authorising any public access to such sites.

5.3 Survey coverage

Survey coverage for Aboriginal cultural sites and places in the study area is incomplete. Environment Australia's 1996 data audit indicated that generally, the extent of survey coverage for Aboriginal places is limited.² In areas that have been systematically surveyed, the amount of ground actually covered is very small. Even where there have been intensive surveys, not all sites will be known.²

Surveys carried out for specific development projects, Telstra cable installations or highway works have resulted in clustered or linear records of archaeological places. Intervening areas with similar land features may have no records simply because surveys have not been carried out. Adequate surveys involving traditional owners and relevant cultural heritage officers must be done prior to any planning and development.

Many Aboriginal cultural heritage programs are currently working at a local level with larger organisations.

Regarding survey coverage, the 1996 Environment Australia report² cautioned that:

- records represented only small samples of the study area

- the central and eastern sections of the study area have had little systematic research
- visible features such as scar trees and mounds are likely to be better represented than surface or buried features
- disturbance of identified places correlates with activities such as timber harvesting and road construction.

Priority areas for new Aboriginal survey work, identified in the data audit, included Chiltern Box-Ironbark National Park, Warby Range State Park, Killawarra forest, Pyrenees Ranges, St Arnaud Range, Terrick Terrick National Park, and the Dunolly–Moliagul, Bealiba–Wehla, and Kingower forests. Rushworth–Heathcote forests, forests around Bendigo and Castlemaine, and numerous other small forests have not been thoroughly surveyed.

For Aboriginal historic places, the Environment Australia report commented that the recorded places were identified in site-specific studies and miscellaneous records, but that none of the Box-Ironbark forests and woodlands had been adequately assessed for Aboriginal historic places.

Traditional owners and Aboriginal communities consulted following the release of the ECC's Draft Report emphasised that the whole study area is a priority for survey work.¹

Regional Forest Agreement studies

The Box-Ironbark study area was previously included in the West RFA area. The 1996 data audit of Aboriginal places mentioned above, and several European cultural heritage studies, were carried out in the Box-Ironbark study area as part of West RFA process, in cooperation with the ECC.

Existing Victorian and Commonwealth legislation requires the protection of Aboriginal sites and places. To complete the Register of the National Estate, Environment Australia intended addressing the gaps in the coverage of Aboriginal place surveys by identifying significant places or establishing a process for their continuing identification. Following the formal decision to exclude most of the study area from the West RFA, Commonwealth funding was no longer available for Aboriginal site survey work and consultation.

5.4 Native title and indigenous land use agreements

Native title is a title based on the laws and customs of indigenous people which is recognised by the common law of Australia.

Aboriginal associations with the investigation area are significant and, as previously stated, Aboriginal communities continue to assert their association with all of their ancestral areas. Aboriginal spiritual and cultural connection to the land and water is intrinsically connected to the natural environment.

The ECC understands that the exercise or enjoyment of native title rights and interests includes hunting, fishing, gathering, and cultural or spiritual activities.

Under the Commonwealth *Native Title Act 1993* Aboriginal people can claim native title on Crown lands and waters in their traditional lands. Several Aboriginal groups have lodged claims with the Commonwealth's National Native Title Tribunal related to land within the Box-Ironbark study area.

In Victoria, Mirimbiak Nations Aboriginal Corporation coordinates the majority of native title claims, and acts for native titleholders and claimants in relation to matters that may affect their rights and interests in land.

The existence of native title is not dependent on a claim being lodged. A recent High Court decision effectively confirmed the right of traditional use by claimants.⁴

Under the 'future acts' provisions of the Native Title Act, there are obligations to notify, receive and consider comments and in some cases negotiate with groups in relation to activities which may affect native title. The obligations may vary according to the type of act or activity proposed (for example, mining or tourism development), whether the area to be affected is land or water, and the tenure of the area to be affected. However, the basic thrust of the provisions is that Aboriginal groups must be consulted about activities proposed on their traditional lands. In the event that obligations are not observed, activities are invalid to the extent that they affect native title. Sections 24 and 29 of the Native Title Act are the major provisions relating to future acts and the management of land and natural resources.

Late last year, the Victorian Government, the Aboriginal and Torres Strait Islander Commission (ATSIC) and Mirimbiak Nations Aboriginal Corporation (MNAC) signed a Protocol for the Negotiation of a Native Title Framework Agreement for Victoria.⁵ In this protocol, the Government acknowledged that traditional Aboriginal owners of land and waters in Victoria may hold native title to their traditional lands, and agreed to commence negotiations with ATSIC and MNAC concerning a framework agreement for the purpose of resolving native title claims in Victoria. The parties agreed that it is desirable that native title applications are settled by negotiation rather than litigation and in order to be comprehensive the framework agreement may allow issues other than native title issues to be dealt with.⁵

The framework agreement will provide for Indigenous Land Use Agreements (ILUAs) which may address a range of issues including:

- recognition, protection, and exercise of native title rights and interests;
- the relationship between native title rights and other rights, and the manner in which native title rights are exercised, including co-management of and access to, national parks, state forests, etc., and any flora and fauna therein;
- the identification, protection and management of Aboriginal cultural property.¹

The full protocol is attached to Appendix 4.

An ILUA is a voluntary agreement made between native title groups (who hold or claim to hold native title) over a particular area, and other people or organisations such as governments, mining companies and other commercial industries, about the use of land and resources in a particular area.

ILUAs allow parties to negotiate flexible and pragmatic agreements. They allow them to formally agree about how things will work on the ground. Once registered, ILUAs bind all the parties and all persons claiming to hold native title to the terms of the agreement.

ILUAs are an important tool for dealing with native title issues. According to the MNAC and the National Native Title Tribunal, negotiating ILUAs is the preferred option for most Victorian Aboriginal communities.¹

Through consultation with Aboriginal groups and communities, the ECC has sought to take into account indigenous interests in the Box-Ironbark forests and woodlands recommendations regardless of what title indigenous people may have to the land, water and resources. Nevertheless, the ECC notes that native title may exist in regard to some areas and that Aboriginal people are concerned to ensure that these rights are not inadvertently extinguished or impaired as a result of their own actions or actions by Government agencies. In view of these concerns, the ECC stresses that nothing in the final recommendations should be taken to prejudice or diminish any native title rights to land, water and resources.

Most of the recommendations in this report, if adopted by Government, would modify permitted uses on Crown land, or change the emphasis of public land management. However, this would not occur prior to further Government consultation with relevant Aboriginal groups on native title rights and interests.

5.5 Legislative framework

In addition to the Commonwealth Native Title Act, key legislation includes the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* and the Victorian *Archaeological and Aboriginal Relics Preservation Act 1972*.

The Aboriginal and Torres Strait Islander Heritage Protection Act was developed to increase the decision-making role of Aboriginal communities in the protection and management of their cultural heritage.

The purposes of the Act are the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginal peoples in accordance with Aboriginal tradition.

The regulations made under the Act define the boundaries of the 'local Aboriginal communities', which have standing under the legislation.

Under the Archaeological and Aboriginal Relics Preservation Act, all archaeological relics and sites are protected. Damage or disturbance without permit is prohibited. Significant penalties also apply to anyone wilfully defacing, damaging or interfering with an Aboriginal object or place.

These Acts provide regimes whereby Aboriginal peoples can take part in the preservation of their cultural heritage by being members of committees that advise Ministers, as inspectors with wide-ranging powers, and as members of community organisations that are responsible for managing cultural heritage issues within their areas.

Aboriginal communities believe that the requirements of these Acts and the spirit of the legislation are often ignored by public and private land and water management agencies. Aboriginal peoples want to be consulted and involved in planning, decision-making and implementation processes, rather than invoking the provisions in the legislation when a problem arises.

The identification, protection and management of Aboriginal cultural heritage places in Victoria are primarily the responsibility of Aboriginal Affairs Victoria (AAV). This responsibility is shared with relevant Aboriginal groups and communities. Traditional owners should be involved in the assessment of significance of Aboriginal sites and places, and should participate in the conservation and management processes. There are also issues of sensitivity and secrecy in regard to the location of some Aboriginal places.

5.6 Consultation with Aboriginal groups and communities

The ECC consulted directly with Aboriginal Affairs Victoria and several Aboriginal communities in the study area when preparing the Draft Report (2000). In addition, as part of its consultative processes for the investigation, there have been two formal periods of public consultation.

In order to ensure Aboriginal participation in the public consultation process following the release of the ECC's Draft Report (May 2000), the ECC commissioned Mirimbiak Nations Aboriginal Corporation (MNAC) to facilitate consultation with Aboriginal traditional owners, Aboriginal Affairs Victoria, cultural heritage program officers, and Aboriginal groups in the study area. MNAC is recognised as being a central contact point, as it is the native title representative body for the majority of Victorian claimants and the peak advocacy group for Aboriginal people in Victoria. Appendix 4 is a summary of MNAC's report to the ECC on the outcomes of consultation with Aboriginal traditional owners and other Aboriginal groups.

Major issues

Major issues and concerns raised by Aboriginal traditional owners and communities are similar to those raised by indigenous peoples around Australia in relation to management of land, water and natural resources. There are four main areas of concern.

- Concerns about environmental degradation through development, resource use and damage to culturally sensitive sites.
- Dispossession from their traditional land and water estates, and loss of traditional rights such as traditional management regimes, hunting and collecting rights, and access for traditional practices.
- Lack of opportunities for genuine participation in decision-making about land and resource planning and management.
- Inadequate responses from government agencies when administrative or legislative mechanisms are established for involvement in decision-making and management.

Comments made by Aboriginal communities, and specific issues raised in relation to parks and reserves, state forests and other area-specific recommendations, are also addressed in Chapters 15–17 of this report.

5.7 Community views

In public submissions received following release of the ECC's Draft Report (May 2000), there was considerable support for the recognition, protection and cooperative management of sites and artefacts representing Aboriginal cultural heritage. A number of submissions called for the general protection of Aboriginal cultural sites and artefacts in national parks or other special protection reserves.

Several submissions sought greater recognition of Aboriginal cultural heritage in park and reserve descriptions and subsequent recommendations. Those mentioned included Kooyoora State Park, Castlemaine Regional Park and Reedy Lake Wildlife Reserve. Also proposed was the inclusion of the protection of Aboriginal cultural sites and places in general recommendations for public land use categories.

Many submissions, particularly from the Bendigo and Castlemaine areas, specifically proposed that due recognition be given to the DjaDjaWurung people and their cultural heritage. Local residents felt strongly about the need to recognise the history of Aboriginal occupation and land use in the area, and the ongoing links Aboriginal peoples share with the land.

Others proposed greater input from Aboriginal communities in decision-making about public lands. There was also support for the development of tourism based on Aboriginal cultural heritage and continuing Aboriginal associations within the Box-Ironbark forests and woodlands.

5.8 Achieving a balance

The ECC recognises the important ongoing connection Aboriginal peoples share with the land and natural environment, and the need to protect sites of cultural and spiritual significance. The ECC has incorporated many Aboriginal sites into the parks and reserves system to complement the protection these sites attract under current State (*Archaeological and Aboriginal Relics Preservation Act 1972*) and Commonwealth (*Aboriginal and Torres Strait Islander Heritage Protection Act 1984*) legislation.

The ECC's consultation with Mirimbiak Nations Aboriginal Corporation and other Aboriginal groups has established a constructive process, which should be actively maintained, to address Aboriginal interests related to implementation of the ECC's recommendations.

RECOMMENDATIONS

- R15** Planning and management relating to traditional interests and uses be based on recognition and respect for the traditional and contemporary relationship of Aboriginal peoples with the land.
- R16** Prior to implementation of ECC recommendations for parks and reserves, and changes in public land management, Government consult with traditional owners and Aboriginal groups regarding their native title rights and interests.
- R17** Government, in consultation with traditional owners and Aboriginal groups, establish mechanisms to improve indigenous participation in land and water management including:
- development of principles and protocols to improve the policy and planning processes of public land and water management agencies and the representation and participation of Aboriginal peoples in these processes;
 - investigation of joint management structures and arrangements between Government and Aboriginal communities with regard to public land, water and resources in the Box-Ironbark study area;
 - preparation of a strategy to improve the participation of Aboriginal peoples in land, water and resource use decision-making and day-to-day management;
 - provision of information to assist the facilitation of land and water use agreements between agencies and local Aboriginal communities;
 - facilitation of surveys and site visits necessary for planning and development purposes; and
 - development of cross-cultural awareness programs for land, water and natural resources agency staff to improve knowledge and understanding of, and communication with, Aboriginal communities.
- R18** NRE (including Aboriginal Affairs Victoria), together with Aboriginal groups, review legislation and policies restricting or inhibiting traditional cultural use of public land and waters with a view to removing unnecessary restrictions.
- R19** Government more actively publicise existing notification and consultation processes, required under the *Native Title Act 1993* and other relevant legislation such as the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, the *Archaeological and Aboriginal Relics Preservation Act 1972*, and take action where there are breaches of such legislation.
- R20** Opportunities for increased employment and training for local Aboriginal people be encouraged in the implementation of any new parks and reserves.

Information Sources

- ¹ Mirimbiak Nations Aboriginal Corporation (2000).
- ² Marshall *et al.* (1996).
- ³ Aboriginal Affairs Victoria's Aboriginal Historical Places Program Database.
- ⁴ Yanner vs Eaton case, High Court of Australia (1999).
- ⁵ State of Victoria, Aboriginal and Torres Strait Islander Commission and Mirimbiak Nations Aboriginal Corporation (2000).

6 Non-indigenous cultural heritage

Non-indigenous cultural heritage has resulted from the last 165 years of land use in Victoria. It is a rich resource of buildings and structures, gardens and landscapes, industrial sites, archaeological places, shipwrecks and irreplaceable collections of objects. Heritage is valued by the community as a tangible link to the past. Places and objects are the historical embodiment of our culture with the power to invoke, illustrate, define and give meaning to our diverse and multicultural society. Chapter 5 discusses indigenous cultural heritage issues.

From the 1830s the Box-Ironbark forests and woodlands have mainly been associated with agriculture, gold mining and forestry. During the gold rush period miners, market gardeners and timber workers made their homes in the forests. Major underground ore bodies helped establish and maintain permanent towns. Many of central Victoria's most important reefs and mines are within existing townships, including Bendigo, Stawell, Maldon, and St Arnaud.

Today, west of the Goulburn River in the study area, people mostly live in cities and towns on the edges of Box-Ironbark forests. Gold mining and forestry operations continue in the forests but their occurrences and intensity are now determined by a combination of factors, including park and reserve status, prospectivity, native title, and commodity prices.

6.1 Historical overview

The take-up of pastoral land in Victoria began when growing stock numbers put pressure on the capacity of pasture in New South Wales and Van Diemens Land (Tasmania). Major Mitchell and other early European visitors also drew attention to the open plains and grassy woodlands of central Victoria. Squatting was legalised in 1836, and pastoral occupation spread across much of the Box-Ironbark study area.

On 1 July 1851, the Port Phillip District of New South Wales became a separate colony with the name of Victoria. Six days later the discovery of gold was announced. The following decades saw over 200 goldfields discovered, many of them within the study area.

The discovery of gold resulted in a momentous influx of immigrants and an explosion of wealth that propelled Victoria onto the world stage. Many of Victoria's most significant regional cities and towns were established, as a result of the gold discoveries, along with some of the state's most revered public and private institutions. The influence of gold continues to resonate down to the present through the growing interest in genealogy, cultural tourism and the appreciation of cultural heritage.

The Box-Ironbark forests and woodlands study area contains some of the most significant historic gold mining landscapes and features on public land in Victoria, including areas of national cultural heritage significance. These landscapes and individual sites are associated with many former gold towns and settlements which, in their totality, form a region of strong historical character and interest. The historic gold mining landscapes are significant components of tourism in the region today.

6.2 Non-indigenous heritage and archaeological places

Today, cities and towns such as Bendigo, Castlemaine, Maldon, St Arnaud, Beechworth and Chiltern tell part of the story of the great gold rush—their streets lined with buildings grand and humble. But the surrounding Box-Ironbark forests harbour their own tales of a golden past: crumbling stone walls of huts and pubs, and the gold mines, reefs and gullies that in some cases yielded fortunes. Some of these forests are today cultural landscapes containing remarkable concentrations of heritage and archaeological places. The Mount Alexander (Castlemaine) Diggings in particular has been recognised as an organically-

evolved cultural landscape possessing values of national significance (also see NHP1 in Chapter 15).

Various heritage studies have been carried out, several focusing their attention on the forests themselves. The most comprehensive was a statewide inventory of historic mining sites.^{1,2,3} This study identified some 5 000 historic mining sites in the Box-Ironbark forests, taking in most public land categories from parks through reserves to uncommitted land. Some 2500 of these have been recorded. These surveys also revealed thousands of relics of settlement sites which were not recorded because they were outside the terms of the brief. A recent archaeological survey in a historic reserve at Castlemaine resulted in 300 habitation sites being recorded in a three-week period.

Several heritage studies were undertaken on a thematic basis as part of the West Regional Forest Agreement process. After an initial data audit,⁴ numerous relics related to forestry activities⁵ were identified, including sawmilling, charcoal production, eucalyptus oil distillation, wattle barking, silviculture, fire protection, timber tramways,⁶ and collection of domestic firewood. Dating from the mid-20th century are many relics associated with State-organised activities of internees, prisoners of war, migrants, youth and the unemployed, focusing on silviculture, forest management work and firewood harvesting. Another study assessed historical water supply, exploration, settlement, recreation, defence and other sites.⁷ In addition, a series of workshops was held across the study area as part of the West RFA process, to identify community heritage places.^{8,9}

Heritage studies have also been carried out in most of the municipalities containing Box-Ironbark forests, including urban areas and private land. Some have been found to possess an extraordinary legacy of heritage and archaeological places.

6.3 Victorian Heritage Strategy

The Victorian Government demonstrated its commitment to the ongoing conservation and promotion of the State's cultural heritage through the launch of the *Victorian Heritage Strategy (2000–2005)*¹⁰ in May 2000.

The strategy provides direction for the identification, protection, management and use of cultural heritage in Victoria. Its programs aim to ensure that the future management and use of cultural heritage is sustainable and has consistent direction and focus.

The strategy also recognises that heritage is a vital component of the economic activity of regional Victoria, including centres such as Maldon, Beechworth, Castlemaine, Ballarat and Bendigo. To that end, the strategy focuses on the role of local communities in owning and conserving local heritage. This direction of the strategy has particular relevance for the communities and heritage of the Box-Ironbark study area.

6.4 Guidelines for the management of cultural heritage values

As part of the RFA process, the Australian Heritage Commission (AHC) and NRE commissioned various studies of national estate values in forests across most of Victoria. For East Gippsland the outcome included development of a set of principles for the conservation of identified places. These principles have been developed further into draft guidelines for the management of cultural heritage values. They will be revised for statewide application, for use by land managers, planning staff and field staff.

The guidelines include information on:

- the location and distribution of known cultural heritage places
- managing such places
- actions when places are located during operations
- monitoring
- compliance
- current legislation
- policies.

One current issue is the practice of fossicking for historical relics, often with the use of a metal detector. Fossicking for relics may damage the archaeological record, where relics are found in otherwise intact sites, or diminish the historical record where other disturbances have already destroyed archaeological layers and associations. If the features are more than 50 years old, they are by definition protected archaeological relics and it is an offence to disturb them. There is a need for an education program to better explain this situation.

The long history of gold extraction around Bendigo has resulted in numerous old mining sites. They have been assessed for their historical significance, and some are recommended as historic and cultural features reserves (refer to Recommendations E6 to

E14 in Chapter 16). Some of these, and others not subject to recommendations, are extensive and now have management issues including weeds, fire risk, public safety, rubbish dumping, trail-bike damage and vandalism. NRE has commissioned Bendigo Regional College of TAFE to develop a management strategy for such sites, addressing these issues.

6.5 Existing consultation and management

The management of cultural heritage in Victoria is based on the principles of the Charter for the Conservation of Places of Cultural Significance (Burra Charter). The cultural significance of a place, as defined in the Burra Charter, is related to its aesthetic, historic, scientific or social value for past, present or future generations. Significance is determined by such factors as rarity, age, condition, integrity, research potential, aesthetic qualities, and associations with important people, events, phases or developments in history. Research into history of a place uncovers information which can influence the assessment of significance, as does comparing similar places.

A central plank to this management philosophy and most relevant to the Box-Ironbark forests is the accepted policy of in situ conservation. Whether a site is linked to historic gold mining or forestry or some other activity, the objective is the same, to maintain the site in its existing location by controlling the natural rate of decay and human disturbance. Management of the integrity of a place may also involve the maintenance of its environmental setting.

NRE has responsibility for the management of heritage places in the Box-Ironbark area, with assistance from Parks Victoria who are usually contracted to deliver park management services. Local government, individual committees of management and Heritage Victoria also play roles.

A range of state legislation provides mechanisms for the strategic and practical protection of heritage places and objects, including:

- *Heritage Act 1995*
- *Archaeological and Aboriginal Relics Preservation Act 1972*
- *Planning and Environment Act 1987*
- *National Parks Act 1975*
- *Parks Victoria Act 1998*
- *Forests Act 1958*
- *Crown Land (Reserves) Act 1978.*

The principal statute for the protection of cultural heritage in Victoria is the *Heritage Act 1995*, which provides two distinct processes for the protection of non-indigenous cultural heritage values.

- *Heritage register*—All heritage and archaeological places registered are considered to be of special cultural significance to the state (that is, of state significance) in respect to what they demonstrate about the history and development of Victoria. Registration legally protects them and means they cannot be altered in any way without authorisation from the Executive Director of Heritage Victoria.
- *Heritage inventory*—All archaeological relics and objects older than 50 years are protected, whether or not they are recorded by Heritage Victoria. Appropriate permission must be obtained from the Executive Director of Heritage Victoria before relics and objects can be knowingly disturbed, damaged or excavated. An archaeological place is that part of the material heritage, such as ruins, objects or abandoned features, that requires archaeological methods to provide primary or significant information about it.

6.6 Community views

There was general support in submissions for the protection of significant historic and cultural heritage features, representative of post-1830s settlement of the study area. In particular, there were calls for greater recognition of such sites, their need for protection and their role in contributing to the distinctive character of the Box-Ironbark region.

Many submissions proposed incorporating significant historic and cultural heritage sites into national or state parks to provide adequate protection. In particular, these submissions suggested more emphasis be placed on such values as important contributors to national park status. Some supported the establishment of a new park category that signifies and addresses the need to protect historic and cultural heritage values, as will be achieved by the recommended Castlemaine Diggings National Heritage Park (see NHP1 in Chapter 15).

Greater recognition and protection for historic and cultural heritage values in specific areas, including Maryborough, Bendigo and Castlemaine, was called for in submissions. There was specific support for recognition of particular features as significant

heritage sites, and for alternative names for recommended historic and cultural features reserves.

Some submissions referred to the management of significant historic and cultural heritage sites and archaeological relics, their sensitivity to disturbance and their legislative protection. Importantly, it was stressed that all archaeological relics are protected under legislation, and that this should be brought to the attention of the general community.

6.7 Achieving a balance

The ECC recognises growing community appreciation and concern for the protection and conservation of important historic gold mining landscapes and features in the study area. While all archaeological relics and objects are protected under the *Heritage Act 1995*, the recommendations in this report will contribute significantly towards establishing a system of parks and reserves that will protect these landscapes and features. Cultural features and historic sites contribute to the outstanding features of national and state parks and accordingly attract the highest level of protection.

The Castlemaine area, particularly the Mt Alexander goldfields, has been strongly supported as a key cultural landscape of national significance. The ECC has recommended the establishment of Castlemaine Diggings National Heritage Park to provide adequate protection and awareness of this area. The ECC has also recommended the establishment of 15 new historic and cultural features reserves in addition to 32 existing historic areas and reserves recommended by LCC;^{11–15} all to be designated as historic and cultural features reserves.

These include substantial reserves at Whroo, Maldon, Moliagul and Percydale. Along with Castlemaine Diggings National Heritage Park, these reserves will provide opportunities to extend public knowledge and increase tourism potential. Notes have also been included throughout the recommendations in regard to the management of specific heritage features occurring in particular land use categories.

The features listed for particular parks and reserves, later in this report, reflect highly significant places in the relevant park or reserve. Numerous other identified, but less significant, historic features are located in existing and recommended parks and historic and cultural features reserves, and these will generally be protected through detailed management planning. Together, they form networks and in some cases cultural landscapes, offering opportunities for interpretation and public education. Similarly, in state forest, many other sites have been identified which will be protected appropriately through the forest management planning process.

The Coliban Water Supply System continues to supply domestic and irrigation water, and the Melbourne–Bendigo Railway still operates. Both are significant historically, however their primary public land uses continue. Some features in both are listed on the Victorian Heritage Register. Elements of the Coliban system are no longer required for water supply, and some have been incorporated in the recommended Castlemaine Diggings National Heritage Park, Greater Bendigo National Park, and the Bendigo Regional Park.

Numerous significant sites from the studies carried out by Bannear^{1,2,3} (mining), Bannear⁵ (forest activities), Butler⁷ (other themes), Evans⁶ (sawmills and tramways), and Context⁸ (community heritage places), are listed for protection in various land use categories where relevant.

Note that many of the identified historical places are either:

- within existing parks and reserves (not all such sites are listed in this report);
- sited in areas committed to another primary use (e.g. bridges and tunnels on the Melbourne–Bendigo Railway);
- located outside the Box-Ironbark study area (the RFA studies covered a larger area); or
- located on freehold land, beyond the ECC's jurisdiction.

RECOMMENDATIONS

- R21** When heritage sites are located on public land, they be assessed, and significant features be protected by public land managers, consistent with relevant state legislation, the *Victorian Heritage Strategy 2000–2005*, and NRE’s cultural heritage guidelines.
- R22** The guidelines for the management of cultural heritage values, developed by NRE and the Commonwealth for East Gippsland, be revised and applied statewide by land managers.
- R23** The historic site management strategy being developed for NRE, by Bendigo Regional College of TAFE, addressing the issues of weeds, fire risk, public safety, rubbish dumping, trail bike damage and vandalism, be completed and applied around Bendigo and to other locations where similar problems exist.
- R24** Fossicking for historical objects and relics be discouraged by NRE, other public land managers, and Heritage Victoria.

Information Sources

- 1 Bannear (1993a-g).
- 2 Bannear (1994a-b).
- 3 Bannear (1995).
- 4 Marshall *et al.* (1996).
- 5 Bannear (1997).
- 6 Evans (1999).
- 7 Butler (1997).
- 8 Context Pty Ltd (1999).
- 9 Crocker & Associates (1999).
- 10 Government of Victoria (2000).
- 11 LCC (1981).
- 12 LCC (1985).
- 13 LCC (1986).
- 14 LCC (1994).
- 15 LCC (1997).

7 Mining

The 1851 discovery of gold around the study area transformed Victoria from an obscure, essentially pastoral colony into one of the wealthiest communities in the world.

Throughout the 1850s thousands of diggers arrived at the major and minor goldfields scattered through the forests of the inland hills. Most of the existing towns and settlements in the study area were established at this time, as well as several others which are now virtually deserted. Working alone or in small groups, the diggers used simple equipment to dig for and extract shallow gold nuggets; shovels, picks, buckets and ropes, tin pans, cradles and puddling machines were the order of the day.

As the shallow gold ran out, more sophisticated methods were required to mine and extract deep lead, reef, and finely disseminated shallow alluvial gold. Many diggers formed or worked for companies, and by 1878 quartz reef mining had surpassed shallow alluvial production. Company mining and advancing technology continued to dominate production into the early decades of the 20th century. By the 1950s, most of these mines had closed and gold production from the study area had all but ceased.

In the 1980s and 1990s interest was renewed in gold mining in the study area. New technologies for finding, extracting and processing gold improved the economics of mining and exploration, and increased the chances of discovering new deposits. This renewed interest has focussed on the recognised goldfields; those that were discovered and mined in the first phase of mining (1850s–1950s), and which had appreciable historical production. Nearly all the recent major mines and developments are in recognised goldfields; for example, Stawell, Fosterville, Tarnagulla, Bendigo, Amphitheatre and Maldon. The only notable exception is the recently closed Nagambie open cut mine.

7.1 Current mining operations

In 1999/2000, 4 750 kg of gold was produced in the study area; that is, 99% of total Victorian production. This total includes gold mined from public and private land. Because many individual operations work across both public and private land, it is difficult to quantify the contribution of each. However, about 24% of the total area of all mining licences at the surface occupies public land, which is roughly the same as the proportion of public land in the inland hills generally, with the northern plains being of little interest for gold mining. Some people in the mining industry have argued that this approach underestimates the size of the industry and the importance of public land for mining, but it is important that some factor be applied to provide a reasonable comparison with other public land industries (see Appendix 5). It has also been necessary to apply factors to other industries in which quantification of the public land contribution is problematic (for example, apiculture and tourism—see Chapters 9 and 11). In any event, the derivation of figures in this report is transparent, and the ECC is keenly aware that access to public land is essential to the industry, and that mining is—by some margin—the largest Box-Ironbark public land industry.

Although there is some overlap in the different types of mining operations, four basic divisions are readily apparent, as follows.

Underground mining involves tunnelling from a surface portal to extract reef or deep lead gold, frequently hundreds of metres below the surface. Currently there are two underground mines in the study area: at Stawell (which started as an open cut), and Bendigo (which is yet to commence production). Recently, underground mines at Maldon and Tarnagulla ceased production.

An important advantage of underground mining is the high value of production relative to the generally small area of surface disturbance, although waste dumps and processing facilities can be extensive. However, not all deposits can be mined underground. Compared to other methods, underground mining is relatively expensive and there is less certainty in predicting the amount of gold in underground deposits.

Open cut mines are surface pits typically less than 100 metres deep, 200 metres wide and 500 metres long (not including overburden dumps, etc.). In the Box-Ironbark study area, two open cuts are currently producing gold—at Baileston (where digging has finished), and Fosterville. The recent open cut at Costerfield has now ceased production.

Shallow alluvial mining focusses exclusively on gold-bearing gravels accumulated along current or ancient drainage lines. Individual operations are generally smaller and, in particular, much shallower than open cuts. There are several operational shallow alluvial mines in the study area, particularly in the area roughly bounded by Avoca, Wedderburn and Maldon.

Doze and detect mining involves surface stripping with a bulldozer followed by intensive hand-held metal detecting to uncover nuggets. Operations are generally less than a metre in depth and five hectares in area. Numerous, short-term doze and detect operations may occur over the course of a year, but few are current at any one time and there are few operators in total. The main focus is the Dunolly–Wedderburn area. Prospecting and other metal detecting is discussed in Chapter 10 (Recreation).

Gold extraction

Metal detectors and hand tools are used to find and then extract gold in ‘doze and detect’ operations. In other types of mining, gold is generally extracted using cyanide-based techniques such as heap-leaching to extract finely disseminated gold, or gravity methods (without chemicals) to extract relatively coarse gold. Generally, the more sophisticated and expensive chemical methods are used in underground and larger open cut mines, but there can be much overlap in the extraction techniques used in different types of mining.

Mining is the largest employer and generator of wealth from public land in the study area (figures provided below) but is dominated by a small number of mines. The largest ten producers account for all but a tiny proportion of production,

and the underground mine at Stawell accounts for 73% of all Victorian production. Future production from the new underground mine at Bendigo and the expanded Fosterville open cut has the potential to rival current production levels of the Stawell mine, although significant ore extensions have recently been identified at Stawell.

The great variation in the amount of gold produced from individual mines makes estimating future production very difficult. That is, exceptionally good or poor results from only one or two prospects could dramatically alter the overall value of production.

Although the study area represents the heart of the Victorian gold mining industry, not all parts of the study area were of historic or are of current interest to miners. As well as the northern plains, there are relatively large areas of public land not currently subject to exploration licences and of little interest to miners in the St Arnaud Range, parts of the Rushworth–Heathcote forests, and much of the public land east of the Goulburn River.

Other minerals produced commercially in the study area are kaolin from pits near Axedale, feldspar from a recently opened quarry near Beechworth, and small amounts of diatomite from near Avoca. As indicated below, the total value of production of these minerals is much less than that of gold.

7.2 Access and approvals

In terms of access for exploration and mining, the *Mineral Resources Development Act 1990* establishes three broad divisions of public land. These divisions are exempt, restricted and unrestricted Crown land, and are defined as follows.

Exempt from exploration and mining. Four public land categories are exempt: reference areas, national parks, state parks, and wilderness parks. Exploration and mining are not permitted in these areas unless there is an authority or tenement in place at the time of declaration as a park or reference area to allow subsequent access, in which case approval under Section 40 of *the National Parks Act 1975* is required for mining to proceed.

Section 40 specifies an approval process requiring the consent of the Minister for Environment and Conservation, and tabling in both houses of Parliament for 14 days. This process allows full consideration of implications of mining on land with the highest conservation rating.

Restricted Crown land requires the consent of the Minister for Environment and Conservation for any exploration or mining to proceed; it includes nature conservation reserves, regional parks and natural features reserves (see Schedule 3 of the *Mineral Resources Development Act 1990* for the comprehensive list). The ECC notes that national heritage parks should be added to this Schedule, and that this definition requires updating to reflect all land use categories.

Some areas, in public land categories which are generally considered ‘restricted’, are scheduled under the *National Parks Act 1975*. There are three such areas in the Box-Ironbark study area: the existing Deep Lead Flora and Fauna Reserve, and Reef Hills and Beechworth Parks (both recommended as regional parks by the LCC). Applications for exploration and mining in these areas are subject to the provisions in Section 40 of the *National Parks Act 1975*.

Unrestricted Crown land does not require the consent of the Minister or the land manager. In these cases the land manager (e.g. NRE Forests Service) is consulted on the application, but the formal approval or otherwise rests with NRE Minerals and Petroleum Victoria. All public land categories, other than those listed above to be exempt or restricted Crown land, are unrestricted (e.g. state forests and various other reserves).

Applications for exploration and mining on public land would also be subject to the ‘future acts’ provisions of the *Native Title Act 1993*, as discussed in more detail in Chapter 5 (Aboriginal interests).

The following process applies to all mining, once the initial licence application has been approved.

Work plans

NRE has an agreed process to ensure that mining work plans, as required under the *Mineral Resources Development Act 1990*, in the north-west region (which includes most of the Box-Ironbark study area) are assessed on a whole-of-department basis.

In summary, the process involves:

- early consultation with all NRE divisions which may have an interest in the mining proposal;
- an opportunity for input by interested NRE divisions on work plan requirements and conditions; and

- a dispute resolution mechanism, should divisions not be able to agree on whether or not a project is acceptable and under what conditions.

Planning permits

NRE is currently reviewing its processes for dealing with planning referrals and appeals for the mining and extractive industry. For planning referrals, the intention is that the work plan already endorsed by NRE will be the key document submitted by the permit applicant. As such, NRE’s response as a referral authority would usually only be a reiteration of requirements established in its internal assessment of the work plan.

Environment effects statements

NRE is also currently reviewing its processes for mining and extractive industry projects going through the environment effects statement (EES) process, with a view to formalising the approach which has been taken on recent EES projects.¹ This approach involves NRE’s Minerals and Petroleum Victoria taking the lead role and, in consultation with all relevant divisions, developing department submissions.

7.3 Economics and employment

Because many individual gold mines occur on or below both public and private land, it is difficult to reliably quantify production attributable to public land. Overall, around 24% of the total area under mining licence is public land. In 1999/2000, the total value of gold produced in the study area was around \$70 million (24% of which is \$17 million). The value of production has not changed significantly since 1996/97 (for which figures were provided in the Draft Report) because the recent cessation of production at several small to medium-sized mines has been largely offset by a substantial increase in production at Victoria’s largest gold mine at Stawell. Estimated expenditure on exploration and mining development on Box-Ironbark public land in 1996/97—\$6.2 million—is also derived using the 24% ratio.

Employment due to exploration and mining for gold on public land has been estimated at 133 full-time equivalent jobs, again using the 24% ratio. In addition to exploration, large scale mining in particular generates relatively high rates of indirect employment and expenditure in local economies, especially in servicing machinery.

Total value of production and employment attributable to public land from minerals other than gold are less than \$4 million and 15 full-time equivalent jobs, although feldspar production at Beechworth is increasing.

In terms of both value of production and employment, mining is the largest industry utilising Box-Ironbark public land.

7.4 Industry trends

The outlook for total annual gold production in the study area is for an increase from around \$70 million at present to around \$160 million (from public and private land) in five years, if the expectations of the three largest proposed mines are achieved. The expected increase in production from large mines is tempered by recent closures of some medium-sized mines, as noted above.

These expectations are reflected in industry and Government investment. Industry expenditure on exploration peaked in 1997 and has declined since, in line with national trends. Interest in Victoria has been sustained in part due to the recent availability of advanced geological and geophysical data through NRE's Victorian Initiative for Minerals and Petroleum (VIMP).

Innovations in all aspects of mining—exploration, excavation of ore, extraction of gold from ore—continue to generate interest.

In recent years miners, including those active in the study area, have increasingly adopted new measures to improve environmental management, including:

- low impact exploration techniques such as tagging and avoiding significant vegetation, drilling from existing tracks, and using trays under machinery to prevent oil or fuel contamination of sites;
- procedures to minimise the long-term impact of mining, such as removal of topsoil prior to mining (for replacement after mining), and assessment of vegetation and collection of seed prior to mining as a basis for post-mining indigenous revegetation;
- compensation for habitat lost as a result of mining, through measures such as transfer of freehold land with indigenous vegetation to the Crown.

Low impact exploration techniques have been successfully employed in the Box-Ironbark study area at Deep Lead near Stawell in the late 1980s, and in what is now Chiltern Box-Ironbark National Park in the early 1990s. The procedures employed in these operations provide good examples of the standard which would be appropriate to apply to all exploration in the study area, given the importance of all native vegetation for the conservation of natural values.

Responsible miners now routinely incorporate the measures listed above into exploration, mining, and rehabilitation operations. Mining rehabilitation is now a large and dynamic discipline, generating a considerable body of research and literature nationally and internationally, and supporting the view that standards in Victoria can continue to improve.

Compensation for lost habitat has also been embraced by many miners, who are often proud of the high quality habitat that, through their actions, has been added to the public estate. While direct compensation through presentation of other indigenous vegetation to the Crown is often preferred, compensation could also take the form of rehabilitation of degraded areas (for which many miners have particular expertise), assistance with management of key areas, or contribution to a land fund to allow the Crown to purchase or manage larger areas to add to the public estate. The native vegetation management framework currently being developed by NRE² may assist in determining an appropriate compensation package for habitat lost to mining.

7.5 Issues

In the first century or so of Box-Ironbark gold mining, accepted practice was to give little attention to the effects of mining on environmental or other values, often leading to widespread and severe environmental degradation. Some of this damage remains conspicuous today, and is even part of the interest of historic places such as Diamond Hill Historic Reserve (near Bendigo) and Eldorado Gold Dredge (near Beechworth). In recent years, the diverse and significant values of Box-Ironbark forests and woodlands have been more widely appreciated, and many modern miners have responded accordingly. Nonetheless, several contentious issues remain.

Loss of values

A major issue is the loss of key values in works areas where most or all native vegetation is removed, where major earthworks are undertaken, and where public access is excluded. These activities typically impact severely on biodiversity, Aboriginal cultural values, and historic, landscape and recreational values.

These impacts can be disproportionate to the area affected because some of the most productive areas for mining are key sites for many values—gullies for flora and fauna, hilltops for landscape and recreation, and old goldfields for historic features. Both historic and modern mining have adversely affected large old trees, natural deep soil profiles, and flora and fauna species with populations confined to small areas which happen to coincide with the more productive areas for alluvial gold.

Impacts can be permanent if, for example, cultural, historic or natural features are destroyed, or pits, tailings dams, earth heaps or walls are left—although in recent years, only pits, and overburden and leach pits have been permanently left, covering a relatively small total area.³ Other impacts can be temporary, particularly when sites are comprehensively rehabilitated to a high standard, but some of the most important and depleted features, notably large old trees, will take very many decades to re-establish.

Where mining is permitted within the conservation reserve system (for example, Inglewood Flora Reserve and Nagambie Bushland Reserve in recent years), it would be expected that high standards would be achieved in amelioration of, or compensation for, impacts. In some cases, this appears not to have occurred; for example, Inglewood Flora Reserve.

Cumulative area affected

The total area subject to mining at any one time is small; only 0.3% of Box-Ironbark public land was disturbed by mining in a 20-year window, in one assessment undertaken in 1996.³ However the cumulative effect of these comparatively small areas of disturbance, over the many decades required for Box-Ironbark eucalypts to mature, can result in more substantial disturbance in some areas. For example, in the Craigie Forest near Maryborough (about 1 800 ha), 4% of public land was cleared in the ten years to 1994. While much of the currently evident disturbance results from historic mining, it

is important to ensure that the mistakes of the past are not repeated in the current period of reinvigorated mining. Low impact exploration, careful location of mining activities, compensation for land disturbed, and high quality rehabilitation can significantly ameliorate this problem, leading to a net increase in Box-Ironbark vegetation.

Undervaluation of public land

While some works can only be located on public land (necessitating the removal of native vegetation), particularly if that is where the gold occurs, in many cases there is nearby or adjoining cleared freehold land where works, particularly infrastructure, could be located. In the past, public land has often been preferred to private land simply because it is seen as being more readily available, or of little value. Doze and detect mines are very rare on private land, for example. With greater recognition of the values of public land and the now greatly depleted indigenous vegetation of the study area, this approach is no longer appropriate.

When planning to take areas out of agricultural production, miners are required under the *Mineral Resources Development Act 1990* to provide a statement of economic significance to demonstrate that the venture is reasonably likely to be of net benefit, but no comparable comparison is required for forested public land. While public land values and economic values are less directly comparable, an informal comparison based on statements of economic and ecological significance would assist in clarifying the basis for decisions on applications. NRE is currently developing a framework for native vegetation management² which may assist in quantifying the value of any habitat lost.

Establishing environmental standards (or codes of practice)

The commitment to, and quality of, environmental protection in exploration, mining and rehabilitation has improved significantly in recent years.^{4,5} Nonetheless, the standard of environmental protection in some operations has been well below that achieved by the most responsible operators. There are recent examples of poor practice and forfeiture of bonds which were not adequate to cover subsequent rehabilitation, indicating that the conditions specified in at least some mining licences were below the current industry standard.⁶

A consistent and high standard, specified in all mining licence conditions, would also greatly assist in the establishment of research and monitoring programs to further improve environmental protection measures. Such work is particularly needed in relation to post-mining restoration of indigenous biodiversity, which is in its infancy in Box-Ironbark environments.^{7,8,9,10} An NRE assessment indicated that recent restoration programs in the study area had generally been successful in returning indigenous vegetation cover to sites, but less successful in controlling weeds and effecting the return of biodiversity.³

7.6 Community views

Submissions were received both from those who supported mining and its contribution to the Victorian economy and those who believed that it led to an unjustifiable loss of remnant Box-Ironbark forests and their associated values. Some within the mining industry believed that any increase in exempt Crown land in the form of national and state parks was not justified, given improvements in environmental rehabilitation techniques for mines and the potential economic return from some areas within proposed parks that were seen as highly prospective for gold.

Some submissions called for the removal of current exploration licences from parks, and proposed that the declaration of a national or state park should annul any existing exploration or mining licences.

There was criticism from some large mining companies, that use of the 24% ratio to apportion total mining costs and returns to public land, understated the economic value of public land.

Several within the mining industry questioned the workability of the Draft Report recommendation for an economic significance test to be applied to proposed mining on public land. It was also contended that, because of the extra requirements in the approval process, mining was effectively excluded from restricted Crown land (such as regional parks, nature conservation reserves, and historic and cultural features reserves).

The issue of more demanding administrative procedures effectively excluding mining was also raised in relation to areas where Section 40 of the *National Parks Act 1975* applies. The industry's view was that the additional requirements of Section 40 prevented miners securing capital to advance their plans which is why few applications have been made for licences requiring Section 40 approval.

7.7 Achieving a balance

Overall approach

Both mining and conservation of natural and cultural heritage, especially biodiversity conservation, in Box-Ironbark forests and woodlands are of great importance to Victoria and Victorians. A very high proportion of Box-Ironbark public land is of interest to miners, but contains significant conservation and cultural heritage values that are susceptible to impacts resulting from mining.

In gauging potential future wealth from mining, the Council considers, in concert with its economic consultants, that the average ratio—24% of the area in mining licences is on public land—remains valid.

In order to realise the wealth-generating potential of Box-Ironbark mining, a large proportion of the study area, particularly to key areas such as recognised goldfields, will need to be generally accessible for exploration and mining. In order for Box-Ironbark biodiversity to be maintained, and in the long term to recover, it will be necessary to ensure that key areas are not disturbed, and to ensure that disturbance to native vegetation is minimised over the study area.

Strategically located national and state parks, which are exempt from mining, are the most appropriate mechanisms to protect key areas such as the habitat of the Bendigo population of the pink-tailed worm-lizard, and landscapes of large old trees. With careful planning, parks can be sited to protect significant environmental and cultural heritage values, represent vegetation types, yet include areas of least interest to miners; in particular away from recognised goldfields.

The ECC considers that the recommended national and state parks have natural and cultural heritage values that warrant them being given this status and the associated mining exemption. However, existing licences in these areas should be able to continue. The ECC is recommending a review of Section 40 procedures aiming at timely and transparent processing of applications, without reducing the current level of scrutiny, which is appropriate for the most significant and highly protected parts of the reserve system.

Despite claims to the contrary, many recent mines have operated in areas of restricted Crown land and it is certainly not the ECC's intention to effectively exclude mining from the relatively large areas recommended as restricted Crown land. At the

same time, the very purpose of recommending areas as restricted Crown land is to improve protection of key values, and a certain amount of increased scrutiny is appropriate. In these areas, exploration and mining would continue to be subject to approval from the Minister for Environment and Conservation, and a comprehensive assessment process which may require an environment effects statement. This process should ensure that important values within these reserves are protected. The ECC is recommending that moves by NRE to clarify its approval processes (as described above) be upgraded to a formal review so that mining is not unduly impeded or delayed, and protection is transparently provided.

The requirement proposed in the Draft Report for an economic significance test to be applied to proposed mining on public land has now been made less formal.

Underground mining beneath areas with significant values

Although many key areas for natural and cultural heritage are of little interest to miners, there remain some areas of exceptional natural or cultural significance, and high prospectivity for mining, particularly underground mining. The ECC is now recommending that these areas—the recommended Greater Bendigo National Park (A4), Castlemaine Diggings National Heritage Park (NHP1), and Deep Lead Nature Conservation Reserve (D2)—be reserved only to a depth of 100 metres (see specific recommendations in Chapters 15 and 16). Traditionally, the boundaries of public land units, including parks and reserves, have been assumed to extend to the centre of the earth. The ECC's approach will allow new mining ventures under, but not within, the relevant areas. That is, entrance portals and other surface infrastructure could be located outside these areas, but still access gold more than 100 metres below the surface. It is not unusual for modern underground mines to tunnel more than a kilometre from the entrance portal, and to depths of several hundred metres.

Apart from the major surface features such as entrance portals and processing facilities, underground mines also require much less intrusive infrastructure such as air vents through to the surface along the length of the drive. While the preferred option should always be to locate all infrastructure outside the park, where this is not reasonably possible, the ECC is of the view that,

with care, less intrusive facilities such as air vents can be installed within recommended park areas with low impact on visual and other values.

General principles

Over the vast majority of public land, mining should be permitted with environmental best practice measures codified as the industry standard, with particular emphasis on protection of native vegetation. Additional measures would include compensation for and rehabilitation of any areas where native vegetation is lost.

The ECC supports the view in numerous submissions that high environmental standards are required in regard to mineral exploration, mining operations and rehabilitation on all public land. Minimal impact techniques should be utilised by the mining industry at all times. A net increase in Box-Ironbark vegetation on public land through the purchase of replacement vegetated private land by, or with the assistance of the mining industry is also supported.

To this end, the ECC is recommending that the principles in the box below be adopted as the standard to be applied across all exploration and mining operations on Box-Ironbark public land. These measures are already applied by the most progressive miners, and are increasingly being adopted across the industry. It is important that measures to achieve the key aim of net community benefit—the balance of social, environmental and economic considerations—are consistently and transparently applied to all mining operations, independently of other factors such as the size of the operation.

Public land outside national and state parks, with significant natural, cultural, historic or recreational values can be available for mining but afforded nature conservation reserve, historic and cultural features reserve or regional park status. These categories, where mining is restricted but not excluded, provide extra protection, scrutiny and appropriate management. In state forests, key sites with important values can be identified and protected when specific mining proposals are under consideration.

This approach will permit a vigorous world-class mining industry to operate in conjunction with a high level of protection for the region's significant natural, cultural and recreational values, featuring a comprehensive, adequate and representative reserve system.

PRINCIPLES

Because of the historical depletion and current diversity and significance of natural, cultural, historic and recreational values, high standards are required of exploration, mining and rehabilitation in Box-Ironbark forests and woodlands. These standards should be applied consistently to all mining operations, with the extent and significance of the values potentially or actually lost being the main factor in variations. They should augment, rather than replace, existing environmental protection measures, such as controls for the retention of native vegetation under the *Planning and Environment Act 1987*.

General principles

Removal of native vegetation should be minimised.

As a planning principle, surface mining should not be precluded, but preference should be given to underground mining.

Prior to approval, proposals to clear vegetation on public land for mining should informally, but explicitly, compare the expected benefit to the community with the value of the natural, cultural, historic and recreational values to be lost.

Low impact exploration

Key elements of low impact exploration are:

- (a) preliminary assessment of vegetation and fauna habitat to identify and mark areas or sites to be avoided during exploration works;
- (b) an assessment of historic and Aboriginal cultural values;
- (c) drill sites located on or adjacent to existing tracks where possible;
- (d) trays or similar apparatus installed beneath machinery to protect ground and vegetation from oil or fuel leaks or spills;
- (e) foot traffic around works areas being confined to existing tracks, or duckboards or similar structures if necessary, being installed to protect vegetation and minimise soil compaction;
- (f) washing down earthmoving equipment prior to entering works area to minimise risks of introducing pollution and exotic organisms; and
- (g) after exploration, all introduced materials removed, drill holes capped, and leaf litter spread over drill hole sites.

Mining

Key elements in minimising the impact of mining are:

- (a) a detailed flora survey as a basis for post-mining revegetation;
- (b) a detailed survey and assessment of historic and Aboriginal cultural values;
- (c) removal and storage of topsoil for replacement after mining;
- (d) collection of indigenous vegetation seed from any areas to be cleared; and
- (e) compensation, both for temporary or permanent loss of native vegetation, or other natural, recreational or (where present) cultural heritage values, to be paid by the presentation of suitable private land of equivalent value for addition to the Crown land estate (preferably near an existing conservation reserve to which it can be added), rehabilitation of nearby existing degraded areas, or by other appropriate means, leading to a net increase in indigenous vegetation in the Crown estate.

High quality rehabilitation

Key elements of high quality rehabilitation are:

- (a) replacement of topsoil retained prior to mining;
- (b) revegetation with local provenance indigenous plants—at least 70% of the pre-mining species-richness should be achieved;
- (c) replacement of fallen timber collected from vegetation removed prior to mining; and
- (d) subsequent weed and erosion control until restored vegetation is established and stabilised.

RECOMMENDATIONS

- R25** (a) The existing set of public land use categories and their classification under the *Mineral Resources Development Act 1990*, and existing provisions in the *National Parks Act 1975* relating to mining in areas scheduled under that Act, be retained as the appropriate policy and legislative framework for the administration of mining on Box-Ironbark public land (also see notes below):
- (b) reference areas, and national and state parks continue to be exempt from mining and exploration except that, in line with current practice
- (i) for existing or new national and state parks, or land added to existing national or state parks, mining or exploration licences current at the time of Government approval of this recommendation be renewable subject to approval by the Minister for Environment and Conservation and after tabling in Parliament, until they lapse; and
- (ii) mining licences may be granted within the area of such current exploration licences, subject to approval by the Minister for Environment and Conservation and after tabling in Parliament;
- (c) mining be permitted beneath parts of the Greater Bendigo National Park (see A4), the Castlemaine Diggings National Heritage Park (NHP1), and the Deep Lead Nature Conservation Reserve (D2) which extend to a depth of 100 metres only.
- R26** All works associated with exploration and mining be situated to minimise impacts on natural, cultural, historic and recreational values, and especially to minimise removal of native vegetation.
- R27** All exploration licences issued over Box-Ironbark public lands include conditions to effect low impact exploration, in accordance with the principles outlined above. These licence conditions would be additional, rather than substitutes for other conditions specified by the responsible authorities.
- R28** All mining licences issued over Box-Ironbark public lands include conditions to effect high quality mining and rehabilitation, in accordance with the principles outlined above. These licence conditions would be additional, rather than substitutes for other conditions specified by the responsible authorities.
- R29** Bonds should be adequate to provide for best practice rehabilitation, relevant departmental costs, and amelioration of any hazardous chemicals resulting from mining or processing, such as arsenic or cyanide.
- R30** A review be conducted to ensure that applications for exploration or mining licences subject to the provisions which apply to restricted Crown land or land scheduled under the *National Parks Act 1975* are processed in a timely and transparent manner, without reducing the current level of scrutiny afforded by these provisions.

- Notes:
1. The ECC has recommended a limited number of variations to this framework to reflect specific local circumstances, most notably in limiting the recommended Castlemaine Diggings National Heritage Park (NHP1), Deep Lead Nature Conservation Reserve (D2), and parts of Greater Bendigo National Park (A4) to a depth of 100 metres, thereby reducing restrictions on underground mining beneath these areas.
 2. The definition of restricted Crown land in the *Mineral Resources Development Act 1990* requires updating to include national heritage park, and to reflect other land use category name changes.
 3. Applications for exploration and mining on public land are also subject to the 'future acts' provisions of the *Native Title Act 1993* (see Chapter 5).

Information Sources

¹ Perseverance Exploration Pty Ltd (1996).

² NRE (2000b).

³ NRE (1998b).

⁴ AMEEF (1999).

⁵ ANZMEC (1994).

⁶ Grollman *et al.* (1994).

⁷ Bellette (1998).

⁸ Williams and Van Praagh (1997).

⁹ Sprague (1992).

¹⁰ Tongway and Hindley (2000).

8 Wood products

Box-Ironbark forests are an important source of timber for a variety of national, regional and local uses, from high quality sawn timbers to firewood. This chapter outlines wood production matters, while forest management is discussed further in Chapter 17.

Box and ironbark timbers have various properties distinguishing them from products from taller, faster-growing forests along the Great Dividing Range. Their density makes them high quality firewood. Their durability makes them resistant to insect (particularly termite) and fungal attack and therefore highly favoured for farm fencing and other in-ground uses. The strong colour, grain and often-interesting figure of kiln-dried box and ironbark timbers make them sought after for furniture manufacture.

In the past box and ironbark timber was sought for:^{1,2}

- heavy construction timbers, such as for bridges and pier piles;
- pit props and fuel for mining from the 1850s;
- railway sleepers, particularly during the expansion of railway lines 100 years ago, and the later peak in 1960/61;
- farm fence posts, with peak production in 1953/54;
- firewood, particularly during the 1940s and early 1950s; and
- small volumes of electricity, telephone and farm shed poles.

All those markets have declined and substitutes have become widely available. Firewood had a resurgence in the 1980s and 1990s with the development of wood-burning slow combustion heaters.

8.1 Current products

The highest value timber products from Box-Ironbark forests, in terms of contribution to the economy per cubic metre, are sawlogs. NRE's long-term goal in Box-Ironbark forests is to optimise sawlog supplies and maximise value-added products. This strategy will have the added advantage of allowing stands to reach a greater level of maturity than the current forests.

The estimates in Table 8.1 below are based on prices at the firewood, post or sleeper-cutter's yard—effectively a wholesale price. The royalties for different products are:

- sawlogs \$41 per cubic metre
- sleepers \$38.70 per cubic metre
- posts \$32.76 per cubic metre (average for various fencing products), and
- firewood \$10.30 per cubic metre.

Sawn timber

Grey box, red and mugga ironbarks, red box and yellow gum produce high quality timbers with decorative grain and a range of colours. These timbers saw, dry, dress and polish well. They are valuable for furniture, mouldings and other value-added products.

Currently, sawlog harvesting and milling is only a small industry, accounting for about 2% of the total cut by volume, 12% by value, and 17% of full-time equivalent timber jobs.³ As well as the favourable value-adding at the mill in kiln-dried sawn products, this wood can be used for much higher value purposes such as furniture.

Sleepers and sawlogs are cut from the same size and class of log. Some 500 cubic metres per year of sawlog wood was cut for sleepers on average over the period 1993/94 to 1998/99.³

The Rushworth sawmill holds the main sawlog licence, cutting 730 cubic metres of the 895 cubic metres total cut in the Box-Ironbark study area. Main species harvested are grey box and red ironbark. About 40% of its output is kiln-dried, dressed and shaped for furniture, flooring and trims. Most of the remainder is used for outdoor furniture and electric fence droppers.

Fencing timber

Sawn or split posts, strainer (large cylindrical) posts, smaller diameter round posts (sometimes treated), and minor products such as rails, power line or shed poles are mainly cut by licensed commercial cutters. Cutters often take firewood timber from the heads of post trees; otherwise it is made available for domestic wood collectors.

Firewood

Firewood is by far the largest timber product by gross volume, and also the largest by total dollar value (see Table 8.1). Licensed commercial cutters take a set amount by chainsaw in the bush, or by carting cut lengths to a sawbench. Commercial cutters take about 60% of the harvest. The balance is taken by domestic cutters who either have a permit to collect their own requirements from already felled trees, or are authorised to cut small trees in designated areas.

In general, firewood is cut from relatively small diameter trees, thinned stems and heads of larger dimension trees cut for sawlogs, sleepers or fencing products. NRE intends that current firewood harvesting from standing trees be managed as a thinning strategy, to encourage growth in retained stems for future sawlog harvesting.

As a general principle, and provided the market is available, all timber should be sold for the highest value product for which it is suitable. Milled sawlog timber is first, then value-added post log products, and then firewood.

Commercial firewood cutting occupies numerous part-time workers and thus makes an economic contribution to a wide spectrum of households.

The North Central Farm Forestry Network, in conjunction with NRE, supports new box and ironbark timber plantations on farms. Agroforestry plantations can provide substitutes for small dimension box and ironbark forest products such as fence posts and firewood, and possibly sawlogs from species such as sugar gum. As well as timber products, these farm plantations can have other benefits such as lowering water tables to reduce salinity, creating windbreaks, and shelter belts for animals and general beautification of properties.

The Network also promotes marketing of high-value wood products including kiln-dried timber from dead paddock trees. Such moves reinforce value-adding and marketing efforts for Box-Ironbark timber.



Cutting a grey box log to size for fence posts.

Table 8.1 Approximate value of annual timber production from the Box-Ironbark study area

Source: Stage 3 social & economic study³

	Sawlogs	Sleepers	Fencing	Firewood	Totals
Total production in cubic metres (m ³)	895 m ³	500 m ³	4 390 m ³	42 150 m ³	47 935 m ³
Value of production	\$0.404 M	\$0.077 M	\$0.69 M	\$2.13 M	\$3.3 M
Value/m ³ produced	\$496	\$129	\$117	\$45 local \$70 Melbourne	\$72 (average)
Jobs – total full and part time	16	4	53	100+	173+
Jobs – full time equivalents (FTE)	13	4	18	43	78
Jobs/000 m ³ produced	14.5	8	4.1	1.7	-

Notes: 1. Production volume for Bendigo FMA is the average for the years 1993/94 to 1998/99; for other FMAs, it is the estimated annual production.

2. Some 300 cutters in Bendigo FMA hold Forest Operator's Licences, of whom about 160 operate in commercial coupes. Numerous others cut small volumes, mainly domestic firewood, for other users.

8.2 Industry trends

Sawlogs

The value of sawlogs can be substantially increased with the use of humidity-controlled drying kilns, and by dressing sawn wood for finished products such as furniture, mouldings and flooring. The Rushworth sawmill has significantly increased employment and profitability through value adding. About 40% of the 730 cubic metres timber allocation is dried at present. This is a small, specialist industry with a growing but limited Australian market. Some potential also exists for exporting finished products.

Sleepers, poles and heavy construction timbers

Most of the markets for these products are now met by alternative materials.⁴ V-Line had been purchasing fewer box sleepers and was using more concrete and river red gum sleepers. However the recent purchaser of V-Line's freight lines, Freight Australia, has indicated a continuing interest in Box-Ironbark sleepers. When sections of metropolitan railway track are being renewed, concrete sleepers are increasingly being used. Individual wood sleepers are generally replaced with wood.

Fencing

The demand for Box-Ironbark posts has declined over the past decade. Similar products are available from outside the region, including round posts from plantations and agroforestry. Alternatives include concrete products, treated pine posts, creosoted hardwood posts, steel star posts, galvanised-steel end assemblies, and electric fencing. Several post cutters mentioned the reduced demand for Box-Ironbark posts due largely to the lower prices for treated pine, steel and electric fence alternatives. Some post cutters are diversifying into value-added sawn products, utilising their post log allocation. Cutters at Inglewood, Rushworth, and Talbot are sawing post logs into small dimension products such as stakes, pegs and droppers, as well as specialty fencing and construction timbers.

Firewood

About 70% of Box-Ironbark forest firewood is consumed within the study area, and 30% sold in Melbourne. The demand is not expected to change in the short term. Australian Standards for wood-heating appliance emissions are being implemented progressively and newer more efficient appliances

require less fuel. This may marginally reduce demand in the medium term, although this may be counter-balanced by population increases.

About 2% to 5% of Victoria's firewood comes from Box-Ironbark public forests.³ While Melbourne consumers could shift to firewood from elsewhere, local users will maintain a strong demand for Box-Ironbark firewood. Cartage distance is a real concern to low-income households dependent on firewood. If local supplies became scarcer, consumers within the study area would have to obtain firewood from outside the region. Commercially supplied river red gum from NSW is the main product used in Melbourne's controlled combustion heaters but this would probably be more expensive than local timber for use in the Box-Ironbark region. Relatively local substitutes are necessary to replace local consumption. Quantities of less dense timber are available from other forests in western Victoria.

If firewood collection was reduced or excluded from some areas of public land, an immediate effect might be to increase firewood collection on private land, and hence the pressure on private land habitat could be increased if no other actions were taken.

With a continued shift to highest value products, firewood will increasingly be from thinnings, branch wood and small diameter trunk sections that are not suitable for sawn products. The Box-Ironbark Timber Assessment⁴ (BITA) records an average of 499 and up to 780 tree stems per hectare in state forests, suggesting that thinning can produce substantial volumes of firewood.

'Light' or 'common' timbers such as mountain ash and messmate are less dense but have the same relative heat per kilogram of air-dried wood as grey box, which is seen as the best firewood. Light wood is in widespread use by domestic wood collectors, but little is commercially sold.

For Victoria as a whole, alternative supplies of firewood are available from outside the study area. Large volumes of residual wood resources are available from state forests, in western, central and eastern Victorian forests. In the medium term, firewood supplies from outside the region are expected to increase due to the growth in plantations supplying a range of wood products, and of farm forestry.

Extensive areas of farmland around the margins of Box-Ironbark forest blocks are used for low

production dryland grazing. Such land may be well suited to growing trees, particularly for firewood. Plantations can also have benefits for groundwater and salinity control, greenhouse gas abatement, provision of habitat, strengthening the regional industry base and improved economic opportunities. Virtually all of the Box-Ironbark study area is in the Murray–Darling Basin, and much is at risk of developing dryland salinity problems.

The recent ANZECC discussion paper⁵ on a national approach to firewood collection and use contains draft strategies to improve firewood use by:

- encouraging and providing incentives from government for farm forestry plantations;
- exploring alternative resources;
- upgrading efficiency of wood heaters; and
- education.

Similar issues are under consideration in the Victorian Government’s Firewood Strategy⁶, which is currently under development by NRE. Transitional subsidies would help get plantations established, with the industry becoming self-funding in the longer term.

New plantations for other products, primarily paper pulp and sawlogs, could be established on some 1.8 million hectares of private land around Benalla and Shepparton, according to a recent study.⁷ This land, including irrigated farmland, is within reasonable distance of pulpmills and has been identified as broadly ‘suitable for private forestry’. Additional roundwood would be produced, potentially available for posts and firewood. The Minister for Environment and Conservation recently announced⁸ a grant of \$2.4 million for the establishment of wastewater-irrigated plantations on private land, as an alternative timber resource to state forests, in northern Victoria.

Many towns in the study area are now connected to gas pipelines, with Ararat and Stawell recently added. The provision of gas allows the opportunity to replace wood heating with gas.

8.3 Resource sustainability

The wood resource should not be harvested at a rate faster than it is growing. Sustainability is assessed on the basis of forest management areas (FMA). The sustainable yield from an FMA is the rate of annual timber harvest that can be sustained over the long

term. The FMAs affected by the Box-Ironbark investigation were outlined and illustrated in the ECC’s Resources and Issues Report (1997). Bendigo FMA is dominant, accounting for 91.3% of the total state forest area included in the investigation.

Estimations of sustainable harvesting can be made, for most study area forest, from NRE BITA data. The BITA study area is effectively Bendigo FMA plus the Pyrenees. Modelling with these data allows estimation of the expected annual available timber volume from the current land base, and from proposed changes to the land base. NRE’s model⁹ (see Appendix 13) uses a multi-age class spreadsheet approach.

Since publication of the ECC’s Draft Report, NRE initiated a review of the model and re-analysed the Box-Ironbark timber resource information. The model, the review and recent changes are discussed in Chapter 17 (State forests and forest management); the revised estimates are included below.

Sawlogs

Across the whole Box-Ironbark study area, about 895 cubic metres of sawlogs are cut each year, and another 500 cubic metres of sleepers. The current legislated sustainable yield of sawlogs for the Bendigo FMA is 800 cubic metres net per year.

According to modelling by NRE based on BITA data, there is an additional sawlog resource, over and above that presently cut, which could be sustainably harvested from the currently available state forest. Some 2 920 cubic metres (net) of sawlogs (including sleeper logs) are estimated to be available each year from the BITA study area forests, before the ECC recommendations, according to the yield modelling. This volume only includes wood from high and medium productivity forests, excludes defective wood, allows for tree mortality, and assumes trees 60 cm diameter and larger are excluded from harvesting (which is an effect of current forest management).

Recommendations in this report however reduce the available productive area of state forest by 39%, and also reduce the size of this potential resource.

Firewood

NRE has estimated annual available firewood volume from the current land base to be 53 120 cubic metres per year from the BITA study area, according to the yield model. Cuts in the period

from 1993/94 to 1998/99 have averaged 42 150 cubic metres per year from the whole study area. The modelled estimate is for firewood produced from the residue of sawlog and fencing operations and thinning, in high and moderate productivity forests.

Where ecological management operations involving thinning are carried out in parks and reserves, saleable volumes of firewood are likely to be available as a result. The scope and scale of these operations are subject to research, however trials in selected areas are likely to be underway within 18 months of government consideration, if the recommendations are approved. Logistics and details will be determined by the land managers, and operations would be carried out under strict control of the managers. The ECC expects that commercial quantities of firewood will result, and be available for sale, or collection under domestic permit.

For several years, firewood operations have been managed as a heavy thinning, reducing basal area to encourage retained stems to grow faster.

Fencing

The modelling estimates the annual available volume of fencing products from the BITA study area is 9 895 cubic metres, from the current land base. Cuts in the period 1993/94 to 1998/99 from the whole study area have averaged 4 390 cubic metres. NRE expects that this timber will increasingly be directed to sawn products rather than used for fencing.

8.4 Issues

Sleepers

Sleepers are cut from sawlog-quality trees. A sleeper (2.7 m x 25 cm x 13 cm) includes about 0.09 cubic metres of timber. While individual sleeper cutters can cut more efficiently, NRE has in the past used an average conversion of 4.5 sleepers per cubic metre of log; at which rate the efficiency (net product volume/log volume) of sleeper cutting is about 39%. In coupes proposed for sleeper cutting in the next few years, NRE estimates that the relatively small log size means a conversion rate of only three sleepers per cubic metre can be achieved (26% efficiency). As sleepers and sawlogs come from the same timber resource, a sawlog committed to sleeper cutting is a log lost to value-added sawn and kiln-dried timber.

Firewood

The continuation of the firewood industry obtaining large volumes of wood from public Box-Ironbark forests has been strongly questioned. Issues include the perception that operations on public land are subsidised, uneconomic, and that heavy thinning operations adversely affect fauna habitat.

The ECC believes that, in the longer term in these highly fragmented public forests, the community would be best served by shifting firewood production mainly to plantations on freehold land, along with production from coupes within state forest in conjunction with harvesting of higher-value products, such as sawlogs and fencing material. This is already likely to occur to some extent because the current cycle of heavy thinning for firewood in high and medium productivity forests will be completed in about 15 to 20 years. This thinning process should result in increased numbers of coupes yielding higher-value products in the medium to long term. This time frame would allow a sufficient period to establish firewood plantations on private land. Some firewood may also be available in the short and medium term from parks and reserves where thinning may be used as an ecological management tool.

Typically, the Box-Ironbark forests, on public land, are on relatively poor soils in terms of depth, structure, and moisture-holding capacity, and on the better soils common on nearby private land, plantations can produce merchantable firewood in 12 to 15 years. A decision to reduce firewood-only operations from public forests would also encourage investment in private plantations.

Assuming a growth rate of 5 cubic metres per hectare per year, around 800 ha planted each year for 10 years could completely replace the current production of firewood from Box-Ironbark forests.

Recent research has identified potential health problems resulting from wood smoke in certain urban areas and rural towns. In response, the Australian Standard for Woodheaters (AS 4013) was recently tightened. Demand for firewood in Melbourne may change as new air pollution restrictions are imposed. In the United States, burning of reconstituted wood fibre for heating rather than sawn or split wood is now required in some states, in response to air pollution and resource use concerns.

Several issues are linked to domestic firewood collection. Removal of fallen timber and standing dead timber for domestic use can reduce important fauna habitat. Regulation and control over the location of domestic firewood collection, retention of habitat trees, safety and volume taken are difficult to achieve. There has been a reduction in the proportion of wood taken by domestic collectors in recent years relative to the commercial cut.

8.5 Community views

An overview of submissions relating primarily to wood products is included here. Matters in submissions relating to forest management are included in Chapter 17.

Some areas proposed as parks or reserves were seen as being important to the timber industry. Timber interests wanted continued access, for timber harvesting, to the Rushworth-Heathcote and Dunolly-Inglewood State Forests, the proposed St Arnaud Range National Park, Kooyoorra and Paddys Ranges State Parks and many proposed nature conservation reserves which were seen as important to the timber industry.

Several submissions expressed the view that Box-Ironbark forests were now adequately managed for maintenance of biodiversity, and supported continued harvesting of firewood and other wood products in specific proposed parks and reserves. Submitters from several towns including St. Arnaud, Tarnagulla, Rushworth and Heathcote were concerned about continued domestic firewood collection.

Several submissions requested that sleeper production continue in the Box-Ironbark forests of the Maryborough area.

Some submissions criticised the timber resource modelling based on the BITA data, saying it overstated available resources. There was clear concern about the potential for job losses in the industry on implementation of the ECC's recommendations.

Detailed matters relating to the economics of native forest harvesting were raised in some submissions.

Conservation of biodiversity in Box-Ironbark forests and removal of activities perceived as detrimental to conservation, were priorities in very many submissions. There was strong support for moving eucalyptus oil, timber and firewood production from

Box-Ironbark forests to plantations on private land or to previously cleared public land, and phasing these industries out of state forests. There were particular calls to reduce firewood harvesting from state forests, including increased restrictions on harvesting and support for establishment of plantations and agroforestry.

Numerous submissions called for protection of large old trees, increased areas in parks and reserves, and protection in general for Box-Ironbark forests and woodlands.

8.6 Achieving a balance

The ECC recognises that public land forest areas contain significant timber resources, but they also have biodiversity values of great significance. **The ECC's view is that it cannot provide adequately for biodiversity conservation, and also retain all timber resources available for harvesting.**

The ECC is, however, required to balance the competing demands on the forest and to consider social and economic issues including the likely impacts on those now employed in Box-Ironbark timber industries. The final recommendations are intended to achieve this balance.

The ECC believes biodiversity is best protected through a system of dedicated conservation reserves, coupled with appropriate forest management. Forestry operations will continue in the remaining state forests.

NRE's timber modelling estimates of available resources after implementation of the ECC's recommendations, exceed the present harvests of sawlogs and fencing timbers, and for firewood the estimate is about 14% below the current harvested volume. However for reasons that are explained in Box 8.1, the ECC's social and economic study consultant has decided to assess the effect of the recommendations in terms of a reduction in the current volume cut and the ECC has accepted this view.

Additional firewood resources and possibly some round posts may become available from thinning for ecological management in parks and reserves. Alternative supplies of wood are available from other forest types—additional firewood could in the future be produced from plantations on farms.

As plantations are established, the number of commercial firewood-only coupes will reduce.

Firewood harvesting operations conducted in conjunction with harvesting of higher-value products such as sawlogs and fencing material, would continue. Incentives and this gradual change should encourage investment in plantations on private land, and offer long-term industry security in planting, tending and harvesting plantations, and processing and marketing plantation wood.

Firewood felled in commercial operations prior to establishment of recommended parks and reserves can be allowed to dry out for a reasonable time prior to removal.

The ECC has recommended that sleeper production be phased-out in state forests in favour of higher value use of these logs for kiln-dried timber. This size and quality of wood should be redirected into higher-value sawlogs and converted into kiln-dried products. The fixed dimensions of sleepers mean that there is much wastage from a sawlog-sized tree. Sawing the same timber into dried boards makes more efficient use of logs and adds more value. Available alternatives for sleepers include river red gum and concrete. Post-size timber is increasingly being used for sawn products and the ECC encourages this trend.

Likely social and economic effects

The likely implications for state forest users are discussed in the Stage 3 social and economic study report (see Appendix 5). The main economic impacts of the ECC's park and reserve recommendations are briefly outlined in Box 8.1.

Domestic firewood supply in parts of the region could be reduced, especially larger dimension wood. Firewood will continue to be available from forest thinning, including ecological thinning where appropriate, from heads of sawlog and post trees and, in future, from plantations. The ECC is aware that its Draft Report proposals would have affected domestic firewood supplies in some towns, particularly Heathcote, St Arnaud, Tarnagulla and Rushworth. The final recommendations have been modified to reduce impacts in these areas.

Industry structural adjustment

Associated with the Regional Forest Agreement (RFA) process within RFA regions, the Commonwealth may provide funding under the Forest Industry Structural Adjustment Package (FISAP). This funding is to promote development in the native forest timber industry, and assist

businesses and employees in the industry who are directly and adversely affected by the outcomes of the RFA processes. The ECC has been advised that Box-Ironbark industries are able to participate in the Industry Development Assistance component of the program.

In the Box-Ironbark area, the expected reduction in firewood availability, and the effects of the park and reserve recommendations on scheduling of harvesting operations (see Chapter 17), mean that there will be some impacts, particularly on firewood and sleeper cutters, and post cutters in particular locations. In implementing the recommendations, certain communities where timber is an important component of the local economy may be more strongly affected. ECC has recommended strongly that, in considering these recommendations, the Government must take into account the need for industry assistance for individuals adversely affected by the recommendations. In Chapter 17, specific phase-out measures are proposed for certain individuals explicitly affected.

The ECC's view is that comparable treatment should apply for timber industries inside and outside the Box-Ironbark study area (see Recommendation R1 in Chapter 3). If there is a need for industry adjustment arising from implementation of the ECC's recommendations, it would be appropriate for the State Government to undertake such adjustment, according to principles consistent with those applied in RFA regions. Appropriate support should also be provided for affected communities.

The recommendations in this chapter provide the basis for the ECC's approach to timber production from the Box-Ironbark forests. These recommendations have been developed to ensure that a comprehensive, adequate and representative reserve system is created which will protect important natural values while limiting, as far as possible, the impact on current uses of the forest.

Box 8.1 EFFECTS OF RECOMMENDATIONS ON THE TIMBER INDUSTRY – A REVISED APPROACH

Approach in Draft Report

The predictions of the social and economic effects of the Draft Report recommendations were based on output from NRE's Box-Ironbark forest management model⁹ (see Appendix 13) for the Bendigo FMA state forests. Essentially, the model predicted that even with a 42% reduction in the area of state forest (as was proposed in the Draft Report), there would be negligible effect on timber availability and, therefore, employment. This result was largely due to the NRE management strategy in recent years of setting harvesting rates below the rate of volume increase as a result of tree growth — particularly for sawlogs.

In public consultations after the Draft Report, there was considerable criticism of the model's predictions and, consequently, the estimated social and economic effects. Many in the timber industry did not believe that the predicted timber volumes would be available from the proposed reduced area. Others argued that if the volumes were harvested from the reduced area, forest biodiversity values would be greatly compromised as a result of the increased intensity of harvesting. There was also criticism that the absolute number of people employed in the industry had been under-represented.

As a result of these views, all aspects of the social and economic assessment pertaining to timber were fully reviewed, leading to a new social and economic assessment, as explained below. NRE also reviewed and adjusted the model.

The adjusted model

Adjustments to the NRE model are detailed in Appendix 13 and Chapter 17. These adjustments—and, of course, the differences between the draft and final recommendations (a 39% reduction in productive state forest area is now recommended, as are additional measures in Recommendations **F** (b), (h), and (j)–(p) to protect natural values)—lead to changes in the magnitude of the predicted effects of the ECC's recommendations. As shown in Table 8.2, the adjusted model again predicted that the volumes which could be sustainably cut from the existing (baseline) state forest area were significantly larger than the actual average annual cut. The net effect is that, compared to current average annual cuts, the new model predicts available sustainable annual cuts equivalent to 43% and 51% increases in sawlog and fencing timber (respectively), and a 14% decrease in firewood after implementation of the ECC's recommendations. The consultants consider that changes in timber availability would translate to similar changes in employment levels.

The ECC's revised approach

The Stage 3 social and economic assessment takes a different approach (see Appendix 5). In developing this approach, the ECC's consultants have drawn heavily on information and perspectives obtained from:

- numerous discussions, involving the ECC and/or the consultants, with timber workers, Timber Communities Australia, and NRE field and head office staff;
- interviews and questionnaire-based surveys of 27 timber workers (17% of the 160 currently active commercial cutters), with coverage of all product sectors;
- a separate survey of 26 timber workers to determine the number of full-time equivalent jobs in the industry;
- written submissions concerned with wood production, forest management and timber industry employment; and
- review of previous social and economic assessments.

As a result of these new perspectives and information, the consultants concluded that analysis of the effects of ECC's recommendations should be based on a reduction in volume below the current actual cut, rather than below the potential increased cut predicted by the model. This is the key difference between the two approaches (i.e. between the **NRE model (less cautious)** and the **consultants (more cautious)** approach), as shown in comparison in Table 8.2. The consultants were strongly of the view that estimated effects based on the actual cut will prevail over the short to medium term and, accordingly, there will be job losses over that period, rather than the job increases predicted by the model. The modelled estimates may however be reflected in increased production in the longer term.

In summary, then, both the NRE model and the consultants estimated that from the information available, the ECC's recommendations would lead to a reduction in productive forest area, with a proportionate reduction in employment. The two approaches differed in the point where the percentage reduction should apply—the current cut (in the case of the consultants) or the substantially larger baseline modelled volume (in the case of the model). As a result of that difference, the net effect of the consultants' approach is a predicted 39% reduction of the current cut for all products, whereas the outcome from the model predicts that longer term there could be 43% and 51% increases in sawlog and fencing timber availability (respectively), and a 14% decrease in firewood availability, compared to the current cuts.

The ECC has adopted the consultants' **more cautious** approach, and is strongly of the view that **implementation of these final recommendations will result in a reduction in timber industry employment of no more than 30 full-time equivalent jobs.**

Why has the ECC taken the more cautious approach?

Although the outcomes from the two approaches differ considerably, the ECC is confident in choosing the more cautious approach—that of the consultants—as the more appropriate estimate of the effects of its recommendations on the timber industry. The cautious approach sets an upper limit on the potential effects, with compelling reasons (see below) why the impact is likely to be less than this upper limit. This approach provides a clear and reliable assessment of the likely effects of the recommendations. The model-based assessment is more likely to underestimate the effects, and there is little indication as to the extent of the underestimation. That is, the consequences for the community of implementing the recommendations on the basis of the less cautious (model-based) approach, and then finding that the effects on the timber industry were more severe, would be worse than adopting the more cautious (consultants) approach and finding that the effects were less severe. NRE also advised the ECC to interpret the model results conservatively.

In addition, a key issue with the NRE model for the ECC was that of increased intensity of cutting. That is, while the modelled available volumes may or may not eventuate, harvesting these volumes would inevitably mean cutting significantly more intensively than at the present time. This would be likely to have a negative effect on the biodiversity values of the forests and would be strongly opposed by many stakeholders.

There are several very good reasons to be confident that the actual reduction in employment will be considerably less:

- The ECC has no reason to doubt that, for some years, NRE has maintained timber harvesting at rates below that at which the forest grows. Accordingly, the sustainable cut should be larger than the current cut, even if not as large as the model predicts. However, the very substantial extra volumes predicted by the model strongly support the notion that the effects will be appreciably smaller than the cautious estimate adopted. The consultants included, as their “optimistic” options (see Table 8.2), a 30% reduction in volume and employment after the ECC recommendations, reflecting the modelled volumes.
- In some respects, the NRE model is itself conservative. For example, only high and medium productivity forests were included in the model. About 15 700 ha of low productivity forests, amounting to about 13% of the total recommended state forest estate, will continue to produce some firewood.
- Calculations using the BITA summary data—not using the model analysis—support the model's conclusions. The BITA Report⁴ summary lists average standing volumes for sawlogs (1.2 cubic metres/ha) and firewood (10.8 cubic metres/ha). Multiplying these by the net productive area after ECC recommendations (71 040 ha) and dividing by the length of the cutting cycle—50 years for sawlogs and 25 years for firewood—gives raw annual production figures of 1 705 cubic metres for sawlogs and 30 700 cubic metres for firewood. These are similar to the modelled volumes that also allow for increase through growth, and decreases through defect and mortality.
- If sensibly managed, a 39% reduction in sawlog volume should have a markedly lower percentage impact on employment. This is because the predicted reduction (to 780 cubic metres—see Table 8.2) would be sufficient to maintain the current allocation of 730 cubic metres to the Rushworth sawmill. Most of the remaining sawlog material which makes up the current total cut of 1 400 cubic metres is processed as sleepers and employs fewer people. Therefore, if the reduction in sawlog volume is taken from that part of the total volume currently allocated to sleepers, the Rushworth mill would be able to continue operating as at present, leading to a smaller reduction in employment.

- No account has been taken of potential timber production from private land in the study area. Feasibility studies point to a promising future for the large scale establishment of private land woodlots for timber production, and planning is now well advanced.^{10,11} The ECC strongly supports this trend (Recommendations R7, R33, R35)—in the long term, wood production and associated employment from private land have the potential to be significantly greater than current Box-Ironbark public land production. If anything, any reduction in public land firewood production resulting from these recommendations should encourage the establishment of private land woodlots to satisfy the increased demand.
- The ECC also strongly supports increased value-adding in the timber industry (Recommendation R30) which, as a general rule, should increase employment without increasing the volume of wood cut. Similarly, using silvicultural thinning to shift the balance of wood production from low-value firewood to high-value sawn timber has been an objective of NRE forest management for many years. The predicted social and economic effects make no allowance for any increased employment as a result of value-adding or higher-value products.
- The predicted effects take no account of the potentially significant employment which may result from thinning for ecological management of parks and reserves (see recommendations in Chapters 4, 15 and 16).

Factors which might increase the impact on the timber industry are difficult to quantify, but are unlikely to be substantial:

- A number of areas planned for cutting over the next few years are now recommended for inclusion in parks or reserves. Consequently, while there may be adequate volumes to sustain the timber industry at the current level in the long term, it may be difficult in some cases to find sufficient areas to schedule harvesting in the short term. This issue was raised by several cutters and NRE staff in discussions with the ECC and its consultants, and has been factored into the consultants' assessments. An important point to note is that scheduling should cause little, if any, problems for firewood harvesting—which accounts for 56% of timber industry employment—because there is more flexibility in the size of material which can be cut.
- Where recommendations reduce the availability of timber for specific products or communities, some additional travel costs are likely to be incurred. These costs are unlikely to be high given that the additional distances would generally be small relative to the distances many commercial cutters now travel.
- Forest management planning will occur across much of the study area after the Box-Ironbark investigation is completed, and is likely to further reduce timber availability as a result of additional measures to protect values such as threatened species and EVCs in state forest. However, because a very high proportion of sensitive values would be protected in the recommended reserve system (see Appendices 3 and 9, for example) or are protected by existing provisions in state forest management, the impact of additional measures on timber availability is likely to be minor.

Finally, three other factors are relevant to the effects on the recommendations on the timber industry:

- NRE advice is that in some areas, for example Maryborough and Heathcote, there are currently more cutters than can be sustained by the volumes of timber currently available. As a result, even without ECC recommendations, there will need to be either a reduction in the number of cutters, a reduction in the volume allocated to each cutter, or some cutters would have to travel further to gain access to timber.
- Again irrespective of the ECC process, there is an agreement by all Australian governments to establish a comprehensive, adequate and representative system of reserves across all forest types to ensure that, as far as practicable, at least 15% of the area of each forest type, as it occurred in 1750, is protected in conservation reserves. Mostly, this has been implemented in Regional Forest Agreements (RFAs). Most of the Box-Ironbark study area was initially included in the West RFA area but was later removed, largely to avoid duplication between the RFA and ECC processes. However, the obligation to protect these areas remains and, in the absence of the ECC, would be carried out as part of the forest management planning process. It is likely that ECC, RFA or forest management planning processes would all produce similar results as the location of the values to be protected does not vary between processes. In the areas of overlap for the North-East and the West RFA, the ECC and the RFA group worked closely together and have produced very similar outcomes.
- Although many people have a long history in the Box-Ironbark timber industry—several generations in some cases—the turnover rate of shorter-term active cutters appears to be a relatively high—around 25% over a recent two-year period. If this pattern continues, it would help to mitigate the effects of the ECC's recommendations on longer-term cutters.

Table 8.2 Comparison of wood product availability predicted by the revised NRE model and by the ECC's Stage 3 Social and economic assessment.

Sawlogs (including sleepers) — Current actual cut (average)¹: 1 280 m³/p.a.	
NRE Model	ECC Social and Economic Assessment²
Modelled sustainable cut <i>before</i> 2 920 m³/p.a. net <i>ECC</i> recommendations (existing state forest area and management): (128% above current cut)	
Modelled sustainable cut <i>after</i> <i>ECC</i> recommendations: 1 830 m³/p.a. net (37% reduction from above; 43% above current cut)	Optimistic (30% below current cut): 900 m³/p.a. <u>Conservative (39% below current cut): 780 m³/p.a.</u> Pessimistic (48% below current cut): 670 m³/p.a.

Fencing timbers — Current actual cut (average)¹: 4 100 m³/p.a.	
NRE Model	ECC Social and Economic Assessment
Modelled sustainable cut <i>before</i> 9 895 m³/p.a. <i>ECC</i> recommendations (existing state forest area and management): (141% above current cut)	
Modelled sustainable cut <i>after</i> <i>ECC</i> recommendations: 6 195 m³/p.a. (37% reduction from above; 51% above current cut)	Optimistic (30% below current cut): 2 870 m³/p.a. <u>Conservative (39% below current cut): 2 500 m³/p.a.</u> Pessimistic (48% below current cut): 2 130 m³/p.a.

Firewood — Current actual cut (average)¹: 39 300 m³/p.a.	
NRE Model	ECC Social and Economic Assessment
Modelled sustainable cut <i>before</i> 53 120 m³/p.a. <i>ECC</i> recommendations (existing state forest area and management): (35% above current cut)	
Modelled sustainable cut <i>after</i> <i>ECC</i> recommendations: 33 635 m³/p.a. (37% reduction from above; 14% below current cut)	Optimistic (30% below current cut): 27 510 m³/p.a. <u>Conservative (39% below current cut): 23 975 m³/p.a.</u> Pessimistic (48% below current cut): 20 440 m³/p.a.

Notes: ¹ The current actual cuts are the average of 6 years production from 1993/94 to 1998/99. To enable comparison with the modelled estimates, they are for Bendigo FMA only.

The ECC's social and economic consultants consider their 'conservative' options to be the best estimates of effects. The optimistic and pessimistic options were calculated on the basis of a notional 15% increase in timber volume (optimistic) and 15% decrease (pessimistic) above and below the conservative option. The optimistic view reflects the recent history of undercutting, and the modelled volume. The pessimistic view is a 'worst case', based on individual wood cutters' perceptions after the Draft Report.

RECOMMENDATIONS

- R30** Sawlogs be the primary wood product from future timber harvesting in Box-Ironbark state forests, and that value-added kiln drying be encouraged.
- R31** Sleeper cutting be phased out of Box-Ironbark forests, with the timber used instead for sawlogs (see Recommendation F(i)(ii)).
- R32** (a) allocation of coupes in Box-Ironbark state forests solely for commercial or domestic firewood production be progressively reduced in favour of coupes that produce firewood in conjunction with higher value products such as sawlogs and fencing materials.
- R33** (a) establishment of firewood plantations on private land be encouraged;
 (b) use of waste from logging operations in wetter forest types be investigated for use for firewood;
 (c) controlled thinning of dense coppicing and regrowth in state forests continue to be applied to improve the growth rate of retained larger trees, and to produce firewood in commercial operations;
 (d) subject to appropriate research, ecological thinning in parks and reserves, where required for management, be applied to improve the growth rate of retained trees (see note below); and
 (e) domestic firewood collection continue to be subject to strict controls to reduce theft of wood and avoid cutting of habitat trees, and that forest managers reduce domestic firewood collection in areas with sensitive biological values.
- R34** Comparable treatment regarding industry structural adjustment should apply for timber industries inside and outside the Box-Ironbark study area and Regional Forest Agreement areas.
- R35** An industry plan be prepared which includes a long-term program to encourage Box-Ironbark plantations for sawlogs on private land.

Note: The sole objective of thinning as an ecological management tool is to improve the habitat conditions in parks and reserves by increasing the numbers of large trees. Thinning should be carried out in a manner that best achieves ecological goals. It may differ from silvicultural practices. Production of firewood is not an objective. Where it does occur however, thinning will produce wood as a by-product, which can, where appropriate, be sold as firewood.

Information Sources

- 1 Newman (1961).
- 2 Forests Commission, Victoria Annual Reports (various dates).
- 3 Midas Consulting (2001).
- 4 NRE (1998a).
- 5 ANZECC (2000).
- 6 NRE (2001a).
- 7 Plantations North East Inc. (1999).
- 8 Announcement by the Minister for Environment and Conservation of a \$2.4M commitment to private forestry in northern Victoria, utilising irrigation wastewater – Media Release 9 March 2001
- 9 NRE (1999).
- 10 Virtual Consulting Group (1999)
- 11 Grey (2000)

9 Apiculture

Honey bees (Apis mellifera) were first successfully introduced into Australia in 1822. They became widespread throughout native forests by the middle of the 19th century.

Prolifically flowering eucalypts producing large volumes of nectar are a feature of Box-Ironbark forests and woodlands, and commercial beekeepers keenly seek hive sites on public land in the study area. The study area is by far the most important region in Victoria for commercial apiculture. Large, old, wide-crowned trees are considered by beekeepers to be more reliable sources of nectar than small trees. Yellow box is the most highly sought Box-Ironbark species and this species is generally excluded from timber harvesting.

Beekeeping is a highly mobile industry with apiarists continually monitoring nectar flows and climatic conditions. Given that eucalypt nectar flows occur at irregular intervals, sometimes many years apart, occupancy of bee sites by apiaries, geared to infrequent nectar flows, are for relatively short periods on each occasion. The majority of honey production in south-eastern Australia occurs between September and April. Hives are typically moved between five to seven sites during a season, according to seasonal flowering, site availability, or to prepare bee colonies for orchard or other crop pollination.

Large producers in particular move throughout Victoria and even interstate, complicating estimates of production from particular regions, such as the Box-Ironbark study area (see Section 9.2). Nonetheless, there is reasonable consensus in the industry that around 60 to 70% of Victoria's production of honey and other products, such as beeswax, comes from the Box-Ironbark study area.

There are 257 bee farm and range licences (1.6 km radius), and 428 temporary apiary rights (0.8 km radius) current for bee sites on public land across the study area. Commercial operators use about half the public land sites; the remainder is used by small-scale beekeepers. Access for apiarists is retained over a wide range of parks, reserves and state forest; however, permits are not issued over popular public use areas (for safety reasons) or over reference areas and their surrounding buffers, which are primarily

set aside for the maintenance of ecosystems in as natural a state as possible.

Some sites on private land are strategically positioned to utilise nectar produced from adjoining public land. The range of bees from private land sites sometimes overlaps with public land licensed sites. It is estimated that around 60% of Box-Ironbark honey is derived from hive sites on public land; about 40% of Victoria's total honey production.

9.1 Current products and production

Nectar from box and ironbark species consistently produces large quantities of premium quality honey. Increasingly, varietal honey is produced from favored species, especially yellow box, grey box or red ironbark. Apiarists also produce and sell beeswax, pollen and queen bees, and some are paid by orchardists to enhance pollination of fruit trees. On average, around 1 750 to 2 000 tonnes of honey are produced annually from Box-Ironbark public land, although there is considerable variation between 'good' and 'bad' years.

9.2 Economics and employment

The value of Box-Ironbark apiculture is difficult to quantify because of the mobility of the larger producers. However, if Box-Ironbark production represents 70% of Victorian production and 60% of that production is from public land, the annual value from public land of all products to producers would be about \$4.1 million (see Appendix 5 for sources of economic and production figures). The proportion of processing attributable to 'public land' honey amounts to about a further \$4.4 million annually. Nearly all this processing occurs within the study area, mainly by Capilano Honey at Maryborough.

Total Government revenue received from bee site licences within state forest in the Bendigo Forest Management Area during 1994/95 was \$44 968 (or around 1.1% of the \$4.1 million gross value of public land production to beekeepers in the study area).

In 1996/97, there were approximately 2 200 hive owners, registered and unregistered, in Victoria, with a total of around 115 000 hives. Apiculture is a part-time activity for the majority of honey producers. Those with 50 hives or less account for 76% of registered producers, but own and operate only 17% of registered hives. Apiarists report that typical commercial sites in the study area would be stocked with 120 hives, each yielding an average of 30 kilograms during a good honey flow.

It is estimated that 66 full-time equivalent jobs for producers can be attributed to production from public land sites. Processing of 'public land' honey generates a further 13 full-time equivalent jobs, nearly all of these within the study area. On these figures, apiculture is the third largest industry on Box-Ironbark public land, after mining and tourism.

Trends

The industry has had relatively stable production levels throughout the 1990s, despite rising prices. Average prices received for honey increased by 26% over the period 1991/92 to 1996/97.¹

9.3 Issues

Potential impacts

Honey bees and apiculture have the potential to affect nature conservation values in a number of ways. It is recognised that properly managed honey bee colonies are continually moved to sites of least limiting conditions, and the apiarists endeavour to avoid potential competition with native nectar-feeders.

Nonetheless, both feral and managed bees are highly efficient consumers of nectar and pollen, and may compete with native nectar-feeding species, including indigenous bees and birds.² Honey bees can aggressively displace native pollinators or simply reduce their food resources. Such competition may disrupt the complex plant-pollinator systems which have evolved between native plants and animals over thousands of years. Many plants require particular foraging behaviours to facilitate pollination and these behaviours may not be a feature of honey bee foraging.²

Loss of indigenous pollinators is a serious threat to flowering plant species around the world and may be disrupting Box-Ironbark forest and woodland ecology. Feral honey bees may also compete with indigenous fauna for tree hollows, which are generally scarce in the Box-Ironbark forests and woodlands.

There are documented accounts of feral honey bees displacing native animals, including threatened species in some instances, from hollows and nest boxes.³

As exotic animals, honey bees may be considered intrinsically out of place in conservation reserves, regardless of the nature of their effects on indigenous flora and fauna.

Some public land areas not intended to be available for apiculture (such as reference areas and buffers, areas of intensive recreational use, and some ecologically significant and sensitive areas) are accessed from hives on nearby private land. This problem is compounded by the fragmented nature of Box-Ironbark public land.

Research

Despite a significant body of research, technical obstacles have constrained assessment of the impact of honey bee foraging on native nectar-feeding species and plant pollination. Relatively little research has addressed competition for tree hollows in the study area.

The occurrence of feral colonies tends to be very patchy but ranges from very low numbers in dry areas to nearly one per hectare where there are suitable hollows and access to water, frequently provided by fire dams in Box-Ironbark public lands.⁴

Feral bee colonies generally "appear to occupy only a small proportion of available hollows", but "For many plants, [feral and managed] honey bees were the most frequent floral visitors, and often consumed more than half the floral resources being produced ... Numbers of native bees may decline following influxes of honey bees into an area but data on this relationship were equivocal".⁴ Research shows differing responses of honeyeaters to influxes of honey bees.

A major review of the impact of honey bees in Australia⁴ recommended research into the effects of introduced bees on a wide diversity of native flora and flower-visiting fauna, and into feral honey bee population dynamics and methods of removal.

To date there is little evidence which unambiguously demonstrates that honey bees have a substantial negative impact on native flora and fauna.⁵

Their long-term presence and widespread distribution make research difficult. Nonetheless, honey bees are an introduced species which compete for floral resources with native fauna,

suggesting some caution should be applied in parks and nature conservation reserves.

Little practical or research effort has been directed to the destruction of feral honey bee hives, but potentially effective options exist.³ Where there is an existing problem with feral bees, the identification and implementation of an effective control program is likely to have substantial benefits, for both nature conservation and licensed honey production.

9.4 Community views

Apiarists want to retain existing access to public land for apiculture, either generally or to specific forest areas. Recommendations in the Draft Report regarding regulation of hives on private land using public land resources, and the outcome of research into the effects of introduced bees and into feral bee control, were strongly opposed. The discretion of land managers to exclude apiculture from long-standing bee sites was an issue at consultative meetings and in submissions. Greater public land access was called for in some submissions, specifically to reference areas and their surrounding buffers.

Submissions from those specifically opposed to beekeeping called for the removal of managed bees from national and state parks, from nature conservation reserves, from areas with particular values such as swift parrot and regent honeyeater habitat or large old tree sites, and in some cases, from all public land because of perceived threats to natural or recreational values. There was support for increased restrictions on apiculture, and for research into the effects on native wildlife and ecological processes, such as pollination.

Conservationists and apiarists both supported increased control of feral honey bees, although some apiarists did not see this as a priority for their industry. A halt to harvesting of large, wide-crowned trees for timber was also promoted by both these groups. Apiarists called for consultation in regard to timber harvesting, silvicultural thinning and ecological thinning prescriptions.

9.5 Achieving a balance

The ECC has recommended that the apiculture industry maintain access to most Box-Ironbark forest and woodlands, excluding reference areas and their surrounding buffers, and where this does not

conflict with key natural values or recreational sites. Apiculture is recommended to be permitted in national and state parks only at currently licensed sites.

The ECC acknowledges community concern regarding the presence of managed honey bees in sensitive areas. With protection of such areas a prime objective, land managers (in all public land categories) should continue to have the power to cease access to sites where honey bees are causing problems, for example:

- important regent honeyeater and swift parrot sites;
- sites that regularly attract large concentrations of native nectarivores, especially if threatened species are represented in those concentrations;
- areas with threatened plants whose pollination is likely to be disrupted by bees; and
- recreation sites where bee stings may endanger public safety.

At the same time, the ECC has responded to criticism regarding several recommendations in the Draft Report regarding land managers' discretion. These have been amended, to include a course of action and a grievance process (see Recommendation R9 in Chapter 3). Draft recommendation R25, relating to hives on private land has been removed.

Research investigating feral honey bee population dynamics and methods of removal, and the effects of introduced bees on native flora and flower-visiting fauna is recommended and outcomes will guide future management decisions. It is recommended that this be a cooperative process involving NRE and the apiculture industry. Consultation with representatives from the apiculture industry in regards to forest management practices and ecological thinning should be considered by the NRE agencies responsible for these tasks.

Benefits to apiarists as a result of the recommendations in this report include:

- an increase in the numbers of large and wide-crowned trees in state forest and parks and reserves; and
- a systematic program to control feral bees across all public land.

RECOMMENDATIONS

- R37** Apiculture continue in national and state parks, nature conservation reserves, state forest and other reserves, subject to Recommendations R39 and R40 below.
- R38** Apiculture continue to be excluded from reference areas and their buffers.
- R39** Subject to the provisions in Recommendation R9, land managers continue to exercise discretion to vary access to areas where:
- (a) significant conflicts occur between beekeeping and other forest uses such as recreation; or
 - (b) research indicates the effects of nectar removal by managed bees are likely to have deleterious effects on ecological values;
- and:
- (c) land managers seek to maintain overall access by providing access to alternative sites where possible.
- R40**
- (a) The Department of Natural Resources and Environment in partnership with industry initiate a research program to investigate feral bee population dynamics and methods of removal, and the effects of introduced bees on native flora and flower-visiting fauna;
 - (b) an advisory committee be established, including stakeholder participation, to monitor the research and research outcomes; and
 - (c) the results of research should determine subsequent management decisions.
- R41**
- (a) The Department of Natural Resources and Environment establish an ecosystem-wide program to reduce feral bee colonies, focussed initially on areas likely to be most deleteriously affected, and with quantitative assessment of the cost-effectiveness of the program; and
 - (b) a series of long-term reference sites be established across the study area to monitor feral bee abundance.

Information Sources

- ¹ ABARE (1998).
- ² Schwarz and Hurst (1997).
- ³ Trainor (1995).
- ⁴ Paton (1996).
- ⁵ Gibbs and Muirhead (1998).

10 Recreation

Recreational activities are enjoyed in Box-Ironbark forests and woodlands by both day visitors and ‘tourists’ (visitors who travel from elsewhere to stay overnight in the area). For simplicity, the emphasis of this chapter is on the recreational activities themselves, whereas the emphasis of Chapter 11 (Tourism) discusses the commercial and economic aspects of longer-term visits.

Surveys indicate that people make at least 114 000 visits to Box-Ironbark public lands for recreation per year.¹ Some of the characteristic features of Box-Ironbark forests and woodlands make them suitable and popular for a wide range of visitors. For example, Box-Ironbark public lands are highly fragmented, with few areas remote from a private land boundary or sealed roads. More than 100 000 people live close to the forests, including several towns adjacent to, or almost surrounded by forest, most notably the large towns of Castlemaine, Bendigo and Maryborough.

Box-Ironbark forests and woodlands are open, safe, rarely have adverse weather or steep terrain, and are readily accessible year-round with extensive networks of good all-weather gravel tracks.

The forests also have several features of particular interest for visitors—remarkable diversity and abundance of flora and fauna, ongoing prospects of gold nuggets, and historic landscapes and relics.² Bendigo residents for instance can go prospecting, bird watching, orienteering, mountain biking or bushwalking, all within a few minutes drive or walk from home.

Not surprisingly, the majority of visits are by locals—travelling times of less than one hour to visit a forest are much more common than longer trips. Box-Ironbark forests and woodlands are of intense local importance to those who live nearby, and the forests are a key component of the lifestyle that has drawn many people to live in the study area.¹

Box-Ironbark forests and woodlands tend to lack a single focus or centre. Their openness and accessibility make them key areas for dispersed activities such as running, trail and mountain bike riding, horse riding, cycling, or just walking in the

forest. Gold prospectors, orienteering enthusiasts, car rally enthusiasts and naturalists in particular see Box-Ironbark forests and woodlands as of statewide and even national significance.¹

Kooyoora and Warby Range State Parks, parks around Bendigo, and increasingly, Chiltern Box-Ironbark National Park are strong recreation nodes, attracting many visitors. Recreation trail development around Bendigo and Castlemaine appears to have increased use of the public land by those living in the towns.

10.1 Recreational activities

Nature study

Box-Ironbark public lands are renowned for rich wildflower displays in spring and early summer, and for the variety and abundance of bird life. Field naturalists’ clubs are active in all the larger towns in the region, and conduct regular excursions, along with special purpose activities such as mammal surveys or bird counts. Schools and universities conduct regular excursions in the forests. Generalist and special interest field naturalist groups, such as bird watchers, from outside the region also make regular trips to Box-Ironbark forests and woodlands.³

Nature study may be a part of other recreation activities. Most field naturalists are interested in the public land as a whole, including remnant vegetation on roadside verges.

Recreational prospecting

Prospecting involves the use of a metal detector, hand tool, pan or simple sluice to search for gold, gemstones or other metallic minerals, and requires a miner’s right or mining licence under the *Mineral Resources Development Act 1990*.

Through much of the study area, prospecting for gold is an important recreational activity. Around Dunolly, Wedderburn and Tarnagulla, searching for gold is the main recreation. A number of businesses offer prospecting tours, and sell or hire detectors, maps and guidebooks.²

Generally, gold prospecting with metal detectors is a relatively low impact activity. Hand tools are used to dig up gold or metal pieces found. As a condition of their miner's right, prospectors are required to fill in any holes dug and to repair any other damage caused.

Results of a survey conducted by the Prospectors and Miners' Association of Victoria indicate that 89% of respondents prospect in the 'Golden Triangle', bounded by Dunolly, Inglewood and Wedderburn. Of the 596 prospectors surveyed, 62% were hobbyists, 31% part-time, and 7% full-time prospectors. The average number of trips per year was 19. Gold found was normally kept rather than sold. Prospecting is seen mainly as an opportunity to get into the bush for health, recreation and holidays.

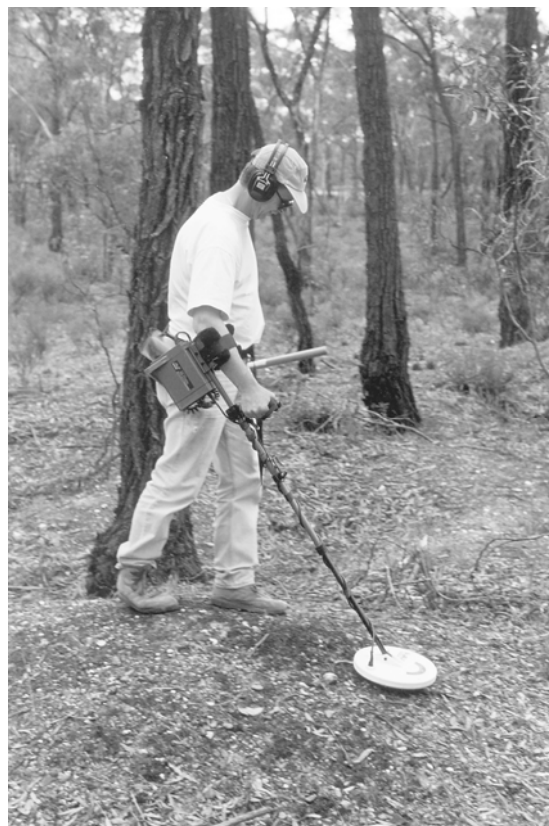
Prospecting is an attractive activity for a wide cross-section of the public, and many submissions highlighted its popularity among retired people. The chance of finding gold is important, but camping in the bush, relaxation, and 'getting away' are also important.

Purchase of a miner's right entitles the holder to search, provided no damage is done to native trees, shrubs or other flora, Aboriginal sites, archaeological sites, and other historic places or objects. Prospecting is not permitted in national parks, areas gazetted under the *Heritage Act 1995*, reference areas, or other specifically excluded areas. Prospecting is permitted in designated areas in some state parks.

Gemstone seeking

Gemstone seeking is the searching for and collection of gems, semi-precious stones and mineral specimens. It may involve the use of a metal detector, sieves and hand tools to locate and recover specimens.

This activity attracts a wide range of individuals, drawn to chance findings, the leisurely nature of the activity and the element of being outdoors. There are several gem, mineral and lapidary clubs established in the study area.



Prospecting with a metal detector is a popular recreational activity on Box-Ironbark public land

Gemstone seeking is generally not permitted in reference areas, areas gazetted under the *Heritage Act 1995*, or national and state parks unless a specific provision is set down.

Creeks draining the Mt Pilot Range—especially Reedy Creek and tributaries—are highly valued by gemstone seekers for a variety of minerals. Disused quarries are among other areas of particular interest to gemstone seekers.

Bushwalking

Visitor surveys indicate that Box-Ironbark forests are used relatively little for bushwalking at present, with availability of water in summer a constraint.¹ Several submissions called for the development and promotion of walking trails, including interpretative walks, to attract and cater for a wide range of visitors.

Many opportunities exist, with numerous smaller public land blocks offering shorter walks and day-walk opportunities, along the numerous tracks or gentle ridges. Also there is potential for rewarding overnight walks in the St Arnaud Range, Mt Pilot Range, Bendigo area, Rushworth forests, Pyrenees Range, and the forests stretching from Tarnagulla past Dunolly and Wehla to Kingower and Inglewood.

Orienteering and rogaining

Orienteering is a sport combining cross-country running or walking and map reading. Rogaining is similar, but includes an overnight component. There is also the relatively new sport of mountain bike orienteering. Orienteering events range from local competitions attracting around 30 to 40 participants, to national and international meetings attracting over 1 000 participants and lasting several days.

One or two local events are held on Box-Ironbark public lands each month, along with four or five state events annually. Orienteering participants make around 4 000 visits to public land in the study area each year.¹

Orienteering participants seek areas of moderate steepness, relatively open forest, and complex features. Box-Ironbark forests around Castlemaine, Bendigo, Heathcote, and Beechworth are of importance to orienteering because of their topographic suitability, proximity to Melbourne, relatively open landscapes, and their complexity due to past mining activity, or granite boulders and outcrops.

While any form of off-track recreation may have the potential to damage rare or delicate plants, responsible organisation of orienteering events aims at ensuring conflicts are overcome with cooperative arrangements between event organisers and land managers.

Camping

Camping is popular, particularly at Melville Caves (Kooyoorra State Park), Teddington Reservoir (Kara Kara State Park), and in the Golden Triangle forests. While detailed provisions are determined by the land managers, camping is generally encouraged in appropriate areas, notably the larger parks and reserves, and in state forests.

Regarding smaller reserves:

- regional parks are generally modest-sized areas close to substantial towns, and are generally not suitable for camping; and
- nature conservation reserves are mostly small areas (less than 2 500 ha), too small for establishment of a camping ground, or to absorb the impact of more than a low level of dispersed camping.

Car touring and car rallies

Car touring is highly popular in these very accessible public lands. Box-Ironbark forests and woodlands are on the hills framing many highways and other major car touring routes, and contribute greatly to their scenic appeal.

Box-Ironbark forests are favoured by rally enthusiasts for their relatively dense road network, maintained to two-wheel drive standard, which creates a challenging navigational environment. Particular areas of interest include Rushworth-Heathcote forest, Killawarra forest near Wangaratta, and Mt Pilot Range. Events range from local competitions to national events, with standard competitions attracting around 100 competitors as well as support personnel.

Car rallies are usually held in state forest areas, avoiding areas frequently utilised by other user groups. Most events are conducted at night, and organisation of events is subject to strict guidelines, involving extensive consultation with the relevant management authority. Car rallies are not generally allowed in parks and reserves.

Horse riding

Horse riding is a popular recreational activity around townships and regional centres in Box-Ironbark forests and woodlands. Several established horse and pony riding clubs in the study area are important recreational providers in their communities.

Riding horses is generally permitted on public access roads in national, state and regional parks subject to certain conditions, and in state forests. Horse riding is not permitted in reference areas. Horse-based camping may be permitted in some reserves. The land managers encourage minimal impact riding techniques, and any adverse effects of riding are monitored. Trail rides and pack animal tours are also subject to specific conditions. Park and reserve management plans identify particular local requirements and conditions.

Heritage appreciation

Heritage values are another key feature of the study area, particularly relating to Aboriginal cultural sites and places, mining, timber industry and settlement history.² With interpretation and education, the popularity of Box-Ironbark heritage-based recreation will almost certainly increase in future.

Archaeological relics, whether Aboriginal or from post-settlement times, are protected under existing legislation. Any tourism developed around Aboriginal cultural sites and places must involve consultation with traditional owners.

Trail bike riding

Off-track trail bike riding is illegal. The extent of damage caused is generally limited, but may be more severe in steep or erodible areas close to population centres. Damage is expected to reduce with education and provision of purpose-built venues.

Recreational shooting and hunting

Elsewhere in Victoria, there are several specific exceptions that permit hunting in certain large national parks remote from settled areas, and in some coastal parks. These are areas where there is a specific exotic hunting resource, for example, deer. Recreational shooting is generally not allowed in parks and reserves in Box-Ironbark forests and woodlands.

Several sites in the northern plains region of the study area are of particular importance to recreational shooters, including wetland areas classified as wildlife reserves, such as Reedy Lake and Dowdle Swamp. Recreational shooting is a permitted activity in state forest.

10.2 Recreation trends

A gradual increase in recreation and some additional opportunities for Box-Ironbark forest recreational users are expected. Many current activities will increase, with interpretation of the new parks and reserves, and increasing awareness of these forests in the urban centres in the region, and in Melbourne.

Recreational demand may change relatively quickly,¹ as was the case with mountain bike riding and metal detector use. There has been an increase in metal detecting activity in recent years but this might increase further if, for example, improved detectors become available, or reduce if the rate of gold discovery declines.

Population growth, particularly around Bendigo, Benalla and Wodonga, together with an ageing population suggest an increasing role of Box-Ironbark forests and woodlands as sites for local, relatively informal, low-cost recreation.

10.3 Issues

Numerous recreational activities in Box-Ironbark forests and woodlands are, by their nature, dispersed. This makes provision of facilities more difficult. Car rallies and orienteering events must be conducted in areas that have not been used for some time. Prospectors are generally not interested in repeatedly searching the same areas. Individuals living throughout the Box-Ironbark forest areas have local, rather than centralised, places where they run, walk dogs, ride horses or study the birds and plants.

Recreational nature study may have localised, generally minor, adverse environmental effects; for example, trampling of vegetation or disturbance to nesting birds. Trampling by enthusiasts and illegal collection of orchids and other plants is a major threat to some rare species. Further development of nature- or heritage-based tourism in Box-Ironbark forests and woodlands may lead to particular pressures on vulnerable sites, or to disturbance of plants and animals.

Car rallies may have some adverse environmental impacts; for example, disturbance of flora and fauna and collisions with wildlife (the potential is most likely increased at night). Issues regarding road damage, and the restriction of access for other user groups and their safety during events, are incorporated into event planning and are strictly controlled in a cooperative arrangement between car clubs and land managers.

Trail bike riding (on registered bikes) on open tracks formed for the passage of vehicles is a legitimate recreational activity. Steep tracks may suffer erosion in wheel ruts, and some are seasonally closed to all vehicles. Most problems arise from illegal off-road riding. Such riding damages vegetation and soil and has been a chronic localised problem, concentrated around centres of population, and in parts of steeper areas such as the Pyrenees. Illegal riding may be rectified with education, enforcement and other management strategies, such as the provision of special areas. Increasingly mountain bike riders use the same areas and can cause similar damage although generally at a lower level.

Weed invasion sometimes associated with horse droppings appears to be a minor issue, at worst, on the relatively hard dry tracks of the Box-Ironbark public lands. There are few instances of horse riders failing to stay on the tracks.

Recreational prospecting can have impacts on environmental, historic and Aboriginal cultural values. While most prospectors are responsible, some fail to fill in dug holes, although the overall impact is relatively small in view of the number of prospectors. Other problems, such as off-road driving or parking, occur occasionally.

Some prospectors rake the ground clear of leaf-litter and sticks, in order to allow the detector coil to be closer to the surface. Sometimes a chain is dragged behind prospectors to mark where they have been. Even though the raked litter is sometimes raked back, ground habitat is disturbed, the processes of utilising the litter by insects and fungi on which other animals depend are altered, seedlings are likely to be uprooted, and small plants damaged in the process. Orchids for example are very sensitive to environmental conditions, and only successfully flower when conditions are correct, which may be several years apart. Raking could inadvertently eliminate a small orchid population. In conjunction with prospector organisations, land managers should monitor this practice and seek to minimise adverse effects.

Prospectors often work on old alluvial diggings, focusing along drainage lines, which are of particular importance for nature conservation (see Chapter 4).

Historic sites may also be damaged by prospectors, who sometimes focus on the remains of puddlers or around the foundations of old buildings. Under the *Heritage Act 1995*, it is an offence to damage or disturb archaeological relics without the consent of the Executive Director of Heritage Victoria, and any person who picks up or collects an archaeological relic in Victoria must immediately notify the Executive Director. These relics do not have to be registered or otherwise identified in inventories. Inadequate marking of sites where prospecting is not permitted can lead to accidental or deliberate transgressions occurring. Rare instances of illegal use of machinery such as bobcats have occurred.

Education and reinforcement of the need for responsible operation, through voluntary codes and newsletters prepared by groups such as the Prospectors and Miners Association of Victoria (PMAV), can assist with these concerns. PMAV has recently released a code of practice which reflects the standards currently adopted by the majority of

prospectors. Parks Victoria has also produced a guide for prospectors.

Gemstone seeking can potentially have impacts on environmental and heritage values, similar to those for prospecting. Disturbance of ground habitat, drainage lines, stream beds, and historical or archaeological features can reduce values. Responsible operation and education, assisted by voluntary codes such as the Victorian Gem Clubs Association's Field Trip Ethics, assist in reducing such concerns.

Recreational shooting and hunting require careful management for public safety. While recognising hunting is a dispersed activity, the presence of hunting parties should be advertised where practicable, particularly in more frequented areas, such as in wildlife reserves during game seasons.

Proximity of towns to the forests often results in illegal rubbish dumping and unlicensed removal of stone or firewood. Smashed bottles and vandalism are evident at some sites.

Recreational impacts may change over time. While some impacts may be satisfactorily managed by providing specific zones for certain activities (such as areas for four-wheel driver training or mountain bike trails) or designating areas for different levels of protection, problems may remain. The numerous small areas with significant historical, cultural or natural values are difficult to signpost. Informing users of the location of such sites is difficult, as users may come from different directions and maps and guides are inconsistent.

10.4 Community views

A significant number of submissions focused directly on recreation and tourism, many on specific areas. Several of these were in favour of conservation-based nature tourism and heritage-based tourism. Other submissions called for maintenance of access to all Box-Ironbark forests and woodlands for one or more of the present recreation activities.

Many submissions supported new parks and reserves, often with specific local or regional proposals highlighted. These submissions often had a recreation perspective; that is, the authors visit these areas and want them protected. Recreational aspects such as wildflower and scenery appreciation, and activities such as walking and riding, are highlighted in these submissions, rather than a purely conservation-orientated viewpoint.

Other submissions opposed new parks and reserves, because of the actual or perceived limitations on availability of these areas for their selected pursuits.

Recreational shooters, for example, opposed the establishment of Broken–Boosey State Park, which would exclude hunting from several favoured areas, notably sections of Broken and Boosey Creeks, Black Swamp (near Wunghnu) and Moodies Swamp. Alternatively, some people proposed that their preferred activity be guaranteed in the ECC's recommendations. These submissions included some prospectors, car rally enthusiasts, recreational hunters and firewood collectors.

Numerous prospector submissions expressed concern about their ability to camp in future in certain recommended nature conservation reserves, particularly Wychitella and Waanyarra. There was also criticism of the proposal to no longer permit raking in association with metal detecting.

10.5 Achieving a balance

Recreation is a component of appropriate use of most public land use categories, except reference areas, domestic water supply storages and areas set aside for services and utilities and earth resources. The ECC has attempted to cater for existing recreational use where this is compatible with recommendations for parks and reserves. Land use categories vary in the land uses, such as recreation, that are encouraged. The ECC's recommendations allow for the greatest diversity of uses in state forests. Most other categories also provide for a wide range of recreational pursuits appropriate to the category. Parks Victoria visitor statistics attest to the large numbers of people travelling to parks and reserves for recreation.^{4,5}

In some cases there was opposition to specific parks and reserves arising from proposed restrictions on particular recreational activities. The Council has considered these views and in certain cases exceptions have been made to general provisions where these would not overly compromise the natural or cultural values of the particular park or reserve. These exceptions in particular parks are for organised recreational hunting, car rallying, prospecting and gemstone seeking.

Regional parks are primarily intended for recreation in natural settings but significant conservation and other values are also protected. The recommendations in this report: retain and endorse the popular

existing regional parks at Mt Alexander, Beechworth (Historic) and Hepburn; expand the park system with additions around Ararat, Bendigo and Maryborough; and add a new regional park at St Arnaud.

Camping, picnicking and barbecues are encouraged in appropriate areas in parks and state forests. Responding to prospector concerns, the ECC is recommending that designated site or dispersed camping be permitted in appropriate locations in the larger nature conservation reserves, where this will not adversely affect the biodiversity values of the reserve. Draft recommendation R30 relating to raking has been removed.

Driving (including four-wheel driving) and riding (including bicycles and trail bikes) are permitted on roads and formed tracks in national and state parks, other parks and reserves, and state forests, except where tracks are seasonally closed. Off-road driving and riding is not permitted on any public land, except in specially designated areas.

Car rallies are not generally allowed in parks and reserves, however exceptions are recommended in west Mt Pilot Range (A1 Chiltern–Pilot National Park) and the Killawarra addition to Warby Range State Park (B3), subject to certain conditions. Rallying remains a permitted use of state forest areas subject to conditions and approval. No new restrictions on social rallies are recommended.

Recreational shooting will continue to be generally excluded from Box–Ironbark parks and reserves. Organised shooting drives for pest control, however, have previously been used in parks and reserves at the request of park management and may continue at the request, and control, of the land manager. Black Swamp (near Wunghnu) and Moodies Swamp, proposed for inclusion in Broken–Boosey State Park in the Draft Report, are now recommended to remain as wildlife reserves. Over a third of public land along the Broken and Boosey Creeks system remains as public land water frontage or wildlife reserve, and is available for hunting.

Dogs are generally not permitted in national parks, although there may be some minor exceptions where, for example, dogs are permitted on leads in car parks and picnic areas. In state parks, restrictions on access for dogs vary according to provisions which are specific for each park.

Park and reserve management plans identify particular local requirements and conditions. Public

access in general will be maintained and encouraged by better infrastructure.

In general, current policy regarding appropriate activities in parks and reserves will be maintained. As a result, some activities currently permitted in state forests would not be permitted to continue if these areas are reclassified as parks or reserves.

Other activities will continue to be assessed on a case-by-case basis by the land manager in new parks. Importantly, state forest remains a multi-use area available for a wider range of recreational activities. Most parts of the study area, and in particular most towns, have large areas of state forest recommended to be retained nearby.

RECOMMENDATIONS

Recreation

R42 Box-Ironbark public lands be available for a range of recreation activities for community enjoyment and appreciation and appropriate to the land use category.

Prospecting

R43 (a) Prospecting and gemstone seeking be generally permitted on public land, with the following exceptions:

- (i) exclusion from areas where evidence suggests it may adversely affect significant natural, historic or Aboriginal cultural values, as specified in management plans; and
- (ii) exclusion from reference areas and national parks except where specified in the recommended Chiltern–Pilot National Park (A1) and, subject to zoning, in the recommended Greater Bendigo National Park (A4);

and

- (b) land managers, in consultation with the Prospectors and Miners Association of Victoria (PMAV), continue to develop guidelines for prospecting in other land use categories; and
- (c) land managers consider making provision for gem seeking at specific sites in the recommended Heathcote–Graytown National Park (A5), Kooyoora State Park (B1) and Warby Range State Park (B3).

R44 Prospecting be allowed in state parks specified in Chapter 15, in accordance with the note below.

R45 Land managers monitor areas favoured by prospectors and gemstone seekers and, subject to the provisions in Recommendation R9, respond appropriately if excessive damage to natural, historic, landscape, or Aboriginal cultural values is occurring.

R46 The prospecting community be encouraged to adhere to the PMAV code of practice to promote responsible use of public land.

Orienteering and rogaining

R47 Orienteering and rogaining be permitted at the land manager’s discretion in all land use categories except:

- reference areas;
- domestic water storage areas; and
- nature conservation or other reserves where sensitive natural features are vulnerable to disturbance.

Car rallies

R48 Car rallies be permitted on open tracks formed for the passage of vehicles and at the land manager’s discretion in state forests, and subject to specific conditions as to frequency, timing, locations and repair of damage, in west Mt Pilot Range (A1 Chiltern–Pilot National Park) and the Killawarra addition to Warby Range State Park (B3).

Trail bikes

R49 Land managers endeavour to provide some dedicated areas for off-road trail bike riding where significant demand exists.

R50 Trail bike riding be restricted otherwise to open tracks formed for the passage of vehicles as per current practice.

Education

R51 Land managers develop educational and marketing programs to encourage:

- (a) increased use of Box-Ironbark public land for recreation; and
- (b) responsible use of Box-Ironbark public land.

Note: Excluding reference areas, most national parks and Broken–Boosey and Warby Range State Parks, metal detecting should be permitted in designated parks and reserves, except in zones designed to avoid significant values, such as habitat for small, threatened ground-dwelling animals and plants, and historic and Aboriginal cultural values, which may be damaged as a result of prospecting. These zones should be developed as part of the management planning process, including consultation with representatives of prospectors, following guidelines as per Recommendation R9 on land managers' discretion. This variation is not intended to affect current arrangements for metal detecting in existing state parks in the study area, or elsewhere in Victoria.

Information Sources

- ¹ Brookes (1997).
- ² Stone and Dunnett (1993).
- ³ Calder *et al.* (1994).
- ⁴ Read Sturgess Associates (1999).
- ⁵ Read Sturgess Associates and Henshall Hansen Pollock Associates (1995).

11 Tourism

Tourism on Box-Ironbark public lands is essentially driven by the same recreational activities described for day visitors in Chapter 10 (Recreation). Tourism Victoria defines tourists as those who have travelled at least 50 km for a day trip or overnight stay. Tourists therefore bring added commercial benefits to the region in the form of expenditure on accommodation, meals and other activities.

Box-Ironbark public land does not have many scenically spectacular destinations, but the forests provide the setting for many tourist visits to the region, and almost every block has features of interest to tourists. Most areas of forest have abundant bird species, for both guided beginners and expert bird watchers. Many blocks have seasonally impressive wildflowers including a wide variety of orchids, which are ideally appreciated by a guided visit. Basic spotlighting trips would readily be rewarded by relatively common fauna, with the surprise appearance of a rare or threatened species always a possibility. The 'hit-or-miss' nature of such activities is part of their appeal. Guided or expert trips, particularly to areas with large old trees and gullies would increase the success rate of spotlighting. In other areas, individual very large trees are attractions in themselves. Such values will be key considerations in the formation of viable ecotourism operations.

Some areas have an array of significant historic and cultural features, while in other areas these features are more scattered. There are numerous vantage points, some with scenic lookouts, such as Mt Pilot, Warby Range, Mt Black, One Tree Hill near Bendigo, Melville Caves, Mt Korong, Mt Tarrengower, and the St Arnaud Range.

Relatively large tracts of forest are suitable for walks of several days duration. Car-based camping is an established and popular activity (for example, Reedy Creek near Beechworth, Lake Eppalock, Kooyoora State Park, and Teddington Reservoir); while adjoining water bodies are popular for water-based recreation or scenery. Accessible water storage areas include Eppalock, Waranga, Cairn Curran, Lake Nagambie, Mokoan, Laanecoorie, Teddington, Lonsdale and, potentially, Crusoe.

Tourist drives (for example, the Goldfields touring route, Sunraysia Highway) travel through Box-Ironbark forests and woodlands. Major and secondary highways and several large towns are close to forests, and they are nearly always a highly visible feature of the landscape. The public lands are very accessible with good local bitumen or gravel roads into the forest.

The region is within easy driving distance of Melbourne, and weekend tours to the region are popular. It is well suited to overnight trips, and is only slightly affected by seasonal conditions. An element of people's pleasure in car touring to this region is the scenic backdrop of forested hilltops, with semi-cleared land winding up the tributary valleys. Forest scenery provides the setting for historic gold towns such as Maldon and Beechworth.

National and state parks facilitate rather than restrict access to public land areas. In fact, national, state and other parks in Victoria have approximately 14 million visitors per year¹ while state forests have around 3 million visitors per year.² These visitors provide flow-on benefits to local communities through local expenditure and organised tours.

11.1 Economics and employment

Tourists to Box-Ironbark parks and reserves account for at least 214 000 visit days per annum. Total income to the area from tourism is estimated to be \$8 million. Direct expenditure on tourism to public land in the study area generates an estimated 90 full-time equivalent jobs.³

Approximately 180 400 overnight and 306 700 day visitors to the goldfields area visited historic/heritage buildings in 1998.⁴

Prospecting is an important component of tourism on public land in the study area, and generates a significant proportion of tourism expenditure (perhaps as much as 20% of the total visitor expenditure) in towns in the area, particularly Dunolly, Inglewood, Maryborough, St Arnaud and Wedderburn.

11.2 Tourism promotion

In the Box-Ironbark study area local tourism boards or associations, often in conjunction with local shires and Tourism Victoria, have generally managed tourism. Tourism Victoria has included the Box-Ironbark region in several of its car touring promotions—the Goldfields, Midland, Murray Valley, Capital and Country, and Great Victorian tours. However these promotions do not generally feature public land values. Tourism Victoria's website does feature the Bendigo Bushland Trail and Woolshed Falls Historic Walk (Beechworth).

The principal tourism attractions of the study area include: urban centres, historic and cultural attractions, wineries, parks and reserves, ecotourism, the lure of gold, and bird watching in some areas. Despite good access to the forests, the visitor rate to public land is still relatively low but could be substantially increased with identification of local destinations, interpretative material, and marketing.

Major tourism proposals involving Box-Ironbark public land include the:

- Diggings project—heritage trails around Castlemaine, Maldon and Chewton;
- Bendigo Steam World and Heritage Railway on V-Line restored track linking Maryborough, Maldon, Bendigo and Echuca;
- Dunolly historic village project;
- Whroo interpretative centre, near Rushworth;
- Legends Trail; and
- Bushrangers National Hall of Fame (Benalla area).

In the ECC's recommendations, key sites that have the potential to be marketed for tourism are:

- Mt Pilot addition to Chiltern National Park;
- St Arnaud Range National Park;
- Bendigo Regional Park; and
- Wehla addition to Kooyoorra State Park (large old trees).

An LCC report in 1997⁵ concluded that a promising future for tourism was indicated by the increasing number of initiatives to actively attract tourists to the public land, and a similar increase in cooperative endeavours between shires, tourism organisations, and land managers. It remains uncertain, however, whether such recreation activities are sustainable, and whether income from recreation and tourism activities can contribute to the conservation, and perhaps restoration, of the forests.

Tourism is essentially recreational travel. Tourists may visit public land forests deliberately, by chance having travelled to an area for other reasons, or may pass through forests on the way elsewhere. Some features are seasonal, such as wildflowers, while others are year-round, such as historic sites and prospecting. Numerous public land features are site-specific, and could be included in tourist routes developed for other purposes, such as winery tours and conferences.

While some forest areas may be tourism attractions in their own right, the role of the Box-Ironbark forests and woodlands in tourism is less developed and more low-key. Box-Ironbark forests receive little marketing compared to more spectacular areas, such as the Alpine area or the Grampians. It is worth noting however, that some travellers do not think of themselves as tourists, and prefer to visit places which are not seen as 'tourist traps'. For such people, low-key development may be an attraction in itself.

It is not clear to what extent regional visitor figures, derived from surveys of accommodation providers and visitor centres, overlap with visitor figures for forest areas. In some of the smaller towns prospectors make up both the largest group seeking accommodation and the largest group visiting public land. In the larger towns, it appears that many tourists have limited access to information on forest visits—a large proportion of tourism in Box-Ironbark regions (for example tourism in Bendigo) may be unrelated to public land.

On the other hand, many visitors to public land camp in the forest or do not stay overnight—in either case, they do not contribute to tourism accommodation figures.

Designation as a park and subsequent marketing has, as a general rule, tended to significantly increase visits to public land. Marketing should aim at achieving extra nights from many business visitors, and getting highway travellers to visit again and appreciate Box-Ironbark forests and woodlands.



The Maldon tourist railway is a popular attraction which combines two quintessential Box-Ironbark themes: gold rush era history and a leisurely journey through scenic open forests.

Prospecting tours to the Box-Ironbark area are popular, and now provide a major component of caravan park clientele in some areas. With marketing, additional prospectors could perhaps utilise and increase motel beds.

11.3 Industry trends

The Australian tourism industry has shown sustained growth, and is an important source of employment. Various estimates attribute around 5% of all employment directly to tourism. In the period 1985–94, annual employment growth in tourism of around 5% exceeded overall employment growth of 1.8%.³

According to the Australian Tourist Commission,⁶ an increasing proportion of tourists show a greater awareness of ecological issues. These tourists often have a preference for outdoor activities and seek experiences in touch with nature. However, tourism growth has not been uniform across the country. In Victoria the rate of growth in hotel and motel rooms sold, from 1991–1994, was the second lowest of all states (12% over the three years), and occupancy rates remained well below the levels achieved in the 1980s.

The easternmost Box-Ironbark forests, near Chiltern and Beechworth, are close to areas which attract relatively high numbers of tourists, or through which large numbers of tourists pass. Further west, however, Box-Ironbark forests and woodlands are in areas which attract only a small proportion of Victoria's tourism. Accommodation takings in the region bounded by Bendigo, Castlemaine, Maryborough and St Arnaud amounted to approximately 3% of the Victorian total.

A range of factors, including economic conditions, marketing, and facilities or programs developed for tourism, will determine the future of tourism in

Box-Ironbark forests and woodlands. The role of public land in future tourism will also depend on several factors, including how it is managed for recreation, and the development of cooperative arrangements between shires, tourism organisations and public land managers.

Positive examples of such arrangements include the Bendigo Bushland Trail and the Castlemaine Diggings Project. In the medium to long term, the condition of the forests themselves will be crucial. Important factors may include the diversity and abundance of understorey flora, control of erosion and litter, whether sufficient gold for prospecting remains and the visual and natural appearance of the forests (including the sizes and numbers of larger trees in the forests).

There is a worldwide trend towards tourism that contributes to environmental sustainability. The future attraction of the Box-Ironbark forests and woodlands for tourism, as distinct from local recreation, may depend on how restoration of the forests proceeds, and to what extent such restoration is underwritten by income from tourism.

Domestic tourism in Australia is expected to experience modest but real growth, that is, to grow slightly faster than the population. This growth will depend on better marketing of existing tourism products and the development of new attractions, including national and state parks.

11.4 Community views

The strong support for measures to encourage tourism in the study area, evident in the first public consultation period, was reinforced in consultation after the Draft Report. Most of this support came from people associated with the industry, and from conservationists who saw tourism—especially nature- and cultural heritage-based tourism—as an expanding industry with the capacity to generate employment and income comparable to that currently generated by industries which they saw as environmentally damaging and hence wished to see shifted to private land. Not surprisingly, support was strongest in larger centres, such as Bendigo and Castlemaine, where tourism is already a large and well-established industry, and in Melbourne where most visitors to the region live.

Other submissions cautioned that tourism ventures do not necessarily achieve projected visitor numbers and that, while tourism expenditure can increase at

a statewide level, the returns do not necessarily accrue to the region. Some reinforced the economic consultants' view that marketing of Box-Ironbark tourist features was necessary to achieve the estimated increases in tourism. Others contrasted this area with the Grampians and Wilsons Promontory National Parks, saying that Box-Ironbark national parks could never attract comparable numbers of tourists.

11.5 Achieving a balance

The ECC encourages the development of the tourism industry in the study area based on experiencing and enjoying the values occurring on public land. Support for tourism development should be provided through partnerships between Tourism Victoria, NRE, Parks Victoria, local government, Aboriginal groups and regional tourism boards developing coordinated programs to increase promotion of tourism based on the park and reserve system and also on state forests.

Efforts to attract and hold tourist expenditure should be addressed through appropriate marketing and promotion of the key values of Box-Ironbark forests and woodlands—gold, flora and fauna, and cultural heritage.

The ECC recognises that returns from increased tourism are not necessarily spent entirely in the region (vehicle fuel is often purchased in Melbourne, for instance), providing additional justification for government assistance.

The ECC has recommended a park and reserve system that provides eco-tourism and nature-based tourism opportunities, while providing for a diverse range of recreational activities that should form a basis for the development of more extensive tourism enterprises. This is expected to increase regional employment in tourism and related services. The value of prospecting to the tourism industry has been recognised with access maintained to most suitable public land, including key areas.

The park and reserve system provides a focus for gradually increasing tourism to this fascinating and accessible area.

The comparisons with the Grampians and Wilsons Promontory missed the point that the consultants' estimated returns were based on a modest percentage increase over current relatively low tourist levels, not a high absolute number of visitors.

If adopted, the recommendations in this report will:

- raise the status and awareness of several key areas of public land, assisting tourism promotion;
- increase public land tourism in Box-Ironbark forests and woodlands; and
- generally retain access for prospectors to popular areas.

RECOMMENDATIONS

- R51** Tourism Victoria, NRE, Parks Victoria, regional tourism boards and local government develop coordinated programs to increase public land tourism in Box-Ironbark forests and woodlands (also see note below).
- R52** Land managers explore opportunities to work with tourism agencies and associations, to assist tourism promotion in the recommended new parks and reserves, and in state forests.
- R53** The specific strengths of the Box-Ironbark study area, such as gold, flora and fauna, and cultural heritage be highlighted in tourism promotions.

Note: Tourism development on public land should also involve the consultation and participation of local Aboriginal communities (see Chapter 5 for detailed discussion of Aboriginal interests).

Information Sources

- ¹ Read Sturgess Associates (1999).
- ² Read Sturgess Associates and Henshall Hansen Pollock Associates (1995).
- ³ Essential Economics and Read Sturgess Associates (1998).
- ⁴ Bureau of Tourism Research.
- ⁵ Brookes (1997).
- ⁶ Australian Tourist Commission (1995).

12 Eucalyptus oil production

Eucalyptus oil production is often described as the first ‘truly Australian’ industry. In the Box-Ironbark study area it began after the 19th century gold rushes, when disused boilers and cheap labour for hand-cutting eucalypt foliage were readily available.

Production progressively focussed on areas of blue mallee, essentially in the same districts where harvesting now occurs. Many of the current producers are third and fourth generation descendants of the early producers. These historical associations, and the historical sites and relics associated with eucalyptus oil production, are an important feature of the current industry and are the basis of tourism associated with the industry.

12.1 Harvesting and management

Blue mallee is preferred for eucalyptus oil harvesting because it has the highest cineole content of Victorian eucalypt species. Cineole is the major active pharmaceutical component of eucalyptus oil. Public land harvesting is now done mechanically—chopping all vegetation to within a few centimetres of the ground across harvest plots of around 100 ha, every two to three years, by which time the eucalypts have usually regrown to 1 to 1.5 metres.

Harvesting generally targets areas where blue mallee is most abundant, principally within Broombush Mallee EVC (including its constituent community *Gravelly-Sediment* Broombush Mallee). Other less suitable species are often present in varying degrees, usually green mallee, and sometimes other species including non-eucalypts.

Public land harvesting is administered by NRE. Seven producers hold licences covering around 12 000 ha in total, near Inglewood, Bendigo, Wedderburn, St Arnaud and Rushworth. However, only around 2 780 ha (23%) of this is actually cut (approximately 800 ha per annum). The percentage of each licence area harvested, however, varies greatly, from about 8% to 100%.

Producers extract oil from the harvested foliage using simple steam distillation. Spent leaf is used to fuel boilers or is sold as ‘eucy’ mulch for gardens.

Some public land producers also harvest from naturally occurring patches of mallee (as opposed to plantations) on private land. A recent feasibility study of a variety of potential farm forestry products concluded that eucalyptus oil production from fully-planned, private land blue mallee plantations may be profitable in many parts of the study area.¹ Several people (including one public land producer) are now in the process of establishing such plantations, the most advanced of which has produced several high quality harvests within five years of planting.

12.2 Economics and employment

Oil producers are mainly family operations. The primary use of Victorian eucalyptus oil is in pharmaceuticals. The largest Victorian buyer of eucalyptus oil is a ‘vertically-integrated’ company based in Melbourne making pharmaceutical products from the oil. The company also imports oil from China for this purpose. One producer sells direct to the public only, in tandem with heritage-based tours of the distillery.

Currently, the economic value of public land eucalyptus oil production is around \$125 000 per annum to producers, directly generating 5 to 10 full-time equivalent jobs. The industry generates relatively little indirect employment and capital investment is small.²

Approximately \$20 000 per annum is paid to the Government in royalties, from public land eucalyptus oil production.

12.3 Industry trends

Victorian eucalyptus oil production has declined from around 70 000 kg per annum in the 1950s to around 20 000 kg per annum presently. Market share has mostly been lost to China, which currently accounts for around 90% of global production.

Victoria supplies less than 1% of the total world production of around 3 000 tonnes per year.²

In recent years, a large-scale farm forestry program in the Western Australian wheatbelt has resulted in the establishment of blue mallee plantations to control salinity and produce large volumes of eucalyptus oil, predominantly for the industrial solvent export market. Plantings to date could produce in the order of 30 times the current Victorian production and, by 2020, production is planned to be about 20 times higher again. The quality and consistency of oil produced from public land in Victoria is compromised by the presence of other species and less efficient distilleries. The Western Australian oil will be of higher and more consistent quality than that produced from public land in Victoria and, due to economies of scale, production costs are likely to be considerably lower than for Victorian oil.

Early results from blue mallee plantations on private land in the study area show promise.

12.4 Issues

Biodiversity values

Public land eucalyptus oil harvesting is a significant threat to many biodiversity values. The following species are particularly affected:

Pink-tailed worm-lizard is endangered in Victoria and vulnerable nationally. About half of the Victorian population occurs in Broombush Mallee in the Whipstick–Kamarooka area, where around 300 ha of public land is harvested for eucalyptus oil. Further expansion of harvesting would destroy areas known to be habitat for the pink-tailed worm-lizard and adjacent to recorded populations.³ The existing harvest areas may be compromising the long-term viability of this species in Victoria.

Malleefowl is also an endangered species in Victoria and vulnerable nationally. Malleefowl were formerly widespread in Box-Ironbark forests and woodlands but are now restricted (in Box-Ironbark) to Broombush Mallee near Wedderburn. The current area of available habitat is too small for the population to survive in the long term. Around 300 ha of this forest near Wedderburn is currently harvested for eucalyptus leaf, and recovery of malleefowl will require larger patches of unharvested Broombush Mallee, not just at Wedderburn but also, in the long term, in areas away from Wedderburn (especially Inglewood and Bendigo).⁴

Whipstick westringia is a slender shrub which is endangered in Victoria and nationally. Apart from a very small population in the Little Desert, this species occurs only in Broombush Mallee adjacent to Whipstick–Kamarooka harvesting areas. It may occur in current harvesting areas and, if so, harvesting is likely to jeopardise the species' long-term persistence within, and potentially adjacent to harvesting areas (by limiting population size below a viable level). Harvesting also reduces availability of suitable sites for re-introduction.⁵

Long-tail greenhood is an endangered orchid in Victoria and rare nationally. In Victoria it is found in a single small population in and adjacent to a eucalyptus oil harvesting area. Harvesting at this site is the main current threat to this species in Victoria.^{6,7}

Fifteen other threatened species occur in Broombush Mallee, to varying extents, as do numerous non-threatened species (including many species not found elsewhere in the study area). Eucalyptus oil harvesting suppresses the natural biodiversity of Broombush Mallee, effectively reducing a complex community to a monoculture.

Eucalyptus oil harvesting essentially represents an exclusive use of public land. Cut areas have limited value for recreational users, apiculture, or nature conservation. Soil compaction and erosion and weed invasion is evident at several eucalyptus oil harvesting sites.^{5,6,7} The royalty returned to the public, approximately \$20 000 per year for a total area of around 2 500 ha harvested on a three-year cycle, does not appear to be commensurate with such an exclusive use.

The extent to which environmental values re-establish after exclusion of harvesting is unclear; but is likely to be variable. Malleefowl, for example, may find formerly harvested areas suitable for foraging within five years, but it may be many more years before there is sufficient loose soil and litter to allow the construction of nesting mounds.

12.5 Community views

There was significant community support to phase out or close public land eucalyptus oil harvesting, and add the areas currently set aside for harvesting to the conservation reserve system. However, the public land oil producers argue for continued access to current harvest areas, questioning the impacts on biodiversity associated with the industry and the

validity, in terms of nature conservation, of excluding eucalyptus oil harvesting from those areas recommended. Within the industry there is support for the recommendation of greater tenure of licences in the belief that this will increase investment opportunities, aiding the development of private land plantations. Others propose direct funding and support be available to investigate the viability of mallee plantations on private land.

12.6 Achieving a balance

Some areas currently licensed for eucalyptus oil harvesting are recommended to be included in the park and reserve system as priority areas for biodiversity conservation. Such areas support a number of threatened species dependent on Broombush Mallee EVC, including four species listed on the *Flora And Fauna Guarantee Act 1988*. Access to eucalyptus oil harvesting sites should not be continued where it threatens the protection of these and other species.

The ECC recommends that where access to current areas change, a six-year phase-out period apply except in one patch with particularly high conservation values where immediate cessation is recommended. Support should be provided to aid the development of freehold land plantations for future harvesting, reducing the impacts on current operations. The ECC recognises the need for long-term stability associated with continued use of areas for oil production and acknowledges support for the recommendation of greater tenure of licences.

The most optimistic long-term view is that eucalyptus oil production, based on public land harvesting, will remain as a minor industry with historical and tourism value. The industry is, however, continually under threat from overseas oil and high quality oil from local and interstate plantations.

The availability of public land at minimal charge for eucalyptus oil harvesting is a significant disincentive to existing producers shifting to more efficient, higher-value production based on appropriately planned freehold plantations.

While there may be some opportunity for local boutique producers, the most plausible long term future for the Victorian eucalyptus oil industry is as a producer of high quality oil for the highest value pharmaceutical use from freehold plantations. Such an industry has the potential to be considerably larger and more profitable than the existing industry. It is appreciated that this will require suitable assistance and support to initiate and maintain plantations during developmental stages.

Several existing public land producers should be able to move to more profitable production based on freehold plantations, and retain their traditional associations with eucalyptus oil production, and hence tourism based on this association. Such an industry would allow currently harvested public land areas to return in time to their natural state and be available for a wide range of uses, including protection and recovery of the distinctive and significant flora and fauna which depend upon Broombush Mallee vegetation.

Several areas are recommended below for removal from eucalyptus oil harvesting. These are priority areas for nature conservation that form important links between existing conservation reserves, or are important for key species.

RECOMMENDATIONS

- R54** (a) Eucalyptus oil harvesting be immediately excluded from one currently-available patch of 7 ha near Rushworth and this area be incorporated into Whroo Nature Conservation Reserve (D4), as indicated on Map A; and
- (b) within six years of the date of Government approval of these recommendations, eucalyptus oil harvesting be excluded from other specific currently-available areas at Whroo, and near Wedderburn, and Bendigo, and incorporated into Whroo Nature Conservation Reserve (Recommendation D4), Wychitella Nature Conservation Reserve (D3), and Greater Bendigo National Park (A4), respectively, as indicated on Map A.
- R55** Comparable with the industry structural adjustment support recommended for timber industries affected by these recommendations (see Recommendation R1 in Chapter 3), appropriate assistance be offered to eucalyptus oil producers affected by these recommendations, to assist:
- (a) in the termination of harvesting as recommended above; and
- (b) with the establishment of plantations for oil production.
- R56** Sites where eucalyptus oil harvesting has occurred since 1995 inclusive, in state forest at St Arnaud, Wedderburn, Inglewood, West Brenanah, Glenalbyn and Rushworth, be identified, zoned, and used to:
- (a) produce eucalyptus oil;
- (b) provide opportunities for prospecting;
- and:
- (c) drainage lines and an appropriate buffer strip not be harvested.
- R57** Within the areas previously available for oil production, sites not harvested for eucalyptus oil since 1994 be identified, zoned and used to:
- (a) conserve biodiversity, particularly threatened species and species which (in the study area) are dependent on Broombush Mallee EVC;
- (b) produce honey;
- (c) provide opportunities for prospecting;
- (d) provide opportunities for open-space recreation and education;
- and:
- (e) these areas remain or become state forest under the provisions of the *Forests Act 1958*, and managed by NRE.
- R58** Where areas are to be retained for eucalyptus oil production in the long term, longer tenure of licences be granted to encourage licensees to invest in eucalyptus oil plantations on freehold land.

Information Sources

- ¹ Virtual Consulting Group (1999).
- ² Essential Economics and Read Sturgess Associates (1998).
- ³ Scientific Advisory Committee, Flora and Fauna Guarantee (1996).
- ⁴ Benschmesh (1994).
- ⁵ Davies and Riley (1993).
- ⁶ Scientific Advisory Committee, Flora and Fauna Guarantee (1991).
- ⁷ Backhouse and Jeanes (1995).

13 Commonwealth land

There are three major blocks of Commonwealth land in the Box-Ironbark study area. Longlea lies east of Bendigo. Puckapunyal lies north-west and Mangalore north-east of Seymour. The Commonwealth agreed to include Puckapunyal, Longlea and Mangalore in the Box-Ironbark investigation.

13.1 Puckapunyal and Graytown

The 41 490 ha Puckapunyal Military Area (PMA), which includes the Graytown Proof & Experimental Establishment, exists to maintain the capability of the Australian Defence Force; it is one of the Defence Force's busiest ranges. The Army carries out frequent military training exercises with live artillery firing, tank firing, demolition, aerial bombing and hand weapon firing. In public land use terms, military training is the approved primary land use of this area. This area "will be used for the foreseeable future as a military training area, continuing the present challenge of managing the PMA so that this use can be sustained without compromising either operations or important environmental values".¹

The Department of Defence states that appropriate environmental management "involves the conservation and management of key ecosystems such as forests and woodlands... as well as the protection of rare and endangered species."² In principle, Defence-controlled areas are managed for sustainable use. Environmental management plans guide and implement Defence's 'commitment to sound and effective environmental stewardship'.²

The PMA Environmental Management Strategy¹ provides for "effective and responsible management which seeks to protect significant environmental areas... while providing for the ongoing military use of the area". This strategy gives the commitment to "maintain the ecological diversity of the PMA, consistent with the sustainable use of the area for military activities."

The native vegetation of the Puckapunyal and Graytown military ranges is in good condition. However, there is some variation in the quality of remaining Box-Ironbark communities, including in

areas previously fully cleared for agricultural pursuits prior to Defence use. The majority of the broadacre forested areas have a forest structure dominated by small stems. Current management effectively provides a relatively high level of ecosystem protection for nature conservation in most areas with indigenous vegetation. Continued use of the military range for training should not prevent, or be constrained by, management of key areas for nature conservation. The range's current condition suggests that military training and conservation can satisfactorily co-exist.

The Puckapunyal and Graytown ranges contain a number of relatively high nature conservation values, including examples of several highly depleted EVCs, and habitat for certain threatened species. The Department of Defence recognises that the Puckapunyal and Graytown ranges contain some places of 'conservation worthiness'. The Department commissioned a flora and fauna survey of the ranges,³ resulting in identification of:

- two nationally threatened plant species;
- twelve state significance plant species;
- four state significance plant communities;
- records of two nationally significant birds; and
- thirteen state significance bird species.

The Environmental Management Strategy was part of an overall Environmental Management Plan for the PMA.⁴ Among other things, the plan aims at avoiding impacts in significant areas, minimising other impacts, and rehabilitating disturbed areas.

Specific ‘no-go’ and ‘no-impact’ zones are identified to protect sensitive areas. As defined by the Defence Department, the:

- ‘no-go’ areas are fenced and signed to exclude all vehicles. These areas may not be targeted for any direct firing. Activities are restricted to foot movement that does not involve digging or vegetation disturbance; and
- ‘no-impact’ areas are mostly not fenced and generally do not exclude vehicle movement. These areas must not be subject to targeting or direct firing from explosive rounds.

Fire protection and management are key issues at Puckapunyal and Graytown, particularly with live firing and the need for asset protection. Management of the area needs to continue to recognise the importance of appropriate strategies for fire. Pest plant and animal control are also actively undertaken in the military area and should continue.

13.2 Longlea

Longlea (496 ha) was formerly a magazine area for the storage of bulk high explosives, propellants and chemicals. The land has been under Commonwealth control since 1941 and, apart from the munitions storage buildings and roads, the forest community is intact. The primary public land value at Longlea is this little-disturbed Box-Ironbark forest. There are few large old trees, but parts have trees notably larger in diameter than in Box-Ironbark forests subject to harvesting and culling. Basal area of wood in many parts is unusually high, at around 20 to 24 square metres per hectare.

The Defence Department has recently indicated that it will retain all or part of Longlea for driver and other training purposes for the foreseeable future. Under Commonwealth Government tenure, the ECC proposes that the majority of Longlea remain substantially as at present, and be managed for nature conservation.

Intermittent use of the existing road network by Australian Defence Industries (ADI) for testing the Bushmaster and other vehicles is compatible with management of the forest for nature conservation.

A management plan to be prepared by the Defence Department is expected to provide, among other things, for appropriate nature conservation management of the forested areas. Development of

the management plan will include a flora and fauna survey to clarify the natural values of Longlea.

To ensure safety, Longlea should remain fenced and closed to public access during training and vehicle testing. Construction of any limited special testing sites should take place in the existing cleared areas. Open public access for recreation should not be permitted but, by arrangement with the Defence Department, access for educational, research and nature study groups could be facilitated.

Around five hectares located in the cleared land adjoining Atlas Road is proposed to be developed as a multi-user depot for Bendigo cadet brigades and other users. Other proposed and future users would need to retain ready access from Atlas Road. Potential use of part of the road network for a community driving school is a matter to be resolved between the Commonwealth and the proponents. If such use is agreed, it should be limited to a level that does not reduce nature conservation values, and the tenure should not extend beyond the period Longlea is used by ADI.

Acquisition by the Victorian Government

The Minister for State and Regional Development has indicated that the Victorian Government will acquire Longlea from the Commonwealth. Discussions between the Commonwealth and Victorian Governments, to resolve this matter, are continuing. Once transferred to Victoria, the land would become public land under the *Environment Conservation Council Act 1997*.

The status of the former munitions storage buildings, and to what extent they are to be demolished and hazardous materials removed by the Commonwealth, needs to be determined. Before demolition, a heritage survey should be carried out to determine if any of the structures should be retained for heritage purposes.

When the area is no longer required for training and vehicle testing, the majority of the forested land should be included with the adjoining Bendigo Regional Park (see Recommendation C1).

13.3 Mangalore

Another 525 ha Commonwealth property at Mangalore is to continue under the management of the Department of Defence. This area has remnant Box-Ironbark vegetation on less than half of its area, and some of that vegetation is patchy and/or

disturbed. However, there are some intact and semi-intact examples of Box-Ironbark Forest EVC, and small, partly modified remnants of Plains Grassy Woodland EVC.

Extensive areas that formerly carried Grassy Woodland and Granitic Hills Woodland EVCs are highly modified, now supporting introduced pasture grasses with only scattered trees.

Much of the tree cover comprises dense stands with relatively small diameter stems, although some larger hollow-bearing trees remain. Tree cover and particularly large trees should be retained wherever possible.

The Atlas of Victorian Wildlife has several records of bush stone-curlews (endangered) and one record of a brush-tailed phascogale (vulnerable) from Mangalore. Bush stone curlews nest on the ground, and require areas with fallen wood for shelter and as a source of insects for food. Elsewhere, collection of domestic firewood removes this shelter but at Mangalore much wood has been left.

Stock grazing has been carried out by arrangement with the Department of Defence, and this has prevented regeneration of trees. Drainage lines and areas with relatively intact vegetation need to be protected from stock grazing. Management strategies to minimise the impacts of stock grazing on natural vegetation have been developed, with fencing of sensitive areas.

13.4 Community views

The Department of Defence drew attention to three agreements between themselves and Environment Australia under relevant Regional Forest Agreement arrangements, for the protection of nominated forest ecosystems in five states. The Department considers this displays further its commitment to protecting natural values on managed land.

Submissions regarding PMA mostly proposed that the area be protected in a national park should the land be returned to the State and no longer used as a military area. Several proposed incorporating PMA into a large national park based on the Rushworth-Heathcote forest area. Another suggested the Rushworth-Heathcote State Forest south of Mt Ida Nature Conservation Reserve be added to the reserve to form a protected link with Puckapunyal. Others proposed current environmental management strategies for the area continue and that mineral exploration and mining activities be excluded.

Submissions specifically concerned with Mangalore defence area proposed that the area should be managed to provide for fauna conservation, particularly for bush stone-curlews, and protected in a national park or other reserve when no longer required for its current purpose.

In including these significant areas of land in its overview of Box-Ironbark ecosystems, the ECC acknowledges the effort undertaken by the Department of Defence as the land manager to protect, manage and rehabilitate significant habitats occurring on these lands and recommends that this continue. The ECC supports the inclusion of these areas to the reserve system when no longer required for defence purposes..

Exploration and mining for minerals are inappropriate uses of these areas and should be excluded, as the primary uses include live artillery firing and military training activities. Important habitats for threatened species in these areas should continue to be managed for nature conservation where possible.

13.5 Proposals for Commonwealth land

The PMA, Longlea and Mangalore are Commonwealth land, hence are not 'public land' as defined under the *Environment Conservation Council Act 1997*. Accordingly, the ECC cannot make formal recommendations for this land. The following proposals are put forward in order to include these significant government land blocks in an overview of Box-Ironbark public land use for the region.

Unexploded ordnance occur on Puckapunyal and Graytown ranges. Training, involving firing, continues year-round. It would be therefore not feasible to permit public access to these ranges.

According to the particular environmental and Aboriginal cultural values, and their sensitivity to disturbance, application of zoning may either limit access to foot only, or may permit appropriate military training but not disturbance. Constructed creek crossings (in accordance with current procedures) would be necessary to provide access for tracked vehicles between cleared areas. Normal training would continue in the extensively cleared areas.

The flora and fauna survey report for Puckapunyal and Graytown includes some of the following locations.

'No-go' zones should include:

- the 'areas of greatest ecological significance' identified in the flora and fauna survey report;³
- areas with large old trees such as the stand of red ironbarks north of Jacksons Hill;
- areas with regeneration of depleted tree species such as buloke; and
- relatively intact occurrences in Puckapunyal and Graytown of the following highly depleted EVCs: Grassy Woodland; Plains Grassy Woodland; Creekline Grassy Woodland; Plains Grassy Woodland/Gilgai Wetland Mosaic; Alluvial Terraces Herb-rich Woodland; and Valley Grassy Forest.

Proposed 'no-impact' zones include:

- remaining forest and woodland areas in West Range;
- remaining forest and woodland areas in Graytown Proof & Experimental Establishment;
- areas of more than four hectares with intact native vegetation in East Range; and
- regenerating native vegetation.

Roads required for access and training would be excluded from the zones.

Current environmental management practices, including tree-planting, fencing significant remnants and regrowth against disturbance, soil conservation actions, and pest plant and animal control, should be continued. Re-establishment of vegetation should be with indigenous species utilising seed of local provenance.

Aboriginal cultural sites and places should be identified and protected in accordance with conventional practice. These areas should not be open to the public. However reasonable access to the area should be available by arrangement for Aboriginal cultural purposes, and flora, fauna and historical research.

Remaining significant historical features, including relics of the Majors Creek railway line, European settlement and mining, should be protected as part of range management.

The PMA is primarily used for military training, including weapon and ammunition testing and live firing. It is therefore inappropriate to allow commercial activities such as exploration, mining or apiculture. Restriction of these other activities also assists in protecting the high natural values of these areas.

Although not directly concerning Commonwealth land, it is recognised that the Department of Defence makes use of state forest areas for training purposes. Some state forests, including Rushworth-Heathcote State Forest, are particularly relied upon and it is recommended that state forest in these areas remain available for low key military training purposes, subject to the land manager's discretion.

P1 LAND USE PROPOSALS

- (a) Puckapunyal Military Area, of 41 490 ha, including the Graytown Proof & Experimental Establishment:
- (i) continue to be used to provide military training and testing; and
 - (ii) maintain 'no go' and 'no impact' zones listed above to conserve and protect communities of indigenous animals and plants, and for military training, as appropriate.
- (b) The Department of Defence:
- (i) use indigenous species of local provenance where possible when areas are being rehabilitated or otherwise planted;
 - (ii) conduct cultural heritage surveys and protect Aboriginal cultural site and places;
 - (iii) not permit harvesting of forest products; and
 - (iv) exclude grazing from the 'no go' and 'no impact' areas as far as practical.
- (c) Longlea (496 ha) be used to:
- (i) conserve and protect communities of indigenous animals and plants, and cultural heritage values;
 - (ii) provide for military training and special vehicle testing on the existing road network and existing cleared areas;
- and:
- (iii) harvesting of forest products and grazing not be permitted;
 - (iv) flora and fauna and cultural heritage surveys be carried out to assist management; and
 - (v) when no longer required for military training or vehicle testing purposes, the fence be removed and the firebreak revegetated, and the area be managed as part of the Bendigo Regional Park (C1).
- (d) 5 ha at Longlea be used as a multi-user depot, if required.
- (e) 87 ha of Commonwealth land adjoining Longlea (outside the security fence):
- (i) be managed and used as a natural features reserve bushland area;
- but:
- (ii) as per (c)(v) above, when Longlea is no longer required for military training or vehicle testing purposes, this area be managed as part of the Bendigo Regional Park (C1).
- (f) Mangalore (525 ha):
- (i) continue to be used for Department of Defence purposes; and
 - (ii) be managed to conserve and protect communities of indigenous animals and plants, and cultural heritage values;
- and:
- (iii) commercial harvesting of forest products and collection of fallen wood not be permitted, except the minimum required for fire protection around Defence Department facilities;
 - (iv) management strategies be developed to minimise the impact of grazing on natural vegetation; and
 - (v) when no longer required for Defence purposes, the areas with natural vegetation be transferred to the Victorian Government and managed as a nature conservation reserve.

Note: Commonwealth land is shown as P1 on Map A.

Information Sources

- ¹ Department of Defence (undated, circa 1998).
- ² Department of Defence (1998).
- ³ Australian Army (1996).
- ⁴ Department of Defence (unpublished, c.1998).

14 Other uses

Having dealt with the major uses of Box-Ironbark forests and woodlands in previous chapters, this chapter will cover the other significant uses of public land in the region.

Smaller, but significant, land uses in the area include extractive industries such as quarrying for gravel, clay and rock. Water production and distribution is an important activity in Box-ironbark forests and woodlands. Grazing also occurs on a small scale on some public land. Each of these issues was described in the ECC's Resources and Issues Report (1997).

14.1 Extractive industries

'Stone' is defined broadly to include many extractive industry products such as gravels, most clays, sand, soil and earth, and various types of rock—notably granite and hornfels in the Box-Ironbark study area.

Several types of commercial operations are substantial contributors to the regional economy, for example: quarrying granite, hornfels, sedimentary rock, slate, sand, gravel, clay, and clay shale. A total of 139 work authorities are operational in the study area, but most of these are located on freehold land, particularly on the northern plains, and some extract basalt from non-Box-Ironbark sites.

Twenty companies and four municipalities operate extractive sites on public land in the study area (see Table 14.1 below), on 29 work authorities under the *Extractive Industries Development Act 1995*.

Main products are construction materials such as crushed rock and sand for concrete and other purposes, gravel for road construction, clay for bricks and ceramics, and dimension stone.

The materials extracted include the following:

- **hornfels, granite and quartzite**—hard rock materials used for crushed rock or dimension stone (granite). Numerous potential sources of varying quality exist;
- **Palaeozoic sedimentary sandstones and shales** are widespread but relatively soft materials which provide road sub-base, some weathered slate, and residual clay and clay-shales; and
- **sand** is widely available from ancestral stream channels on the northern plains, dune deposits and granite colluvium.

As cost of transport is a significant proportion of the cost of production, quarries tend to be located near the point of consumption. The level of quarry production is largely determined by population growth and major projects such as new or upgraded roads. Plans to upgrade the Calder, Goulburn Valley and Midland Highways over the next 10 to 20 years indicate at least maintenance of the current demand.

Table 14.1 Quarry production reported in the study area – public land (1998/99)

Type	Number of quarries	Production (tonnes)	Value \$M
Hard rock	8	935 590	3.86
Sand, gravel and clay	17	57 360	0.31
Dimension stone	4	2 330	0.47
Total	29	995 280	4.64

Community views

The Construction Materials Processors Association has asked that industry not be excluded from areas with proven 'stone' reserves.

One submitter considered land managers should go through the same work authority process as private operators, when extracting stone for management purposes.

Unused stone reserves not currently economically viable should be retained for future generations as stone reserves, according to one submission.

Several submissions expressed the view that extractive industries for clay, sand and soil should be phased out.

VicRoads drew attention to the need for road making materials for upgrading the Calder Highway between Kyneton and Ravenswood.

Issues

Regarding exclusion of extraction from public land with proved reserves, a key principle of the recommendations in this report is the protection of areas with indigenous vegetation. This does not affect industry access to the 83% of the study area without Box-Ironbark vegetation.

The ECC believes that unused stone reserves may be more valuable now for their remnant vegetation, particularly in locations where little other public land remains.

The ECC does not share the view that extractive industries should be phased out. These activities are necessary to provide the community with resources. Location of new sites should be determined via a transparent planning process.

Regarding the provision of road making materials along the Calder Highway, as very little public land remains in the section from Harcourt to Ravenswood, public land here with native vegetation should not be used for stone.

Some high-grade extraction sites are located in public land blocks primarily used for conservation or recreation, for example Skeleton Hill Quarry at Chiltern and the Mt Alexander quarries. Issues include noise, dust and the loss of biodiversity values if these operations expand.

Access to stone resources for industry for the future is a significant issue. For example, a shallow brick clay pit in the Wellsford State Forest currently

provides a valuable resource for production of local and exported bricks and new resources will be required to continue this operation.

The ECC's view is that such operations are of considerable economic importance but that any applications for extraction of new resources, where clearing of Box-Ironbark vegetation would be necessary, should be required to meet similar requirements to those for mining operations (see Chapter 7). As a general principle such operations, particularly where they are shallow deposits with a short operational life, would be better carried out on already cleared land.

The Extractive Industry Interest Area Report for Bendigo¹ identifies areas of private land and public land with potential for commercial stone extraction. The report identified 18 extractive industry interest (EII) areas around Bendigo totalling 560 square kilometres. Approximately 84% of the total EII area is located on private land that is largely cleared, reflecting the overall proportion of cleared land across the study area. Small cleared public land areas are also identified. This indicates that there are sufficient potential reserves of stone resources located in cleared land—predominantly private land—to provide alternatives to extraction sites that would require clearing of indigenous vegetation. Appendix 15 provides a summary of the EII areas, and notes any ECC recommended parks and reserves included in them.

More general concerns relate to the need for continued rationalisation of small extraction operations to reduce the level of disturbance; decisions on quarry siting; and operating standards. The ECC's recommendations for extractive industries are in Section L of Chapter 18.

14.2 Water production and distribution

Relatively little water is harvested from the Box-Ironbark study area for water supply, but large volumes are stored and distributed.

Major water storage areas include Lakes Lonsdale, Cairn Curran, Eppalock and Mokoan, Tullaroop Reservoir and Waranga Basin. Water is distributed from the Goulburn system via channels from Lake Nagambie, both for irrigation and for stock and domestic supply to the Mallee. Storage areas of the Coliban Water System located outside the study area supply domestic water to Bendigo and other towns, and irrigation water to the Harcourt area, via a channel from Malmsbury.

Lakes Eppalock, Cairn Curran, Laanecoorie and Nagambie have some catchment in the Box-Ironbark area. Other large water bodies such as Waranga Basin, Lake Mokoan and Lake Lonsdale store water channelled from outside the Box-Ironbark area. Large volumes are moved in channels and natural watercourses, for irrigation and stock and domestic supply needs.

Restructuring of local water supply administration over recent years, and concerns over water quality in some small township supplies, has seen the replacement of several obsolete storage and supply facilities with higher quality piped-supplies. This means that some former installations, usually on public land, are no longer required.

Community views

Community views relating to water production and distribution are included in Section I, Water Production in Chapter 18.

Issues

The future of public land surplus to water authority requirements is probably the most significant issue. For example, parts of Coliban Water's Bendigo catchments (Big Hill/Crusoe) as well as several outlying small water storage areas are no longer required. It was recently announced that the Crusoe and No. 7 Reservoirs and their immediate surrounding areas would be developed for recreation and managed by the City of Greater Bendigo. The ECC's recommendations for C1 Bendigo Regional Park and A4 Greater Bendigo National Park reflect this use. Refer to Section I1 in Chapter 18 for detailed recommendations on water production and distribution.

Public land use and management also affects water quality or quantity in sensitive parts of catchment areas. Water distribution may affect public land management, particularly through seepage and salinisation associated with channels and the use of natural waterways to transmit large flows for irrigation supply, for example Goulburn River, Broken River and Broken Creek.

14.3 Grazing

Small areas of Box-Ironbark vegetation are grazed. Little public land grazing is carried out on the inland hills blocks, but on the northern plains many public land water frontage reserves, and small blocks of public land, are grazed. The total grazed area is small, and each individual grazed parcel is small, but these do provide economic value to the respective farmers.

Community views

Many submissions that specifically referred to grazing called for removal of grazing from Box-Ironbark public lands generally, with recommended parks and reserves, water frontage reserves, road reserves, or certain locations mentioned in particular.

Several other submissions, particularly from local landholders, supported some grazing, either for ecological management, weed control, fire protection, or for income for a committee of management.

A number of submissions referred to current biodiversity-orientated management, with grazing excluded from remnant Box-Ironbark vegetation on private land adjoining public land.

Issues

The most depleted EVCs are those on the northern plains. Chapter 4 describes the status of these vegetation types. In this context, public land water frontage reserves and isolated small public land blocks that have remnant plain vegetation are of great importance.

As these frontage reserves and small blocks are not used for timber harvesting or mining, the main current use that affects their condition is grazing. The ECC's recommendations for northern plains frontage reserves and key small block areas that are subject to grazing are: Black Dog Creek frontage reserve (part of Recommendation A1); Broken-Boosey State Park (B2); and nature conservation reserves D58, D59, D63 and D64.

Information Source

¹ Olshina, A. & Jiricek, F. (1998).

15 National, state and national heritage parks

National and state parks are relatively large areas of land with outstanding natural values, set aside primarily to conserve those values in largely natural settings. Typically a national or state park will display a range of exceptional values.

As a result of their outstanding features, national and state parks are also important and popular places which provide unrivalled opportunities for enjoyment, education, recreation and inspiration in natural environments. However, protection of cultural and natural values, particularly biodiversity, remains the primary role of national and state parks. The criteria which the ECC used to provide a general framework for selecting areas to add to the parks system are provided in Appendix 10.

15.1 The role of national and state parks

National and state parks provide the highest level of protection for natural features such as flora and fauna and landscapes, and for Aboriginal cultural sites and places and historic sites. Accordingly, harvesting of forest products, grazing by domestic stock, and hunting and firearms are normally not permitted, and national and state parks are exempt from exploration and mining under the *Mineral Resources Development Act 1990*.

Many other activities are permitted in national and state parks. Visitor rates can be very high and a wide range of recreational and other activities are undertaken: orienteering and rogaining; visiting historic sites; nature observation and bird watching; sightseeing; picnicking and barbecues; car touring; bike riding; bushwalking and camping; fishing; bee-keeping at designated sites; environmental education; and research.

With such a large number of uses and valuable features to protect, astute planning and zoning in parks is essential to minimise potential conflicts.

Interpretative services and other facilities should be provided to encourage visitors and enhance their experiences. At the same time, facilities and activities need to be confined to sites of appropriate size and location to minimise their effect on sensitive values and other uses.

Another important element of national and state park status, in addition to the high level of protection from evident threats, is the imperative for active conservation management. This is particularly important for the conservation of Box-Ironbark biodiversity. Many threatened and declining species will only survive in the long term if their populations are able to recover. Merely halting current and ongoing declines will not be enough, as explained in Chapter 4. Active management to conserve cultural heritage values is often also important.

This pro-active management is most apparent in the requirement for management plans to be prepared for all state and national parks. This requirement has been met for all existing Box-Ironbark national and state parks. The only other areas for which site-specific management plans have been published are Wychitella Flora and Fauna Reserve, Maldon Historic Reserve, and Reef Hills Regional Park. Forest management plans, covering extensive areas of state forest more generally, have been prepared for some forest management areas that overlap with the study area (see Chapter 17).

As well as formal protection, national or state park status raises the public profile and appreciation of the values being protected. Many national and state parks have 'Friends groups', for example. Community involvement in decisions affecting the use and management of public land is generally highly desirable, and considerably enhances the prospects of appropriate protection of key values.

An important dimension of the high level of protection provided in parks is the duration of that protection. In decades to come, national and state parks will support the best examples of values that need long-term protection from unnecessary disturbance. As indicated in Chapter 4, long periods secure from disturbance are a critical requirement for the recovery of Box-Ironbark biodiversity and

landscapes, most particularly, the re-establishment of the original Box-Ironbark forest structure dominated by large old trees.

National and state parks, therefore, are vitally important in providing a legacy for future generations. Protection is required, not just from current threats, but also from unforeseen future threats. Recent proposals to harvest large volumes of wood from extensive areas of Box-Ironbark forests in New South Wales for charcoal (as a fuel for power plants, to produce silicon, and for carbon trading) provide a particularly relevant example of previously unforeseen threats.

Fragmentation within parks is an example of an issue that must be addressed to maintain the viability of Box-Ironbark parks in the future. Existing parks in the study area exhibit some of the highest levels of internal fragmentation in major conservation areas in Victoria. The area of a park that is unfragmented is an indicator of the area of the park that is protected from significant disturbance. Major conservation benefits can be achieved through reducing fragmentation within parks and reserves by maintaining only the essential road and track networks, for example. Such management will benefit biodiversity recovery and provide core protected areas for viable species populations in the future.

15.2 Aboriginal interests

Aboriginal groups support the establishment of national and state parks. Protection and 'recovery' of the Box-Ironbark forests and woodlands ecosystem and Aboriginal cultural sites and places are major priorities for traditional owners in the study area.

They strongly expressed the need for Government to consult their communities prior to implementation. They had concerns about their lack of participation in land and water management, disturbance of cultural and spiritual sites, and the inadequate acknowledgement of their traditional and continuing relationship with the land. Some of their other priorities include;

- acknowledgement, respect for, and protection of significant sites and places;
- the need for adequate surveys of Aboriginal cultural sites and places in parks and reserves;

- involvement in the process of authorising tourism, scientific and commercial activities; and
- lack of compliance by some people and organisations, in relation to notification and survey requirements under existing legislation.

Some specific uses were commented on by Aboriginal groups and this input has been included in the specific park recommendations below. Also indicated in the park descriptions are those areas which are known to be affected by native title determination applications lodged with the National Native Title Tribunal.

15.3 Community views

National and state parks draw strong reactions from the community. For many people, national parks are special places held in the highest esteem, and they receive great comfort not only from visiting national parks, but knowing they exist. Many people proposed relatively large areas as national and state parks, invoking the importance of long-term, high level protection and potential for increased tourism.

For others, the exclusion of some uses from national and state parks represents lost economic and employment potential and excessively rigid constraints on access; "locked up in national parks" being a common expression. Prospectors, in particular, were of the view that the impacts of their activities did not justify blanket exclusion of prospecting from national parks. Many also felt that, although the LCC recommended prospecting be permitted in many state parks in the Box-Ironbark study area, subsequent park management planning had excluded prospecting from large areas of some state parks with little justification or consultation.

There is considerable divergence of opinion over the extent to which park status leads to increases in tourism numbers, with some park supporters providing quantitative evidence to support their case.

15.4 Achieving a balance

Counts of visitor numbers indicate that national parks generally attract more visitors, especially tourists and other long-distance visitors, than other public land categories. In Box-Ironbark forests and woodlands, this difference is amplified by the very low current visitor levels in public land blocks which are not national parks. Of course, parks must

contain substantial areas of outstanding value and interest to the public. Visitor numbers do not simply increase because any patch of forest has been declared a park.

In every major ecosystem, there should be at least some areas of reasonable size where a high level of long-term protection from major disturbance and threatening processes is guaranteed. Currently, there are only two small Box-Ironbark national parks, and the proportion of the study area in state parks is also low. The ECC's aim, in identifying new national and state parks, is to select significant-sized areas demanding high quality, long-term protection and avoid areas of most interest to users whose activities would generally be excluded.

Protection through national or state park status is most appropriate for features which are rare, difficult to replace, and susceptible to activities generally excluded from national and state parks but not other public land categories. Examples include large old trees and populations of threatened species adversely affected by extensive soil disturbance, such as orchids and small reptiles, and areas of the highest cultural heritage significance.

Accordingly, the ECC's recommended national and state parks are generally located to include special features, often the best or only examples of some values, for which the highest level of protection is required. At the same time, the parks largely avoid areas of most interest to those uses which are not generally permitted in national and state parks. For example, no recognised goldfield is included in a recommended national or state park, and metal detecting is generally excluded only from national parks—which are usually in areas of minimal interest to prospectors. Note that the recommended Greater Bendigo National Park (A4) is close to, but does not include the numerous high-producing

historical shafts of the Bendigo goldfield (and that new areas exempt from mining do not extend beyond 100 metres depth), and that metal detecting would be allowed there subject to zoning.

Four major national parks—the new St Arnaud Range, Greater Bendigo and Heathcote-Graytown National Parks and the significantly expanded Chiltern-Pilot National Park—are large areas of outstanding natural value recommended to complement the existing Terrick Terrick National Park. These recommendations would increase the total area of Box-Ironbark national parks from the existing 8 090 ha to 69 100 ha (including reference areas).

The ECC is also recommending two new state parks—Broken-Boosey and Reef Hills—and extensions to three existing state parks—Kooyoora, Paddys Ranges, and Warby Range. The existing Kara Kara State Park is recommended as part of the new St Arnaud Range National Park, and the existing Whipstick and Kamarooka State Parks are part of the recommended Greater Bendigo National Park. The net recommended change in state park area is from the existing 26 500 ha to 27 700 ha (including reference areas).

The areas above, and where relevant through this chapter, include the reference areas contained within particular national and state parks. These are subject to separate legislation which controls their use (see Chapter 18), but they are reserved in accordance with the surrounding land.

The ECC has made general recommendations regarding Aboriginal interests in Chapter 5 of this report. Aboriginal interests are also discussed in Chapters 15 to 17.

A National parks

National parks are extensive, highly significant areas with a diversity of outstanding natural values and land types. They generally display the highest quality examples of their values and unique combinations of features. They provide the highest level of protection to extensive natural areas and their biodiversity and hence exceptional opportunities for enjoyment, education, recreation and inspiration in natural settings. Because of these attributes, national park status, more so than any other form of land tenure, is generally attractive to visitors, particularly visitors from outside the region.

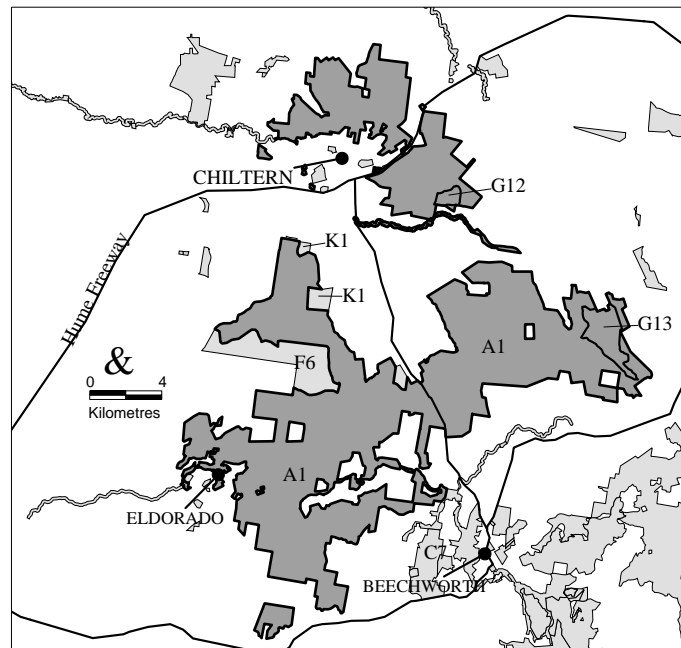
As well as the recommendations below, which apply to all existing and recommended national parks and additions, specific recommendations may apply to individual parks or areas.

GENERAL RECOMMENDATIONS FOR NATIONAL PARKS

- A** The national parks shown on Map A (numbered A1 to A5)
- (a) be used to:
 - (i) conserve and protect biodiversity and natural processes;
 - (ii) protect Aboriginal cultural sites and places;
 - (iii) protect significant historic sites and places;
 - (iv) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments and cultural heritage; and
 - (v) protect natural landscapes;
 - (b) the following activities generally be permitted:
 - (i) apiculture on licensed sites, subject to the outcome of research into the ecological impacts of this industry and park management requirements;
 - (ii) bushwalking, car touring, picnicking and camping;
 - (iii) nature observation, bird watching and visiting historic features;
 - (iv) orienteering and rogaining;
 - (v) horse, mountain and trail bike riding on formed roads only; and
 - (vi) research, subject to permit;
 - (c) in accordance with the ecological management strategy recommended in Recommendation R12 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
 - (d) the following activities not be permitted:
 - (i) harvesting of forest products including eucalyptus oil, grazing by domestic stock, car rallies, hunting and the use or carrying of firearms;
 - (ii) exploration and mining, other than continuation of operations within existing licences, as approved; and
 - (iii) metal detecting, prospecting, gemstone seeking and gold panning;
 - (e) unused road reserves be added to adjoining parks where appropriate;
- and:
- (f) they be included on a schedule to the *National Parks Act 1975*, and managed by the Department of Natural Resources and Environment.

- Notes: 1. Exceptions to the above general recommendations are noted in the recommendations for specific parks, where relevant.
2. Should ecological management (recommendation (c) above) require removal of wood from parks, that wood may be sold.
3. Implementation of recommendations and land management should allow flexibility for minor boundary adjustments.
4. Park managers may set aside areas for particular uses, where appropriate.

A1 Chiltern–Pilot National Park



The recommended Chiltern–Pilot National Park is one of the most important sites for nature conservation in Victoria, supporting an extraordinary number of threatened and non-threatened species. Its impressive biodiversity, landscape and cultural heritage values are attracting an increasing proportion of north-east Victoria’s expanding tourism and recreational visitor market.

Benefits of the park

Biodiversity conservation

The recommended Chiltern–Pilot National Park would provide protected habitat for the most intact Box-Ironbark fauna assemblage in Victoria. The park would play a pivotal role in the recovery of many threatened Box-Ironbark plant and animal populations.

Heritage protection

The recommended park’s suite of Aboriginal, gold era and Kelly Gang sites and relics are compellingly evocative of the region’s absorbing history. Protecting these sites in their original landscape will highlight their significance.

Recreation and tourism

Chiltern–Pilot National Park would be a popular destination for visitors seeking a diverse range of attractions and activities, including low-key car touring, nature and heritage-based recreation, orienteering, camping and, along Reedy Creek, prospecting for gemstones.

Location

The recommended park encompasses the low hills surrounding Chiltern, and much of the striking Mt Pilot Range running east-west between Chiltern and Beechworth. The park straddles both the Hume Freeway and the main Chiltern–Beechworth Road.

The total area of the recommended Chiltern–Pilot National Park is 21 943 ha, comprising: the existing Chiltern Box-Ironbark National Park (4 320 ha, including Reference Area G12); Mt Pilot Multi-purpose Park (14 123 ha, including Reference Area G13); part of Barambogie State Forest (F6; 2 497 ha) and Beechworth Historic Park (52 ha); Barambogie Education Area (597 ha); Black Dog Creek Streamside Reserve (64 ha) and public land water frontage (129 ha), Reedy Creek water frontage and discontinued earth resources area (124 ha), Eldorado dredge and nearby former open cut (31 ha), and a bushland reserve near Chiltern (6 ha).

Environmental values

Biodiversity

The area has the highest number of mammal, bird, and reptile species recorded at any Box-Ironbark site. It is the most important site in Victoria for nine threatened species: squirrel glider, regent honeyeater, swift parrot, painted honeyeater, barking owl, turquoise parrot, Deane's wattle, Warby swamp gum and a recently discovered new orchid species. It is also the most important site in the study area for three threatened species: square-tailed kite, bandy bandy snake and yellow hyacinth-orchid (see Appendix 1 for conservation status of threatened species).

The recommended park contains significant representation of nine EVCs, particularly Valley Grassy Forest, Box-Ironbark Forest, Grassy Woodland, and Grassy Dry Forest.

Heritage

There are numerous pioneer and gold era sites and relics, including well-known features such as the Magenta Mine and a pioneer cemetery near Chiltern, the Kelly Caves, and the famous Gold Dredge near Eldorado. The recommended Chiltern–Pilot National Park is contiguous with Beechworth Regional Park (see C7 on Map A).

Landscape

This area has a marked diversity of landscapes and EVCs, from the Riverina plain, through low sedimentary hills, to the distinctive ridgeline of the Mt Pilot Range. There are many fine views across the surrounding countryside, most particularly from the summit of Mt Pilot. The impressive granite boulder peaks and deeply dissected valleys of this range include the Woolshed Valley along Reedy Creek and the spectacular Woolshed Falls.



Cock's Gold Dredge near Eldorado

Aboriginal interests

There are several Aboriginal sites and places in this recommended park, including the Yeddonba art site, which is of significant spiritual and cultural importance.

Aboriginal groups are concerned about the increase in tourism in the area, and the increased risk of impact on cultural and environmental values. Along Reedy Creek there are a number of Aboriginal cultural sites that could be impacted upon by prospecting. Care should be taken to ensure that no damage occurs to these sites. Aboriginal groups believe this area needs to be more thoroughly surveyed prior to implementation.

The Aboriginal community also seeks a role in the process of authorising tourism, scientific and commercial activities.

An application for a native title determination has been lodged with the National Native Title Tribunal including the recommended park area.

Community views

There were a significant number of submissions expressing both support and opposition to the establishment of the proposed Chiltern-Pilot National Park. Those in favour of the proposal identified the need for large, consolidated protected areas in order to ensure the viability of species (such as the barking owl) requiring sizeable territories. Cultural significance and the diversity of flora and fauna (including many threatened species) were also highlighted as justification for the addition of the Mt Pilot and Barambogie forests to the existing Chiltern Box-Ironbark National Park.

Submissions opposing the proposed national park raised various concerns. Many submissions stated that restrictions or bans on some currently permitted recreational activities would cause a decrease in visitor numbers to the area and have a negative economic impact on local towns. Restrictions on firewood collection were also a source of opposition to the proposed park. Some submissions argued that a ban on firewood collection would increase the risk of wildfires in the area as a result of increased fuel loads.

Several submissions were received from car rally enthusiasts in relation to the proposed park. Mt Pilot Multi-purpose Park and Barambogie State Forest are popular venues for car rallying events and concern was raised that such events would not be allowed to continue.

Current and future uses

Apiculture

There are 18 permanent and 19 temporary bee sites distributed through the recommended park area.

Defence training

The Department of Defence uses parts of the Mt Pilot Range section of the recommended park for low-key training exercises (such as camping and cross-terrain navigation on foot) around 30 times a year on average, amounting to around 4 000 visitor days per annum.

Low-key defence training would continue, subject to the land manager's discretion. Those parts of Barambogie State Forest in which most of the current defence activities occur remain available for more intensive activities, subject to the land manager's discretion.

Gemstone seeking and gold prospecting

Reedy Creek is a popular site for gemstone seeking. Tourists tend to use accommodation in Eldorado while others use dispersed camp sites along the creek.

Other than for some gold along Reedy Creek, the area of the recommended national park addition is of relatively little interest to gold prospectors.

Reedy Creek and a 100 metre wide strip along each bank would remain available for both gemstone seeking and gold prospecting.

Mining

One mining licence, and one application with a total area of nine hectares, are within the recommended Chiltern–Pilot National Park. Four exploration licences cover one third of the recommended park, including virtually all of the existing national park.

Much of the existing Chiltern Box-Ironbark National Park has high prospectivity for gold. Reedy Creek Valley has moderate prospectivity for gold, tin and tungsten.

The current exploration licences and, if approved, mining licences covering the park addition would be renewable subject to Government approval (as is currently the case with exploration licences in the existing national park), but no new exploration licences would be issued over the park area. Any future mining arising from these licences would be subject to Government decision and in accordance with existing provisions in the *National Parks Act 1975*.

Car rallying

The Pilot Range is currently an important venue for car rally enthusiasts, both local and from further afield. A key feature of the area is that it remains suitable in the wetter months of the year, when most other available public land in the district is too wet for car rallying. Car rallies are held at night along routes which are temporarily signed and closed to other users, rarely more than once a year in Pilot Range. Although car rallies are generally not permitted in national parks, the importance of the Pilot Range for car rallying constitutes a strong case for an exception in this instance. Accordingly, car rallies would be permitted in the park in the Pilot Range west of the Chiltern-Beechworth Road.

Recreation and tourism

The existing Chiltern Box-Ironbark National Park receives around 9 700 visitors per year. Vehicle and foot access throughout the recommended park is good, and it is popular for low-key car touring, picnicking, cycling, horse riding, bushwalking, camping, orienteering and rogaining, and nature and heritage-based touring.

Several registered commercial operators of nature-based tours visit the hills surrounding Chiltern and the area features in international books on bird watching locations. Currently, the Friends of Chiltern Box-Ironbark National Park frequently host outings which, as well as enhancing enjoyment of the park's values, assist in park management, for example, with weed control.

The recommended park's cultural heritage and scenic landscape attractions such as Mt Pilot summit, Eldorado Gold Dredge and Magenta Mine near Chiltern, form part of a network of similar sites often visited by tourists to the region. The creation of the Chiltern–Pilot National Park would significantly encourage and promote the area as a destination for nature and heritage-based tourism and recreation, and complement established attractions for visitors.

Stone extraction

A work authority is current for the quarry at Skeleton Hill in the existing Chiltern Box-Ironbark National Park (operating by consent under Section 40 of the *National Parks Act 1975*). Present arrangements for the operation of the existing quarry would continue, with the current work authority being renewable subject to government

approval. No new work authorities would be granted in the park area.

Timber harvesting

There is no commercial timber harvesting in any part of the recommended park area, the last area formerly available having been excluded by the North East Regional Forest Agreement.

Domestic permits are currently issued for the collection of fallen timber from several areas in the Barambogie and Mt Pilot Range sections of the recommended park. Approximately 400 cubic metres per annum are now removed under these permits.

Opportunities for domestic firewood collection remain in the area retained in Barambogie State Forest and in extensive areas of state forest to the south-east of Beechworth. In addition, some domestic firewood may be produced from the recommended park in the early stages of an ecological management strategy (see Chapter 4). Domestic firewood collection would not be permitted in the recommended Chiltern–Pilot National Park.

Grazing

Grazing licences are current along the Black Dog Creek frontage south of the existing national park. Grazing by domestic stock would not be allowed in the recommended park.

Management issues

Facilities

Basic interpretation and visitor facilities are needed to meet current and likely future visitor levels in the Pilot Range.

Community involvement

Aboriginal groups in the area expressed a desire to be more involved in park management and the location and protection of Aboriginal cultural sites and places. Consultation with traditional owners and participation in public land and water management are encouraged by the ECC (see Chapter 5).

The work of the Friends of Chiltern Box-Ironbark National Park has greatly assisted management of the existing national park. The group should be encouraged and supported to extend activity into the Mt Pilot area.

Landscape fragmentation

At a state level, this recommended park is large in size but is highly fragmented. The park is only partly linked to surrounding native vegetation. Linkages within the park are improved by incorporating linear strips of native vegetation existing on public land water frontages and streamside reserves, such as along Black Dog Creek. Management of the park should include measures to address the degree of internal fragmentation currently evident, including rationalisation of the park's road system.

Firewood

Continued control of illegal firewood cutting would be required.

Prospecting

In order to improve water quality (especially to reduce sedimentation) along Reedy Creek, previously uncontrolled gravel extraction has been eliminated and prospecting and gemstone-seeking along Reedy Creek are now more carefully managed.

Careful management of prospecting is an ongoing requirement, and dispersed camping along Reedy Creek requires improved management to ensure water quality and other sensitive environmental, historic and cultural values, including Aboriginal sites and places, are not degraded or damaged.

Water catchments

Some of the catchment of the Barambogie Reservoir, which supplies Chiltern, is contained in the recommended park, as are catchments of creeks from which water is drawn to supply Springhurst. Management of activities in these catchments should ensure adequate protection of water quality and catchments.

Weed control

In recent years, considerable progress has been made in the control of a number of weeds, most notably St John's wort and prickly pear in the Mt Pilot Range. Continuing control should continue to be a major management priority.

The existing Chiltern Box-Ironbark National Park is recognised as one of the least weed-infested parks in Victoria.

The old cork oak plantation at the corner of Mt Barambogie and East Triangle Roads should be retained for its historic interest since it appears unlikely to be a source of weed invasion. All other existing sample plots, and small plantations of various non-indigenous trees scattered throughout the Mt Pilot Range section of the recommended park, should be removed and revegetated with local provenance indigenous plants.

Pest animals

Foxes and rabbits are known to occur in small areas of the park and may pose threats to some threatened species. The impact of feral cats is also a concern. Measures to control these species should continue.

RECOMMENDATIONS

- A1**
- (a) The Chiltern–Pilot National Park area of 21 943 ha shown on Map A be used in accordance with the general recommendations for national parks on page 108;
 - (b) gemstone seeking and gold prospecting, with hand tools only, be permitted in a zone extending 100 metres from each bank of, and including, Reedy Creek;
 - (c) the Reedy Creek area be surveyed for Aboriginal sites and places;
 - (d) car rallying be permitted in the Pilot Range west of the Chiltern–Beechworth Road by arrangement with the land manager; and
 - (e) protection of the water and catchments of the Barambogie Reservoir and the creeks which supply water to Springhurst be maintained.

Information Sources

Backhouse and Jeanes (1995).

Butler (1997).

Commonwealth of Australia and Government of Victoria (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Mirimbiak Nations Aboriginal Corporation (2000).

Parks Victoria (1998a).

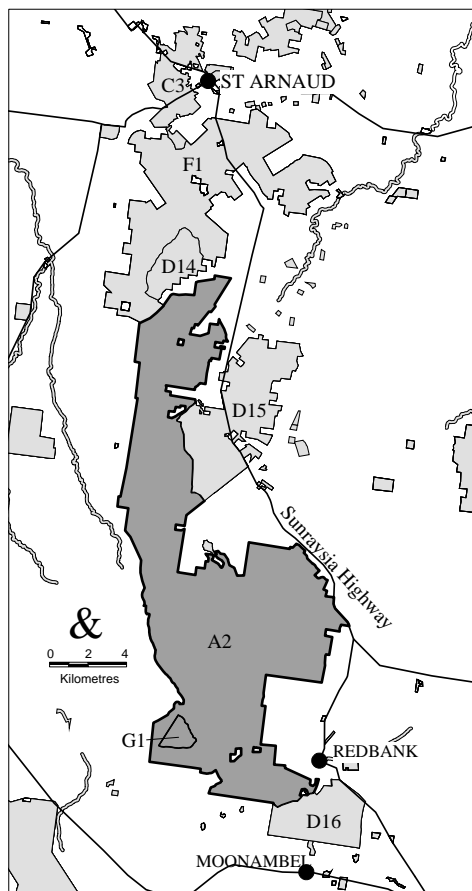
Parks Victoria (2000).

Stone (1985).

Thomas and Thomas (1996).

Wheatley (1998).

A2 St Arnaud Range National Park



The recommended St Arnaud Range National Park contains one of the most intact large areas of Box-Ironbark vegetation and landscapes in Victoria. Its large area and relatively high ecological integrity provides habitat for many flora and fauna species, including those that require sizeable territories and the area is a key component of the entire Box-Ironbark reserve system. The long north–south range has the greatest abundance of large old trees of any Box-Ironbark forest, and presents the visitor with the best remaining opportunity to experience a sense of what these forest landscapes were like before the gold rushes. The recommended park also contains Aboriginal cultural sites and places.

Benefits of the park

Intact landscape protection

The recommended St Arnaud Range National Park would protect the largest relatively intact Box-Ironbark landscape in Victoria, characterised by deeply dissected ranges with high scenic values, diverse landscapes and vegetation types. A relative abundance of large old trees produces a forest structure more reminiscent of original Box-Ironbark landscapes than any other in Victoria.

Biodiversity conservation

The relatively large area of intact forest structure supports an ecosystem of high ecological integrity. It is a highly significant site for species requiring such areas, such as the powerful owl and brush-tailed phascogale.

The park would provide a high level of long-term protection for this habitat structure and its attendant species. Such continuity of protection is required to provide a stronghold for these species and to safeguard against potential threats, both of which are necessary to preserve and enhance Box-Ironbark biodiversity values.

Recreation and tourism

The St Arnaud Range area currently receives relatively few visitors. Greater recognition of the diverse range of features offered by the St Arnaud Range National Park would attract more visitors to the park area and the region generally. The recommended park is easily accessed from several main roads and is close to St Arnaud and popular wineries in the Moonambel area. Increasingly, visitors would be attracted to the park to visit historic sites, go bushwalking, orienteering, picnicking, camping, car touring, bird watching and nature touring, and to experience the natural and remote landscapes with large trees and impressive views.

Location

The recommended park straddles the southern two-thirds of the St Arnaud Range, south of St Arnaud. The main access to the park is from the Sunraysia Highway to the east.

The recommended 13 526 ha St Arnaud Range National Park encompasses the existing Kara Kara State Park (3 948 ha), Mt Separation Reference Area (G1; 188 ha), 8 540 ha of St Arnaud Range State Forest and 850 ha of uncommitted land. Teddington No. 1 Reservoir is not in the park.

Environmental values

Landscape

Dominated by the prominent north–south ridge, the southern half of the St Arnaud Range contains landscapes unique in the study area for their high scenic quality, remoteness and diversity. The landscape ranges from deeply dissected hills in the south to the gentle hills and broader valleys of the northern part of the park, and is reflected in a consequent diversity of vegetation types.

Principally as a result of its remoteness, large old trees are relatively abundant in the recommended park, both individually and in the high proportion of the park containing large old tree sites. The forest has more widely-spaced large trees and more fallen timber than any other large area in the study area. This landscape is of value because of its uniqueness, but particularly because it is the most reminiscent Victorian example of the original Box-Ironbark forest structure (see Chapter 4).

Another feature of this park is its intactness, with large areas being only slightly fragmented. It also remains connected to several other areas of native vegetation in the reserve system.

Biodiversity

The recommended park is the most important site in the study area for powerful owl (four territories) and peppermint box, and is probably similarly important for brush-tailed phascogale—the large contiguous area of high quality habitat could make this the most viable population in Victoria. The park also includes several key sites for swift parrot. Other threatened species (see Appendix 1 for status) include green leek-orchid, buloke mistletoe and outcrop guinea-flower.

Significant contribution to the representation of four EVCs would be provided by the park, particularly for Valley Grassy Forest and Low Rises Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic. It would also protect the largest extent in the study area of *Northern Foothills* Heathy Dry Forest and *Northern Foothills* Grassy Dry Forest floristic communities. The park is also notable for its diversity of plant species and vegetation types.

The park has the highest concentration of large old tree sites in the study area. Thirteen sites, with a total area of 3 643 ha, cover over 25% of the total park area.

Heritage

Scattered through the southern part of the St Arnaud Range are numerous gold era sites and relics—many, located in isolated bush settings, are strongly evocative of the daily lives of early miners and bush workers.

Significant sites which should be protected include charcoal pits and kilns along Teal Track and along Barkly Track, Carapooee West Boys Camp, and many features such as puddlers, batteries, mines, water races and diggings left from the old mining days.

Aboriginal interests

Traditional owners support the protection of this area because of its biodiversity and high ecological integrity. They are concerned about major increases in tourism, because of the increased risk of impact on cultural and environmental values.

Aside from cultural heritage surveys, Aboriginal groups also expressed a need for cross-cultural training for users, such as tourism operators, about procedures to follow when Aboriginal sites are located.

The Aboriginal community seeks a role in the process of authorising tourism, scientific and commercial activities.

Community views

The St Arnaud Range National Park was one of the most strongly supported of the ECC's Box-Ironbark proposals. Indeed, most supporters proposed further additions to the national park, particularly the adjacent recommended nature conservation reserves. Their rationale was that these additional areas would contribute to the establishment of a comprehensive, adequate and representative reserve system, would reduce the fragmented nature of the proposed system, and would improve the conservation values while reducing management problems.

While no submissions disputed the environmental values of the proposed national park, several submissions proposed that existing access be maintained, notably for domestic firewood due to the lack of affordable, alternative fuel sources. Some called for the continuation of access for timber harvesting, concerned that any cessation would have a negative impact on employment in the area. Concerns about management for fire protection and for pest plant and animal control were also prominent issues for those concerned about this park specifically. Others were concerned that the park may restrict recreational activities such as prospecting, leading to a possible reduction in visitors to the area.

Current and future uses

Apiculture

There are 19 permanent and 15 temporary bee sites distributed through the park area.

Mining

There are no current mining licences within the recommended St Arnaud Range National Park. Two current exploration licences cover very small areas in the south-east of the park.

The most prospective areas of the St Arnaud Range, the St Arnaud, Stuart Mill and Redbank goldfields, are outside the recommended park (see St Arnaud Regional Park C3, nature conservation reserves D14–D16, and St Arnaud & Pyrenees State Forest F1).

The existing exploration licences covering the park would be renewable subject to Government approval, but no new exploration licences would be issued over the park area. Any future mining arising from the existing licences in the park would be subject to Government decision and in accordance with existing provisions in the *National Parks Act 1975*.

Prospecting

The area of the recommended St Arnaud Range National Park is of moderate interest to prospectors. Nearby areas of similar size and greater interest to prospectors will remain available in the Redbank, Stuart Mill and St Arnaud Goldfields (see regional park C3, nature conservation reserves D14–D16, and state forest F1).

Prospecting would be excluded from the park.

Recreation and tourism

Compared to many other parts of the study area, the St Arnaud Range receives relatively few visitors. Its main attractions are its scenic and remote landscapes, bushwalks, natural setting, historic features, and as an orienteering venue. The Teddington Reservoir is a noted picnicking, fishing and camping site. The existing Kara Kara State Park receives approximately 5 160 visitors per year.

The main ridge-line through the recommended park is a natural route for walkers. It is one of few Box-Ironbark areas where it is possible to walk for many kilometres while being more than a kilometre from the forest boundary or main roads. There is considerable potential to increase visitor use of the area, and the establishment of a national park of substantial size should heighten its profile as one of the premier Box-Ironbark settings for those activities favoured by its relatively remote, natural and diverse landscapes, particularly bushwalking, orienteering and car touring.

Timber harvesting

The net currently available forest area covered by the St Arnaud Range National Park is 6 440 ha, which is 5.1% of the total area currently available for timber harvesting.

This net area includes high and medium productivity forest, and excludes an estimate for areas protected under forest management prescriptions.

Over 13 000 ha of forest is generally available for timber harvesting in St Arnaud Range State Forest to the north and the Pyrenees to the south (see Recommendation F1 in Chapter 17). Commercial timber harvesting would not be permitted in the park.

Approximately 460 cubic metres of domestic firewood are currently removed annually from the St Arnaud Range National Park. The ECC recognises the importance of firewood to residents of the region surrounding the park, and a significant area of state forest has been retained south of St Arnaud from which firewood would be available. The area of this state forest has been increased from the ECC's proposal in the Draft Report, by reducing the size of the recommended Stoney Creek Nature Conservation Reserve to facilitate firewood collection. Opportunities for commercial timber harvesting would also remain in large areas of state forest to the south of St Arnaud and within the Pyrenees forest.

Opportunities for domestic firewood collection remain in more than 4 600 ha of St Arnaud Range State Forest immediately south of St Arnaud (see F1). In addition, some domestic firewood may be produced from the park in the early stages of an ecological management strategy (see Chapter 4).

Management issues

Promotion

The recommended park's diverse range of features has the potential to attract considerably more visitors than is currently the case. Prerequisite to any significant expansion in visitor numbers would be increased promotion of the park's features, where appropriate, improved access to and interpretation of these features, and development of associated facilities such as toilets and picnic areas. Preparation of a strategy to guide the expansion of visitor capacity and numbers is desirable.

Community involvement

Aboriginal groups in the area expressed a desire to be more involved in park management, the location and protection of Aboriginal cultural sites and places, and any interpretation developed as a result. Consultation with traditional owners and participation in public land and water management are encouraged by the ECC (see Chapter 5).

Water catchments

Most of the catchments of the Redbank and Teddington Reservoirs are contained in the recommended park. These reservoirs provide domestic water supply to nearby residents, and management of activities in these catchments should ensure adequate protection of water quality and catchment condition.

Pest plant and animal control

During the ECC's consultation program, numerous people highlighted that pest plant and animal control requires greater attention. The existing Kara Kara State Park, which forms part of the recommended park, was identified as having a low number of weed species having moderate impact. However, rabbits are widespread and have a moderate impact on native vegetation. Foxes and straying goats may also pose a threat to some species.

RECOMMENDATIONS

- A2** (a) The St Arnaud Range National Park area of 13 526 ha shown on Map A be used in accordance with the general recommendations for national parks on page 108; and
- (b) protection of the water and catchments of the Redbank and Teddington Reservoirs be maintained.

Information Sources

Bannear (1997).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Holland and Cheers (1999).

LCC (1997).

Mirimbiak Nations Aboriginal Corporation (2000).

Parks Victoria (1996).

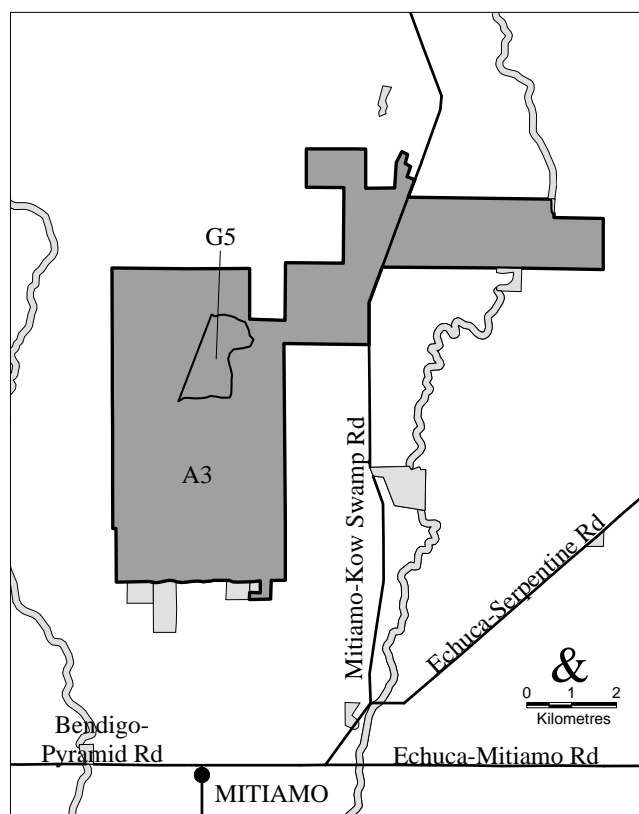
Parks Victoria (2000).

Stone (1999a).

Stone (1999b).

Stone (1999c).

A3 Terrick Terrick National Park



Benefits of the park

Minor additions totalling 84 ha are recommended to enlarge the existing Terrick Terrick National Park which contains one of the largest, most intact tracts of indigenous northern plains vegetation in Victoria. It is particularly important for representation of Grassy Woodland and Plains Grassland EVCs, and at least 35 plant or animal species threatened in Victoria.

Location

The recommended park will cover 3 854 ha, comprising the existing Terrick Terrick National Park (3 770 ha) including the 100 ha reference area G5, adjacent Bendigo Creek public land water frontage (43 ha), Terrick Terrick Flora Reserve (26 ha), uncommitted land (11 ha) and unused road (4 ha).

Environmental values

Biodiversity

The existing Terrick Terrick National Park includes the most significant remaining area of the once extensive native grasslands of northern Victoria—1 277 ha of former freehold land recently purchased and added to the park to protect its unique values. Similarly, grassy woodlands of the park include the largest white cypress pine woodland in Victoria and support many rare or threatened woodland species such as buloke mistletoe, woolly cloak-fern, bush stone-curlew, barking owl and grey-crowned babbler.

Landscape

The indigenous vegetation is also a key component of the scenic values of the park, adding to the imposing views and landscape contrast provided by the isolated granite peaks rising above the vast northern plains. The park is perhaps the only place where the sequence from rocky hilltops, through park-like grassy woodlands and diverse native grasslands, to riparian woodland, remains more or less as it was when famously surveyed from

Pyramid Hill, a few kilometres to the north, by Major Mitchell in 1836.

Heritage

The park contains several historic sites, including sites of former grazing activities, a theme rarely represented on public land, such as the Regal's and Davies' homestead sites in the recently acquired former freehold area. It also contains the Mitiamo Cemetery reserve which is of local significance for its local historical connections, and the aesthetic and natural qualities of its bushland setting.

Aboriginal interests

Aboriginal groups supported the enlargement of the park for biodiversity reasons, and because it contains sites of significant spiritual and cultural importance. They expressed concern that grazing, changes in vegetation, wetland reclamation, foxes and upriver drainage had contributed to major reductions in biodiversity, for example, in the number of brolgas in the area. Traditional owners suggested that park managers ensure protection, and where appropriate enhancement, of broлга habitat in Terrick Terrick National Park. The Aboriginal community also seeks a role in the process of authorising tourism, scientific and grazing activities.

Community views

There were only a small number of submissions which addressed this park and in nearly all cases they supported the minor additions proposed in the Draft Report.

Current and future uses

Grazing

Grazing by domestic stock is generally not appropriate in national parks, particularly in areas of high biological significance. However, following advice from grassland ecologists, low-intensity, sheep grazing has been maintained in the highly significant former freehold grassland areas, until more is known about the potential consequences of cessation of grazing.

Management issues

Landscape fragmentation

This park is one of the most fragmented in the state, despite having a high area-to-boundary ratio. Measures to address this should include rationalisation of the road network within the park.

RECOMMENDATIONS

- A3** (a) The Terrick Terrick National Park area of 3 854 ha shown on Map A be used in accordance with the general recommendations for national parks on page 108; and
- (b) low intensity sheep grazing, where necessary for biodiversity conservation, be permitted at the land manager's discretion

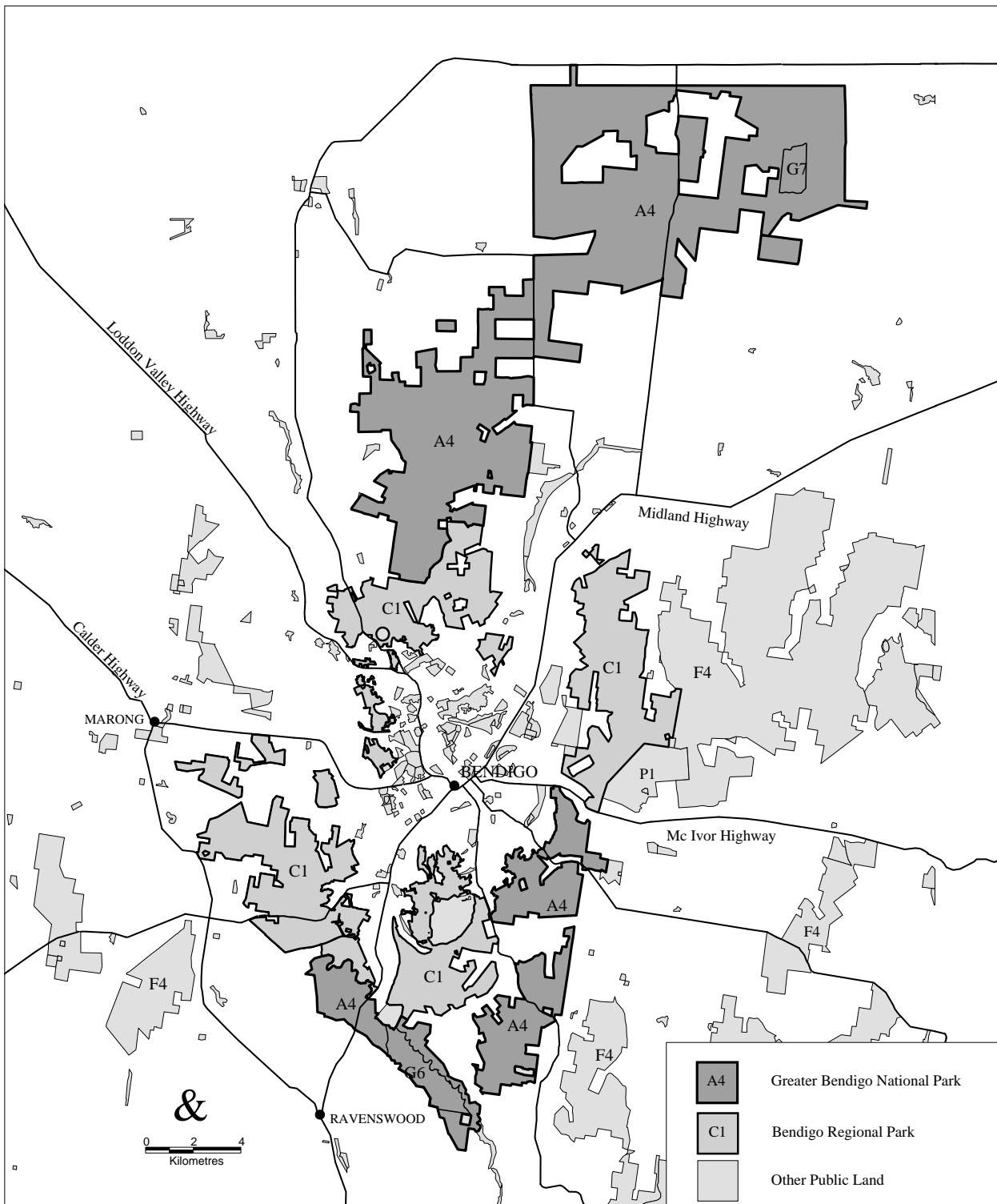
Note: Regal's and Davies' homesteads demonstrate farm dwellings typical of this area; their historical significance should be assessed and appropriate action taken.

Information Sources

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
 Mirimbiak Nations Aboriginal Corporation (2000).
 Parks Victoria (1997b).
 Parks Victoria (2000).

A4 Greater Bendigo National Park

An enlargement of the Bendigo area showing recommendations around the township, including parts of the Greater Bendigo National and Regional Parks, is provided as Map D of this report.



The residents of Bendigo are fortunate to live in a large modern rural city which is surrounded closely on all sides by extensive Box–Ironbark forests. The recommended Greater Bendigo National Park, together with the Bendigo Regional Park (see C1), would make the most of this unique setting and establish Bendigo as a ‘city within a park’. This location has large areas of indigenous vegetation, which are a key part of the visitor experience, for example seasonal wildflower displays in the Spring. Not many cities have the good fortune and responsibility associated with being surrounded by forest which is important for the (global) survival of some threatened species, such as the pink-tailed worm-lizard and McIvor spider-orchid. It also contains significant Aboriginal cultural values, and historic features and associations with gold mining.

Benefits of the park

Biodiversity conservation

The recommended Greater Bendigo National Park contains very high flora and fauna conservation values. It would protect populations of the pink-tailed worm-lizard, McIvor spider-orchid, and Whipstick westringia (a small shrub), all of which are nationally endangered. It would also protect habitat for over 20 other threatened flora and fauna species.

The recommended park includes some of the highest quality Box-Ironbark Forest EVC in the Bendigo area, approximately 40% of the total extent of Broombush Mallee EVC in the recommended reserve system, and one of the largest blocks of Grassy Woodland EVC in Victoria.

Recreation and tourism

The Greater Bendigo National Park and Bendigo Regional Park would stimulate awareness and appreciation of the diverse range of features offered by bushland around Bendigo. Parts of the park are already popular with locals for activities such as bushwalking, horse riding, nature observation, cycling, picnicking and camping.

Increasingly, the two parks would become popular with ‘heritage tourists’ due to their array of significant sites, many of which are linked by trails and roads that allow easy access. Spectacular wildflower displays and the opportunity to enjoy passive recreational activities in a natural setting will also attract tourists.

The features in the parks complement the other attractions which are currently promoted in Bendigo and provide the potential for significant growth in the already substantial local tourism industry. Visitors arriving via the Calder Highway would be greeted by signs identifying the national park, as they pass through the park at Big Hill.

Location

The Greater Bendigo National Park and Bendigo Regional Park (25 682 ha total) would surround Bendigo on all sides, effectively creating a ‘city within a park’. They would incorporate many parcels of public land for which coordinated management is a high priority.

The national park units account for over two-thirds of the total park area, comprising four adjacent blocks south of Bendigo, and linking and

consolidating the existing Kamarooka and Whipstick State Parks to the north of Eaglehawk.

The total area recommended as national park is 16 937 ha—comprising the existing Whipstick and Kamarooka State Parks (2 303 ha and 7 273 ha, including Kamarooka Reference Area G6), One Tree Hill Regional Park (1 090 ha), Mandurang South State Forest and Sandhurst State Forest (1 327 ha), Sandhurst Reference Area (see G7) and a water production area (762 ha), part of Crusoe-Big Hill Water Production area (720 ha), several areas of uncommitted land (1 005 ha total), Whipstick eucalyptus oil production area (2 267 ha) recently purchased former freehold (94 ha), an earth resources area (93 ha) and flora reserve (3 ha).

Below the recommended Sandhurst Reference Area (see recommendation G6), and the existing Whipstick and Kamarooka State Parks, Greater Bendigo National Park would continue as currently exists. Elsewhere in the recommended park, the area would be reserved to a depth of 100 metres below the surface—including One Tree Hill, Mandurang South, Crusoe-Big Hill, Sandhurst forest and the link between the existing Whipstick and Kamarooka State Parks.

Environmental values

Biodiversity

The recommended Greater Bendigo National Park and Bendigo Regional Park (see C1) and their immediate surroundings support the only Victorian population of the pink-tailed worm-lizard. The recommended National Park also contains the larger of the two known populations of Whipstick westringia, is one of only three known sites for McIvor spider-orchid, is the most important site for Kamarooka mallee, and includes key sites for swift parrot and brush-tailed phascogale.

Twenty other threatened species have been recorded in the park, as have an unusually high number of bird species.

The recommended park has many large areas of high botanical diversity. Of particular note are patches of high understorey diversity where wildflower displays in spring are spectacular. The park would make a significant contribution to the representation of five EVCs, particularly Box-Ironbark Forest and Grassy Woodland, as well as containing 40% of Broombush Mallee EVC in the recommended reserve system.

Heritage

The recommended park contains many significant historic water supply features of the Coliban channel system and Bendigo water supply storages.

Parts of the Kamarooka and Whipstick forests included in the park, and the One Tree Hill area, have recorded community heritage values. Aside from the natural values, the Kamarooka and One Tree Hill areas have confirmed social, historic and aesthetic values, including Ruedins eucalyptus distillery at Kamarooka. One Tree Hill contains an historic fire lookout tower and sites of old houses. The Whipstick area has recorded Aboriginal values as well as natural, aesthetic, social and historic values. All historic and community heritage features should be protected.

Aboriginal interests

There are several Aboriginal cultural sites and places in this recommended park. The DjaDjaWurung people have a strong continuing relationship with the land in this area.

The local Aboriginal people have a good working relationship with mining companies in the area. The Aboriginal community seeks a role in the process of authorising tourism, scientific and commercial activities.

A section of the recommended park is subject to an application for a native title determination, which has been lodged with the National Native Title Tribunal.

Community views

Not surprisingly, given the large number of people living in the area and the high level of appreciation and awareness of the local forests and woodlands, a very large number of submissions addressed public land use around Bendigo.

There is very strong local and broader support for protection of the natural and historic values in Bendigo's Box-Ironbark forests and woodlands, mostly expressed as proposals for the creation of a national park and an increase in the area of the park. At the same time many people recognise the advantages that highly profitable underground gold mining would have for the region and Victoria as a whole. Indeed, some submissions could see the advantages of both options, and made proposals accordingly.

The quartz reefs underneath Bendigo made it the richest goldfield in Victoria and generated enormous wealth in the century from 1850. There is good reason to believe that similar wealth can be generated with the application of modern technologies in major new ventures. As a result, continuing access to the most prospective areas of the Bendigo goldfield, is a key issue for the mining industry in Victoria.

Many submissions expressed the view that the regional park proposed in the Draft Report would not provide adequate protection for, or recognition of the forest ecosystems of the area and their conservation values. The diverse flora and fauna in particular are of sufficient quality and diversity to warrant national park status. Many also pointed out the benefits of national park status in highlighting the values of the area, attracting tourism and hence encouraging economic growth.

Among the other people who wished to see existing uses of public land continue around Bendigo specifically, and not necessarily at the exclusion of a national park, the most numerous were prospectors, recreational shooters, firewood collectors, horse riders and orienteers.

Current and future uses

Apiculture

There are 3 permanent and 35 temporary bee sites distributed through the recommended Greater Bendigo National Park.

Mining

There are two small mining licences current within the recommended park, with relatively small production recorded. Three current exploration licences cover most of the recommended park, other than existing reference areas and state parks.

The highly prospective Bendigo goldfield is between the two sections of the recommended national park, and is mostly in the recommended Bendigo Regional Park (see C1), where mining would generally be allowed, with approval.

The mining licence and the existing exploration licences covering the park would be renewable subject to Government approval, but no new exploration licences would be issued over the recommended park. Any future mining arising from the existing licences would be subject to Government

decision and in accordance with existing provisions in the *National Parks Act 1975*.

Historically, the Bendigo goldfields were some of the richest in the world, sparking the great gold rush of the 1850s. The area still has high prospectivity for gold and contains the new Bendigo Mining NL underground venture which has the potential to become the largest modern gold mine in Victoria.

The existing reference area and state parks will continue to be reserved in accordance with conventional practice, but the other areas recommended as Greater Bendigo National Park (notably One Tree Hill, Mandurang South, Crusoe-Big Hill, Sandhurst forest and the link between the existing Whipstick and Kamarooka State Parks) are recommended to be reserved to a depth of 100 metres to allow for approved underground mining beyond this depth. While new exploration and mining would not be allowed in the park, mining under the recommended park may require some infrastructure (notably air shafts and vents) within the park. Such infrastructure should be kept to a minimum, but not unreasonably excluded.

Recreation and tourism

Abundant natural values, community heritage values and diverse landscapes close to Bendigo represent a recreational resource of significant value for Bendigo residents and visitors who enjoy bushwalking, orienteering, prospecting, picnicking, camping, bike riding, and nature study.

The existing Whipstick and Kamarooka State Parks currently receive approximately 10 490 and 3 410 visitors per year respectively.

Areas currently harvested for eucalyptus oil have very little recreational value, and adding them to the park and allowing them to revegetate is likely to increase the recreational value of the area.

The same features, which are enjoyed by the people of Bendigo, will also be major attractions for tourists to the recommended national park.

Prospecting

Parts of the recommended Greater Bendigo National Park, notably the Whipstick–Kamarooka area, are of moderate to high interest for prospectors. As a result metal detecting will be permitted in the park in designated zones defined in a park management plan (see Note 2, in the recommendations for this park).

Timber harvesting

The net current state forest area covered by the recommended Greater Bendigo National Park is 920 ha. This is 0.7% of the total area currently available for timber harvesting.

Commercial timber harvesting and domestic firewood collection would not be allowed in Greater Bendigo National Park. Although the recommended park is a significant size, over 14 000 ha of nearby state forest (F4) is recommended to be retained for timber harvesting (see Chapter 17). Some domestic firewood may be produced from the park as a by-product of ecological thinning (see Chapter 4).

Eucalyptus oil production

Two licensees harvest trees for eucalyptus oil over approximately 490 ha of the area between the existing Whipstick and Kamarooka State Parks, which is recommended to be included in the Park.

After a phase-out period of six years to allow time for freehold plantations to be established, eucalyptus oil harvesting would not be permitted in park.

Water production

Sandhurst, Crusoe and Number 7 Reservoirs lie within the recommended park but are designated for water production, as parts of Coliban Water's Bendigo water supply system. Sandhurst Reservoir is now the core part of that system, and while its immediate catchment contributes valuable habitat to the recommended park, it should continue to be unavailable for public access.

The park managers and Coliban Water should jointly prepare a management plan for these catchments and associated channels, where appropriate, according to agreed principles for management.

Management issues

Interpretation, facilities and uses

As with other areas to be managed as parks or reserves close to towns, this recommended park would have several management requirements, such as interpretative signs, establishment of appropriate facilities at suitable sites, track management, control of illegal trail-bike use and control of a minor rubbish dumping problem.

Aboriginal interests

The Aboriginal community expressed a desire to be more involved in park management, the location and protection of Aboriginal cultural sites and places, and any interpretation developed as a result. Consultation with traditional owners and participation in public land and water management are encouraged by the ECC (see Chapter 5).

Landscape fragmentation

Both the existing Whipstick and Kamarooka State Parks have been identified as being moderately to highly fragmented, although both remain substantially connected to other native vegetation.

A medium area-to-boundary ratio and the road network within the park contribute to such fragmentation levels. Where possible, rationalisation of the road network and management of park boundaries abutting freehold land should be employed to reduce zones of impact.

Pest plants and animals

Being located relatively close to a major urban centre, pest plant and animal management is a major priority. The existing Whipstick and Kamarooka State Parks have been identified as having medium weed infestations, with moderate impact on natural values. Foxes and rabbits occur in small areas for both of these existing parks. Other pest species of concern include cats, dogs, goats and house mouse.

RECOMMENDATIONS

- A4**
- (a) The Greater Bendigo National Park area of 16 937 ha shown on Map A be used in accordance with the general recommendations for national parks on page 108;
 - (b) the park be reserved in accordance with conventional practice for the recommended Sandhurst Reference Area (G6) and the existing Whipstick and Kamarooka State Parks, and to a depth of 100 metres below the surface elsewhere—including One Tree Hill, Mandurang South, Crusoe-Big Hill, Sandhurst forest and the link between the existing Whipstick and Kamarooka State Parks, (see Note 1 below);
 - (c) metal detecting (prospecting) be permitted in designated zones defined in a park management plan (see Note 2 below); and
 - (d) eucalyptus oil harvesting be permitted to continue in areas which have been harvested since 1998 (inclusive) for a period of six years dating from Government acceptance of these recommendations.

Notes: 1. Ground more than 100 metres below the surface of park areas other than the recommended Sandhurst Reference Area and the existing Whipstick and Kamarooka State Parks would be outside the recommended Greater Bendigo National Park. Such areas include One Tree Hill, Mandurang South, Crusoe-Big Hill, Sandhurst forest and the link between the existing Whipstick and Kamarooka State Parks. The administrative arrangements for any future exploration or mining in these areas would be the same as those which apply generally to unrestricted Crown land. Exploration or mining in these areas should not intrude into the recommended national park, other than in accordance with the general recommendations for national parks on page 108. However, the location within the recommended national park of minor infrastructure associated with underground mining, notably air shafts and vents, should not be unreasonably denied. At the same time intrusion of such infrastructure should be minimised.

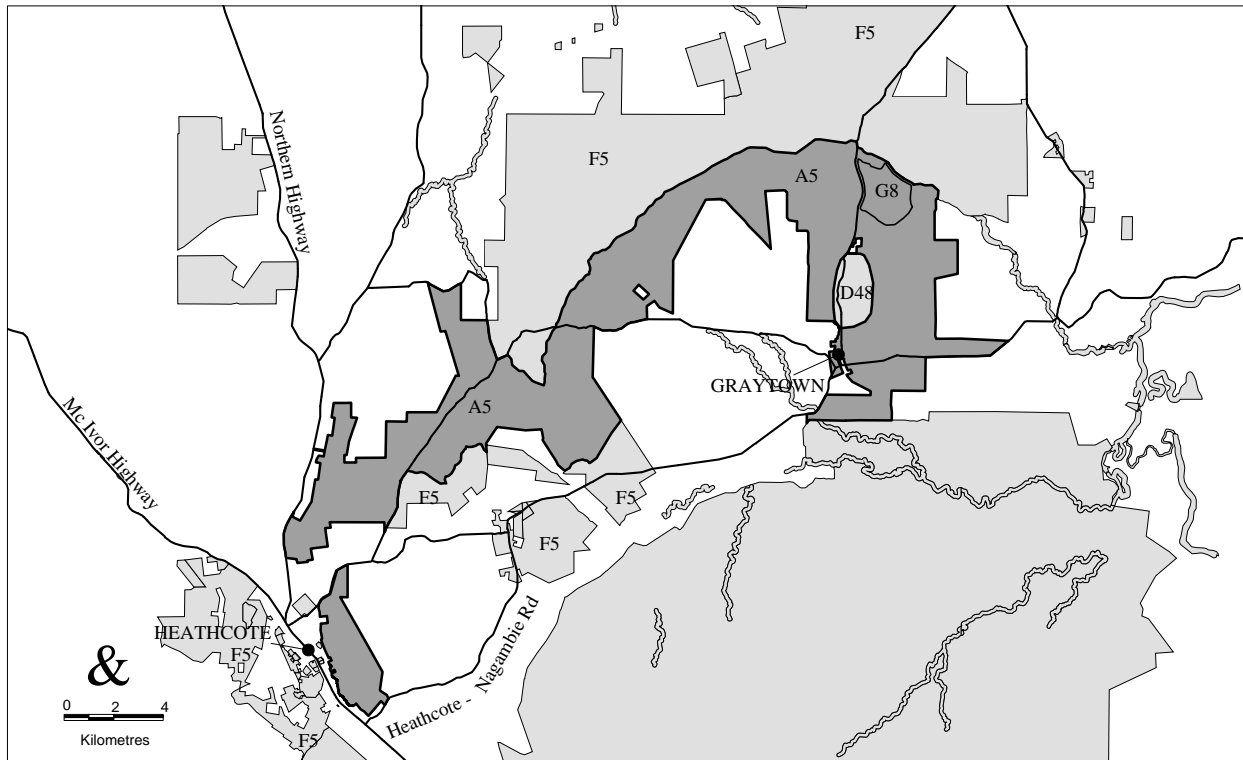
2. Metal detecting should be permitted other than in designated zones, located to protect significant park values, notably threatened small ground-dwelling animals and plants, which may be damaged as a result of prospecting. These zones should be developed as part of the standard management plan process, in consultation with the PMAV. This variation is not intended to affect current arrangements for metal detecting in existing national parks in the study area or elsewhere in Victoria.

3. Certain public land areas now managed by Coliban Water are to be transferred to NRE under these recommendations. Coliban Water should continue to manage storages and channels in the park associated with the supply of water to Bendigo and surrounding towns. In particular: 20 m wide easements/reserves are located along the Specimen Hill channels, and the Main Coliban Channel (north side) downslope from the Sandhurst Reference Area; 30 m wide easement/reserve along the Main Coliban Channel (south side; most of this abuts the Sandhurst Reference Area); and appropriate easements/reserves adjoin the Big Hill tanks and pipelines, and other Coliban Water channels and pipelines providing domestic water supply. The park manager and Coliban Water should jointly prepare a management plan for areas with water supply infrastructure, as appropriate.

Information Sources

- | | |
|---|--|
| Bannear (1993a). | Mirimbiak Nations Aboriginal Corporation (2000). |
| Butler (1997). | National Parks Service (1996a). |
| Context Pty Ltd (1999). | Parks Victoria (2000). |
| CFL (1989b). | Scientific Advisory Committee, Flora and Fauna Guarantee (1996). |
| Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife. | Stone (1996a). |
| Davies (1992). | Stone (1996b). |
| Davies and Riley (1993). | |
| Holland and Cheers (1999). | |

A5 Heathcote–Graytown National Park



The recommended Heathcote–Graytown National Park protects some of the most significant environmental, cultural heritage and recreational values in the largest remaining Box-Ironbark forest in Victoria. It supports sixteen threatened species including crimson spider-orchid, squirrel glider and swift parrot. It includes a concentration of high value large old tree sites and fauna refuges, and contains significant Aboriginal cultural values. Recreational opportunities include exploring gold rush and war era historic features at Graytown, as well as highly accessible areas that offer solitude in a bush setting. Its location close to Melbourne and complementing a diverse range of existing local tourist attractions should significantly increase the value of this large Box-Ironbark forest for tourism.

Benefits of the park

Biodiversity conservation

The Heathcote–Graytown National Park would protect sixteen threatened species, including four powerful owl territories and key sites for brush-tailed phascogale and swift parrot. A large number of bird species have been recorded in the recommended park.

Heathcote–Graytown National Park would encompass some of the largest consolidated large old tree sites in the study area. Protection of these trees would ensure that, in the long term, the park will contain extensive landscapes of large widely-spaced trees reminiscent of the natural vegetation

structure of Box-Ironbark forests (of great importance for biodiversity conservation).

The recommended park also contains many EVCs including extensive high quality examples of the vulnerable Creekline Grassy Woodland along Redcastle and Spring Creeks, the latter overlapping with one of the largest fauna refuges in the study area.

Recreation and tourism

The recommended park would be exceptional in that, despite being highly accessible by road and relatively close to Melbourne and tourist centres such as Nagambie, it would offer solitude in a natural setting only a short walk from the road. The park would also provide excellent opportunities for longer walks and overnight hiking along the 35 km

axis from Heathcote to Graytown, with magnificent views from Mt Black, Mt Ida, and the McIvor Range. The park's landscape would also offer a premier location for orienteering.

Because of its accessibility, high species-richness and importance for several threatened species, the park area is a favoured site of bird watchers.

The gold rush town of Graytown and evidence of a prisoner-of-war and immigrant camp are situated within the recommended park, providing opportunities for historical interpretative walks.

Location

The park would encompass much of the southern section of the extensive Rushworth–Heathcote State Forests, from the McIvor Range and Mt Ida near Heathcote to Mt Black, Spring Creek and Graytown.

The recommended Heathcote–Graytown National Park covers 12 833 ha, derived from the existing McIvor Range Scenic Reserve (780 ha), Mt Ida Flora Reserve (1 265 ha), 9 030 ha of Rushworth State Forest, Mt Black Reference Area (G8; 380 ha), 1 337 ha of the Mt Black Flora Reserve, and Graytown Historic Reserve (41 ha).

Environmental values

Biodiversity

Sixteen threatened species have been recorded in the recommended Heathcote–Graytown National Park, including crimson spider-orchid, clover glycine, scented bush pea, squirrel glider, powerful owl and swift parrot (Appendix 1 lists threatened species and their conservation status). In addition, the total number of bird species recorded in the area is unusually high.

Heathcote–Graytown National Park would make a significant contribution to representation of Box-Ironbark Forest, Creekline Grassy Woodland and Alluvial Terraces Herb-rich Woodland EVCs.

Eight large old tree sites, with a total area of 1 393 ha, are contained in the recommended park. The predominant tree species at these sites are red ironbark, grey box and yellow box.

Heritage

The historic gold rush town of Graytown, which once attracted tens of thousands of diggers, is evidenced by its remaining streets, building foundations and cemetery.

Regionally significant relics of a Second World War prisoner-of-war camp and immigrant camp are located within the area of the former township at Graytown, adjacent to the Heathcote–Nagambie Road.

Mt Black, Melvilles Lookout and parts of the Rushworth forests added to the recommended park have recorded community heritage values (i.e. natural, social aesthetic, historic or Aboriginal values). Mt Black is the highest point in the immediate area. It was a quarry source for the Goulburn Weir, and there were charcoal pits, including the significant Bailieston Track charcoal pits. Aside from the natural and historic values, the Mount Black Flora Reserve has been identified as having National Estate aesthetic values. Melvilles Lookout, a prominent ridge with panoramic views and picnic facilities, is where Captain Melville waited in ambush for miners during the gold rush. Its social, historic and aesthetic values have been confirmed and should be protected.

Aboriginal interests

There are several Aboriginal sites and places of cultural and spiritual significance in this recommended park. Aboriginal groups are concerned about the increase in tourism in the area, and the potentially increased risk of damage to cultural and environmental values. The local Aboriginal community believes this area needs to be more thoroughly surveyed prior to implementation.

The Aboriginal community also seeks a role in the process of authorising tourism, scientific and commercial activities.

Community views

The largest remaining Box-Ironbark forest in Victoria, located between Heathcote and Rushworth, attracted a great deal of interest in both public consultation periods of the Box-Ironbark investigation.

The potential for a large national park in the area to protect the significant biodiversity of the area, to bolster regional tourism, and to provide 'insurance' for Box-Ironbark values against long-term threats was widely supported. Many submissions supporting protection of the area expressed the view that this large area of forest warranted the creation of a national park to fully reflect the natural values and to assist in attracting tourism to the area, thereby helping with economic growth in nearby towns

such as Rushworth, Heathcote and Nagambie. It was also argued that national park status for relatively large areas of forest such as this was essential to provide some park areas of sufficient size to address the highly fragmented nature of most of the remaining forests and woodlands.

However, there has been strong and consistent opposition to a national park in the Rushworth-Heathcote forest—impacts on the availability of wood products being the major source of opposition to new reserves. Firewood is an important resource for most local residents, with alternative energy sources commonly considered too expensive with gas mains coming no closer than Stanhope or Mangalore. The areas where continued access was most keenly sought were close to Heathcote and Rushworth—so that domestic firewood could continue to be collected economically. Similarly, there was strong support for maintaining the local timber industry, with submissions expressing concern over job losses should parks or reserves be established. Several submissions argued that the forest is currently managed well for a variety of multiple uses, including nature conservation and that there is no reason to change the current management.

Exclusion of currently popular recreational activities, such as car rallying and walking dogs, were also identified as negative aspects to any reserve proposal. Many submissions also expressed scepticism with regard to increases in visitor numbers as a result of the creation of parks and reserves. Instead, it was argued that the economic well-being of local towns would actually suffer if reserves were declared due to reduced employment and business opportunities associated with forest-based industries.

Current and future uses

Recreation and tourism

The recommended Heathcote–Graytown National Park is easily accessible by road and provides opportunities to experience solitude in a natural setting a short walk from the road, and especially on longer walks. It has many readily-appreciated natural values such as large trees, scenic views from several peaks and ridges, and a high number of bird species.

Its historic values include the gold rush town of Graytown, the Graytown Cemetery and a Second World War prisoner-of-war camp. The recommended

park therefore lends itself to visits through its accessibility for bird watching, wildlife, wildflowers and historical interpretative walks.

To varying extents, these features are also important elements in other activities enjoyed in natural settings, notably orienteering, for which the area encompassed by the recommended park is one of the prime locations in Victoria.

Prospecting

The park area is of low to moderate interest to prospectors. Nearby areas of generally greater interest to prospectors are located near Rushworth, Whroo, Baileston, and west of Redcastle. These areas would be generally available for prospecting—see recommendations F5 and D4 (Rushworth-Heathcote State Forests and Whroo Nature Conservation Reserve).

Metal detecting would not be permitted in the national park.

Apiculture

There are 7 permanent and 19 temporary bee sites distributed through the park area.

Mining

There is one mine operating in the area. Almost all the recommended park is covered by seven current exploration licences.

Existing exploration licences covering the park would be renewable subject to Government approval, but no new exploration licences would be issued over the park area. Any future mining arising from these licences would be subject to Government decision and in accordance with existing provisions in the *National Parks Act 1975*. The most prospective section is outside the park in the recommended Spring Creek Nature Conservation Reserve (see D48 in Chapter 16).

Timber harvesting

The net available forest area covered by the recommended Heathcote-Graytown National Park is 6 040 ha; 4.8% of the total area currently available for timber harvesting. Extensive areas of state forest are generally available for timber harvesting in the adjacent Rushworth–Heathcote State Forests (see F5). Commercial timber harvesting would not be permitted in the park.

Approximately 1 227 cubic metres per annum are currently removed, as domestic firewood under permit, from the recommended park area. Large parts of the Rushworth–Heathcote State Forests (see F5) remain generally available for domestic firewood collection. In addition, some domestic

firewood may be produced from the recommended park in the early stages of an ecological management strategy (see Recommendation R12 and Chapter 4). Domestic firewood collection would not be permitted in the park.

RECOMMENDATION

A5 The Heathcote–Graytown National Park area of 12 833 ha shown on Map A be used in accordance with the general recommendations for national parks on page 108.

Information Sources

Bannear (1997).

Butler (1997).

Context Pty Ltd (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Heathcote Forest Ecotourism Project (undated).

Holland and Cheers (1999).

Mirimbiak Nations Aboriginal Corporation (2000).

Stone (1994).

B State parks

Although similar to national parks in most respects, state parks are generally less extensive, and generally support less diverse values and landscapes. As a result, while often very popular sites for recreation and tourism, their lower profile typically attracts fewer visitors seeking the stature conveyed by national park status. At the statewide level, metal detecting is generally not permitted in state parks, but most existing Box-Ironbark state parks do have zones where metal detecting is permitted, in recognition of the importance of Box-Ironbark public lands for this popular recreation. As well as the recommendations below, which apply to all existing and recommended state parks and additions, specific recommendations may apply to individual parks or areas.

GENERAL RECOMMENDATIONS FOR STATE PARKS

B The state parks shown on Map A (numbered B1 to B5):

- (a) be used to:
 - (i) conserve and protect biodiversity and natural processes;
 - (ii) protect Aboriginal cultural sites and places;
 - (iii) protect significant historic sites and places;
 - (iv) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments and cultural heritage; and
 - (v) protect natural landscapes;
 - (b) the following activities generally be permitted:
 - (i) apiculture on licensed sites, subject to the outcome of research into the ecological impacts of this industry and park management requirements;
 - (ii) bushwalking, car touring, picnicking and camping;
 - (iii) nature observation, bird watching and visiting historic features;
 - (iv) orienteering and rogaining;
 - (v) horse, mountain and trail bike riding on formed roads only; and
 - (vi) research, subject to permit;
 - (c)
 - (i) in accordance with the ecological management strategy recommended in Recommendation R12 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees; and
 - (ii) except for parks where specifically excluded, metal detecting (prospecting) be permitted outside designated zones defined in park management plans (see Note 2 below);
 - (d) the following activities not be permitted:
 - (i) harvesting of forest products including eucalyptus oil, grazing by domestic stock, hunting and the use or carrying of firearms, car rallies; and
 - (ii) exploration and mining, other than continuation of operations within existing licences, as approved;
 - (e) unused road reserves be added to adjoining parks where appropriate;
- and:
- (f) they be included on a schedule to the *National Parks Act 1975*, and managed by the Department of Natural Resources and Environment.

- Notes:
1. Exceptions to the above general recommendations are noted in the recommendations for specific parks, where relevant.
 2. Metal detecting should be permitted other than in designated zones, located to protect significant park values, particularly habitats of threatened small ground-dwelling animals and plants, and significant, sensitive cultural heritage features, which may be damaged as a result of prospecting. These zones should be developed as part of the standard management plan process, in consultation with PMAV. This variation is not intended to affect current arrangements for metal detecting in existing state parks in the study area or elsewhere in Victoria, nor to alter measures for the protection of archaeological relics and sites under the *Heritage Act 1995*.
 3. Should ecological management (recommendation (c), above) require removal of wood from parks, that wood may be sold.
 4. Implementation of recommendations and land management should allow flexibility for minor boundary adjustments.
 5. Park managers may set aside areas for particular uses, where appropriate.

B1 Kooyoora State Park



The recommended, much enlarged, Kooyoora State Park contains significant examples of a broad range of key Box-Ironbark natural values: many extensive large old tree sites; contrasting landscapes featuring major granitic, metamorphic and sedimentary formations; a consequent diversity of vegetation types; outstanding scenic values with impressive views of adjacent and distant hills and plains; numerous threatened species; and significant Aboriginal cultural heritage values.

Benefits of the park

Biodiversity conservation

The recommended Kooyoora State Park will encompass some of the most extensive consolidated large old tree sites in the study area. Protection of these trees would ensure that, in the long term, the park would contain extensive landscapes of large, widely-spaced trees reminiscent of the natural vegetation structure of Box-Ironbark forests, and of great importance for biodiversity conservation. Eighteen threatened species occur in the recommended park, many of them dependent on large trees.

Diversity of landscapes

The park would provide an important representative sample of a diversity of landscapes and vegetation types in a relatively small area. Many of these landscapes are among the best examples of their type, in particular, Hillcrest Herb-rich Woodland on the metamorphic aureole of Mt Brenanah ridge,

Granitic Hills Herb-rich Woodland on the granitic plateau, Rocky Outcrop Shrubland/Herbland Mosaic on the granite peaks of Mt Kooyoora, and Box-Ironbark Forest on the low Ordovician hills around Wehla.

Recreation and tourism

The expansion of the existing Kooyoora State Park would encourage many of the increasing number of visitors to venture into the diverse landscapes of the recommended additions, and provide scope for continuing increases in the park's popularity.

Location

The recommended park straddles the hills at the northern end of the Bealiba Range. It covers 11 646 ha, comprising the existing Kooyoora State Park (3 606 ha including the existing 325 ha Kooyoora Reference Area G3, and the recommended 345 ha Kingower Reference Area G4), West Brenanah and Glenalbyn State Forests (1 340 ha and 990 ha), part of Wehla State Forest

(5 480 ha), and Wehla North Nature Conservation Reserve (230 ha). West Brenanah and Glenalbyn eucalyptus oil production areas are not included, and the Wehla goldfield is recommended as Wehla Nature Conservation Reserve (see D19 in Chapter 16), which encompasses the existing Wehla Historic Area.

Environmental values

Large old tree sites

The recommended park contains 15 large old tree sites, with a total area of 3 591 ha. The Wehla area, in particular, contains some of the best examples of Box-Ironbark Forest EVC large old tree sites.

Biodiversity

Eighteen threatened species occur in the recommended park, including at least five nationally threatened species (see Appendix 1 for conservation status): McIvor spider-orchid (one of only three known sites), yellow-lip spider-orchid (one of only 2 known sites), Williamson's wattle, crimson spider-orchid, swift parrot (four key sites), and an apparently rare ant in the genus *Peronomyrmex*.

The park would make a significant contribution to representation of seven EVCs, particularly Granitic Hills Herb-rich Woodland and Hillcrest Herb-rich Woodland. It would also include some of the most extensive areas of *Northern Goldfields* Box-Ironbark floristic community and Metamorphic Slopes Shrubby Woodland in the study area.

Scenic landscapes

The new park would add the metamorphic Brenanah ridge, and the low ironbark-dominated Wehla hills to the granite plateau of the existing state park. The high scenic quality of each of these elements, in the numerous rocky outcrops, or the impressive views from Mt Brenanah, Mt Kooyoora and Melville Caves, for example, is heightened by the contrasting landscapes and corresponding vegetation types.

The landscape elements are sufficiently close to allow walkers and other visitors to readily appreciate the contrasts, yet sufficiently extensive to maintain the sense of tranquillity in the park's generally natural semi-remote setting. Melville Caves are named after the bushranger Captain Melville, who used them as a hideaway and lookout during the 1850s, adding extra interest to the view from the nearby summit.

Heritage

Historic mining relics and places in the recommended park include the White Swan Crystal Mine, Chilean Mill remains, Ochre Mine, mud brick hut and outbuildings, and Kingower cemetery.

Aside from once being the hideout of Captain Melville, Melville Caves has a strong Aboriginal heritage and is one of the most important attractions in the area. It has recorded Aboriginal, aesthetic, historic and social community heritage values and the park recommendation recognises the need to protect these values.

Geology

Melville Caves and Mt Kooyoora are among the best Victorian examples of caves formed between large granite boulders.

Aboriginal interests

Many Aboriginal cultural sites and places are found within the existing Kooyoora State Park, including rock well systems, rock shelters and archaeological artefacts. Several of these sites are of high cultural and spiritual significance. It is thought by some that a ceremonial stone arrangement at Kooyoora has totemic connections with the mallee fowl. Traditional owners proposed that this park be elevated to national park status.

The local Aboriginal community is concerned that Aboriginal sites be protected. They want more surveys conducted prior to implementation, in conjunction with traditional owners. If prospecting is to continue, prospectors should undertake cross-cultural training so they are aware of procedures to follow when locating Aboriginal sites.

The Aboriginal community also seeks a role in the process of authorising tourism, scientific and commercial activities.

Community views

There is strong support for the expansion of the existing Kooyoora State Park as proposed in the Draft Report, with many submissions proposing national park status. Another common suggestion was the addition of Kingower forest and the Glenalbyn and Brenanah eucalyptus oil areas to the proposed park. There were a number of submissions from prospectors and miners that argued for retention of current access to all areas, although much of the focus was on the more

prospective Kingower and Inglewood areas nearby. Several prospectors highlighted the large area zoned unavailable for prospecting in the existing park as a particular concern should a similarly large proportion of the proposed park been zoned unavailable. Small miners contended that the proposed park additions included goldfields which should not be exempt from mining. There were also some concerns about loss of access to firewood for domestic collection.

Current and future uses

Apiculture

There are eight permanent and 24 temporary bee sites distributed through the recommended park.

Mining

There is one current mining licence in the area of the recommended Kooyoora State Park, and four current exploration licences covering half of the park area.

The most prospective section in the northern part of the Bealiba Range, the Wehla goldfield, is outside the recommended park in the recommended Wehla Nature Conservation Reserve (see D19 in Chapter 16).

The mining licence and existing exploration licences covering the park would be renewable subject to Government approval, but no new exploration licences would be issued over the park area. Any future mining arising from these licences would be subject to Government decision and in accordance with existing provisions in the *National Parks Act 1975*.

Prospecting

The recommended park area is of moderate interest to prospectors, particularly the eastern part of the existing state park, parts of the current Wehla State Forest, and the north-western parts of the West Brenanah and Glenalbyn blocks.

Metal detecting would be allowed in designated zones in the Kooyoora State Park, in accordance with the general recommendations for state parks. Careful management of prospecting is an ongoing requirement to ensure environmental and cultural values, including Aboriginal sites and places, are not degraded or damaged.

Extensive nearby areas of very high prospector interest: Rheola to Moliagul, and Kingower to Inglewood, are outside the park, as is the Wehla goldfield.

Recreation and tourism

The existing Kooyoora State Park is one of the best known and most visited Box-Ironbark parks, receiving approximately 65 290 visitors per year, despite its distance from major population centres.

Popular activities include bushwalking, picnicking, sightseeing, orienteering, rock climbing, nature observation, prospecting and cycling. Some of these activities have been offered by commercial operators.

For orienteers, Kooyoora is a particularly popular and significant area—the existing park was the venue for the 1985 world championships and is planned as the venue for the 2002 World Masters Championships. These events are important for local tourism. Orienteering events are organised in close liaison with park managers, and no change to existing arrangements is recommended.

The expanded Kooyoora State Park would provide increased scope for many of the recreation and tourism activities currently occurring in the existing park. The proximity of the recommended West Brenanah and Glenalbyn additions to the Calder Highway provide opportunities to encourage more visitors, including long distance motorists using the highway, to enjoy the park's attractions without compromising the generally natural, semi-remote setting.

The park would make a major contribution to the range of visitor attractions in the district, complementing the historic features of Moliagul and Inglewood, and some increasingly popular wineries, for example.

Timber harvesting

The net available forest area covered by the recommended Kooyoora State Park is about 6 150 ha; 4.8% of the total area currently available for timber harvesting.

Commercial timber harvesting would not be allowed in Kooyoora State Park. Extensive areas of state forest are generally available for timber harvesting in Bealiba State Forest to the south of the recommended park and the Kingower State Forest to the south-east (see F2).

Approximately 486 cubic metres per annum of domestic firewood is removed annually from the recommended new areas of the park.

There are large areas of state forest remaining around Rheola, Kingower and Dunolly where domestic firewood will still be available (see F2). In addition, some domestic firewood may be produced from the recommended park in the early stages of an ecological management strategy (see Chapter 4). Domestic firewood collection would not be allowed in Kooyoorra State Park.

Management issues

Visitor numbers

Despite relatively little promotion, visitor numbers in the existing state park are increasing. With an appropriate increase in promotion to attract potential visitors, and because it is larger and more prominent, has more features, and is closer to the Calder Highway, further increases are likely in the recommended park.

While such an increase in popularity is certainly desirable, careful management will be required to accommodate the extra visitors while protecting the park's natural and Aboriginal cultural values.

Landscape fragmentation

In its recent report, *State of the Parks 2000*, Parks Victoria identified this park as being highly fragmented with a medium area-to-boundary ratio. Significantly, the park is largely surrounded by native vegetation. Where possible, rationalisation of the road network and management of park boundaries abutting freehold land should be employed to reduce disturbances associated with such interfaces. Measures to maintain and establish links between park additions should be actively pursued.

Pest plant and animal management

This park is identified as having a medium level of weed infestation, having a moderate impact. Rabbits and foxes are having a moderate impact. Control of such threats should continue.

RECOMMENDATIONS

- B1** The Kooyoorra State Park area of 11 646 ha shown on Map A be used in accordance with the general recommendations for state parks on page 129.

Information Sources

Backhouse and Jeanes (1995).
 Context Pty Ltd (1999).
 Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
 Holland and Cheers (1999).
 Mirimbiak Nations Aboriginal Corporation (2000).
 National Parks Service (1996b).
 Parks Victoria (2000).
 Stone (1988).
 Stone (1996b).
 Venn (1992).

B2 Broken–Boosey State Park

The recommended Broken–Boosey State Park is shown in detail in Map C of this report.

When Major Mitchell crossed Victoria in 1836, he spent several days travelling through grey box-dominated grassy woodlands which, at that time, covered over a million hectares of the vast riverina plain of northern Victoria. Now, the largest patches of that vegetation can be walked across in minutes. Less than 2% remains, most of it with few if any indigenous herbs, grasses and shrubs, and with an even smaller percentage protected in conservation reserves. In this context, the recommended Broken–Boosey State Park represents not only a large and very significant addition to the reserve system, but also a concrete turning point in European attitudes and actions towards these tiny remnants and their conservation and management. The park also contains significant Aboriginal cultural heritage values.

Benefits of the park

Biodiversity conservation

As the only remaining substantial occurrence of high quality native vegetation on the northern plains, the recommended Broken–Boosey State Park would protect over 20 threatened species, including one plant not recorded anywhere else in Victoria. The park would also be pivotal in arresting and reversing the decline of many more species for which the park is of great importance at the regional level.

Landscape

In a landscape which retains few distinctively Australian features, the recommended Broken–Boosey State Park stands as an immensely important example of characteristic natural vegetation and landscapes. It provides a unique contiguous corridor along the natural gradient of land systems and vegetation types from mesic herb-rich woodlands in the east to semi-arid riverine woodlands in the west.

Heritage protection

Around 70 scar trees have been recorded within or adjacent to the recommended park. This abundance indicates a high level of use by Aboriginal people, and suggests that systematic assessment would be likely to detect further sites. The area is highly significant for indigenous cultural heritage.

Land and water protection

Creation of the Broken–Boosey State Park would represent the culmination of a number of initiatives undertaken during recent years by the local community to protect stream banks, water quality and various natural values along these creeks.

Location

The recommended park encompasses mostly linear blocks of land containing the most ecologically intact and significant areas of public land along the Broken, Boosey and Nine Mile Creeks from near Wunghnu in the west, upstream to near Tungamah in the east. There are five discrete blocks in the recommended park, although many of the breaks between blocks are less than a kilometre.

The recommended park is 1 009 ha in area, consisting of: 509 ha in streamside reserves; 63 ha in several small bushland reserves; 37 ha in other small parcels; and approximately 400 ha of public land water frontage.

Nearby recommended nature conservation reserves D58 to D64, and several natural features reserves would complement nature conservation in the park (see Map C).

Environmental values

Biodiversity

The recommended park is the only known site in Victoria for coolibah grass and one of only two sites in Victoria for spiny-fruit saltbush (see Appendix 1 for conservation status of threatened species). Among the 21 other threatened species recorded (not including numerous aquatic species) are bush stone-curlew, grey-crowned babbler, pepper grass and narrow-leaf sida.

Being the only substantial area of largely intact native vegetation in the eastern half of the northern plains, the Broken–Boosey State Park would be the stronghold for most native flora and fauna species in the region, including many species that are declining, such as red-capped robin and diamond

firetail. The recommended park is particularly important for species dependent on mature woodland, such as the crested shrike-tit, tree martin, brown treecreeper and tree goanna.

The park would contribute significantly to representation of Plains Grassy Woodland/Gilgai Wetland Mosaic, Pine Box Woodland/Riverina Plains Grassy Woodland Mosaic, Plains Grassy Woodland, Pine Box Woodland, Sand Ridge Woodland, and Creekline Grassy Woodland EVCs. For all but the last of these, the recommended park contains the largest public land examples in the study area. Over 98% of some of these EVCs has been cleared and much of what remains is in very poor condition. High levels of protection and management are warranted for the best remaining examples of these EVCs, and these are included in the recommended park.

Landscape

The band of indigenous vegetation that lines these creeks is, in many areas, the only distinctively Australian element in the landscape. Stretching over 100 km (in a straight line), it provides the only contiguous cross-section along the natural gradient of land systems and vegetation types from mesic herb-rich woodlands near the foot of the Warby Ranges in the east, to semi-arid riverine woodlands near the Murray River in the west. Contiguous nature conservation reserves and public land water frontages connect the recommended park to Barmah Forest and the Warby Range.

Land and water protection

In recent years, a number of programs have been undertaken to improve land protection, water quality, biodiversity conservation and protection of other natural values associated with the Broken–Boosey Creeks system. For example, the Goulburn Broken Catchment Management Authority and Parks Victoria have managed programs to install fish ladders in the creek, fence water frontages and reduce grazing. Creation of the park would be another important step in improving land, water and biodiversity conservation in this region.

Aboriginal interests

This is an area of high cultural significance to Aboriginal peoples. Proper and systematic surveys and assessment are likely to uncover many more Aboriginal sites and places. This should be done in conjunction with traditional owners.

Traditional owners strongly support the re-introduction of indigenous plants to the area and high-level protection of the land and water resources in the area.

The Aboriginal community seeks a role in the process of authorising tourism, scientific and commercial activities.

An application for a native title determination has been lodged with the National Native Title Tribunal including some of the recommended park area.

Community views

The ECC was aware of the unusual nature of its proposal for a state park along the Broken–Boosey Creeks system, and the first reaction of many people was surprise. However, nearly all respondents, without necessarily supporting the ECC's proposal, recognised and supported what the recommended park is intended to achieve—improved recognition, protection and management of the outstanding natural values of the Broken–Boosey Creeks system. Some agreed that establishing a state park was the best way to achieve this, but others did not.

Adjacent property owners raised a number of significant issues. Some believed that the issues of concern could be resolved and that state park status was the best means of recognising the high natural values of this area. Many others saw these issues, overall as insoluble or too complex, and therefore the state park proposal as unworkable. However, as is clear from the detailed discussion below, when each of these issues are considered in detail, nearly all of them can be resolved with little or no effect on the activities of adjacent landholders.

Nonetheless, the ECC recognises the concerns of the majority of adjacent landholders in the region, without whom any significant land management proposal cannot succeed. At the same time, the need for improved management of public land for nature conservation remains. Accordingly, the ECC has refined the boundaries of the recommended Broken–Boosey State Park to target more closely those areas of highest natural value, and reduce the inclusion of areas where exceptions to standard conditions for state park management are required to cater for existing uses. Many of the areas formerly proposed as state park are now recommended as nature conservation reserves (D58-D64). Black Swamp (on the Nine Mile Creek)

and Moodies Swamp are popular with recreational shooters and are now recommended to remain as wildlife reserves with hunting permitted.

Current and future uses

Apiculture

There is one permanent bee site in the recommended park area.

Grazing

Sixteen licences for grazing are current over 160 ha of the recommended park (16% of total park area).

In recent years, the area of Broken–Boosey water frontage grazed by domestic stock has been greatly reduced in order to protect stream banks, water quality and natural values. Grazing would generally not be permitted in the Broken–Boosey State Park (there may be exceptions to this; see pest plant and animal section below and Recommendation B2(c)).

In places where public land is not currently fenced from adjacent freehold land, new fencing will be required to prevent stock grazing in the recommended park. Because water frontage protection has a variety of benefits, funds for fencing may be available from catchment-wide conservation and land and water protection programs, as has been the case with recent new fencing along many sections of these creeks.

Access to properties

Many roads or tracks through the public land along the Broken and Boosey Creeks are important or essential to adjacent landholders for access to parts of their properties, including farmhouses in some cases. Not all of these roads or tracks are gazetted. There is no reason that establishment of a state park should affect this access and, if necessary, responsible authorities should take appropriate action to ensure that this access is maintained.

Similarly, some landholders require access to the creek frontages for stock movement between different parts of their farms. Specific agreements can be established which allow this access to continue. Similar arrangements are not unusual in parks elsewhere in Victoria, and have proven to be a satisfactory solution.

Access for dogs

At present, adjacent landholders walk their dogs along the creeks, are accompanied by dogs when working along or near the creeks and, when the

farm house is close to the creek, allow the dogs around the house to range into nearby areas of public land. Many people assumed that state park status would automatically exclude this access. In fact, dogs are allowed in state parks unless excluded under specific provisions. Dogs should generally be allowed in the Broken–Boosey State Park, although land managers should retain their discretion and the option to zone particular areas as unavailable for access with dogs, if necessary.

Access to water

Adjacent landholders access the Broken, Boosey and Nine Mile Creeks for stock and domestic water and, downstream of Katamatite, irrigation water and drainage. This access is essential to the operation of farm and other businesses in the area. While state park status may result in more sensitive management of the works and activities associated with this access, it should generally not affect access.

It is important to understand the state park status will give improved recognition and protection to some of the most important natural values in Victoria. If it means that a landholder relocating a pump does so in such a way that avoids a colony of a threatened plant, for example, as opposed to being unaware of the issue and inadvertently destroying the plant's habitat, then in general, this would be a desirable outcome.

Ideally, highly protected areas such as state parks would be located to avoid this sort of infrastructure, but there are no places along the creeks where this is an option. It is the ECC's view that, on balance, it is better to have a state park that is unusual in its allowance for uses such as this, than to fail to capitalise on the opportunity for improved recognition and protection of the area's natural values which a state park would bring.

Pest plants and animals

Many submissions put the view that, without the work currently done by adjacent landholders along the creek frontages, pest plant and animal populations will increase greatly. The ECC's view on this issue is a good example of how this unusual park can achieve the benefits for which it is recommended.

As described below, the ECC believes continuation of cooperative management of the water frontages involving adjacent landholders as pivotal to the success of the recommended Broken–Boosey State

Park, and envisages a park which builds upon, rather than curtails, this management. State park status should encourage improved public land management and, given good working arrangements between public and freehold land managers, without adversely affecting the enormous beneficial contribution of adjacent landholders. So, for example, arrangements which allow appropriate existing weed control initiatives, or organised fox drives, to continue in the park can and should be made. With respect to the role of grazing in pest plant and animal control, the ECC is recommending that grazing by domestic stock be permitted where necessary for biodiversity conservation (which would include weed control).

Other uses

No current exploration or mining licences overlap with the recommended Broken–Boosey State Park. No new licences would be issued over the park area.

The frontages of the Broken, Boosey and Nine Mile Creeks are of little interest to prospectors. Soil disturbance should be minimised in the highly significant riparian zones of these creeks and metal detecting would not be permitted in the Broken–Boosey State Park.

The area recommended as park currently receives few visitors because it is fragmented into a number of rarely signposted units in different public land use categories.

While the size and shape of the recommended park limits its suitability for many recreational activities, creation of the park would encourage more visitors. Although most of the recommended park is within 50 metres of cleared freehold land, long contiguous sections of natural woodland occur. In addition, with development of appropriate materials and facilities, the recommended park has significant potential for interpretation and education, particularly in improving awareness and understanding of the vegetation of the northern plains, before it was almost completely cleared for agriculture.

Management issues

Water flows

As a result of its use as a channel for irrigation water, the naturally ephemeral Broken Creek is now perennial, typically carrying significant volumes of water. Ultimately, the current flow regime is likely to lead to the replacement of some of the existing plains vegetation on the adjacent public land, mostly Plains Grassy Woodland/Gilgai Wetland Mosaic EVC, dominated by grey box, with vegetation more tolerant of waterlogging, probably dominated by river red gum, for example.

Park managers should closely monitor changes in soil moisture and vegetation at locations distributed through the recommended park, and investigate the seasonality of high water flows along the creek and opportunities to significantly reduce, at least occasionally, the volume of water flowing through the creeks.

Weed invasion

In terms of nature conservation, the recommended park contains the very highest quality (including least weedy) public frontages of the Broken and Boosey Creeks. As a result, weed invasion following removal of grazing by domestic stock is likely to be generally minor, but nonetheless requires monitoring and control where appropriate.

Co-operative management

The total length of the recommended Broken–Boosey State Park boundary with freehold land is very large relative to the size of the park. In addition, while the park and nearby nature conservation reserves contain much of the high quality native vegetation in the region, a sizeable part of the total area of such vegetation is on freehold land. For these reasons, nature conservation in the region will be most effective if park managers, freehold landowners and other interested stakeholders work in cooperation. This issue is discussed at length in Chapter 4, culminating in Recommendation R13 for the establishment of a Conservation Management Network for the Broken–Boosey region.

RECOMMENDATIONS

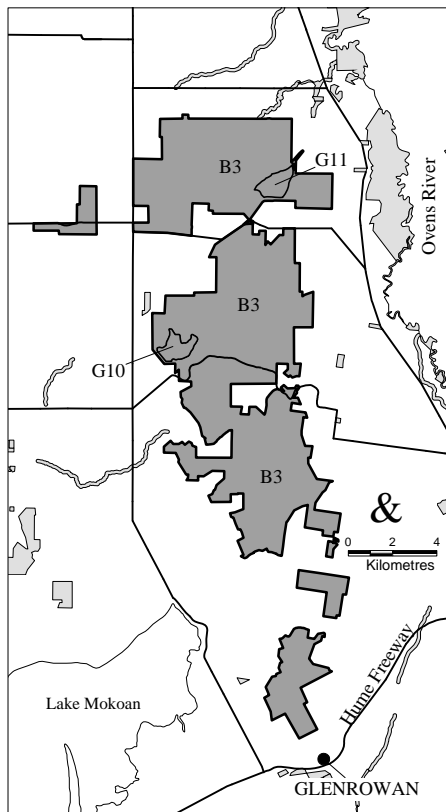
- B2** (a) The Broken–Boosey State Park area of 1 009 ha shown on Map A and Map C be used in accordance with the general recommendations for state parks on page 129;

- (b) metal detecting not be permitted;
- (c) low intensity grazing by domestic stock be permitted at the land manager's discretion, where necessary for biodiversity conservation;
- (d) dogs generally be permitted in the park, subject to the land manager's discretion; and
- (e) the following uses be allowed to continue, through specific agreements where appropriate, at current levels:
 - (i) land owners to retain necessary access through the park to their properties;
 - (ii) stock movement through the park to be permitted where required to access different parts of a property.
 - (iii) continued access to water for domestic and irrigation purposes from the creeks in the park.
 - (iv) changes to access for owners or stock, or changes to water access points to be treated on their merits but approval should not be unreasonably withheld.

Information Sources

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
Mirimbiak Nations Aboriginal Corporation (2000).
Robinson and Mann (1996a).
Robinson and Mann (1996b).

B3 Warby Range State Park



The existing Warby Range State Park protects the impressive landscape, biodiversity, recreation and Aboriginal cultural values of the granite hills immediately north of Glenrowan. The recommended addition of Killawarra forest to the park will add the very significant, and distinctively different, values of the ironbark-dominated forests on the low sedimentary hills to the north. Management primarily for nature conservation will provide secure long-term protection for these values.

Benefits of the park

Biodiversity conservation

The recommended Warby Range State Park would provide protected habitat for a diverse range of plants and animals, including many threatened species, and species at the edge of their geographic range. It would also ensure the long-term maintenance of a substantial habitat corridor of high quality vegetation from the Great Dividing Range to the Murray River.

Recreation and tourism

The expansion of the existing Warby Range State Park would increase the park's popularity by encouraging more visitors to venture into the diverse landscapes of the expanded park.

Diversity of landscapes

The park would incorporate a diversity of landscapes and vegetation types, ranging from the panoramic granite hills of the Warby Range to the undulating Box-Ironbark slopes of Killawarra and Boweya.

Location

The recommended park extends from the steep and rocky granite hills heading north from the Hume Highway at Glenrowan (the existing state park) to the lower and more gentle sandstone hills, as the northern edge of the ranges gives way to the plains of the Riverina.

Warby Range State Park will cover 11 084 ha, encompassing the existing Warby Range State Park (7 600 ha, including 170 ha reference area G10), Killawarra State Forest (2 944 ha, including 141 ha reference area G11), 279 ha education area, and 261 ha Boweya Flora Reserve.

Environmental values

Biodiversity

The recommended park would protect habitat for several threatened plant and animal species, notably narrow goodenia, western silver wattle, northern sandalwood, Dookie Daisy, spur-wing wattle, squirrel glider, turquoise parrot, swift parrot,

painted honeyeater (particularly in Killawarra) and carpet python.

Killawarra forest is of particular importance as one of the few places in Victoria where regent honeyeater has been recorded regularly, including breeding, in recent years. Fifteen other threatened species have been recorded in the area of the recommended park, and Killawarra in particular is well known as an area of high bird species-richness. See Appendix 1 for the conservation status of threatened species.

A high number of reptile species has been recorded in both the existing state park and Killawarra forest, as has an exceptional number of bird species in the existing state park.

Vegetation within the recommended park is of national significance due to its diversity of species and habitats and its outstanding wildflower displays. The park would make a significant contribution to representation of eight EVCs, particularly Alluvial Terraces Herb-rich Woodland/Creepline Grassy Woodland Mosaic, *North-eastern Hills* Box-Ironbark Forest, Valley Grassy Forest, and Grassy Woodland.

Landscape

This recommended park is dominated by a prominent range of high scenic quality, providing spectacular views of the surrounding and distant countryside, including the Australian Alps and the Ovens, King and Murray River valleys. Lower and more gentle hills in the north provide landscape and habitat diversity. Scenic waterfalls can be found in the park when ephemeral streams flow during the wetter months. Another landscape feature of the recommended park is its intactness, being only slightly fragmented.

Heritage

Relics of early European settlement, including a water race and weirs on the 'Taminick Run', are also within the recommended park. Warby Range Fire Tower is of historic significance and should be protected.

Aboriginal interests

The recommended park contains several important Aboriginal sites including rock wells and scar trees. Several of these sites are of high cultural and spiritual significance. Traditional owners proposed that this park be elevated to national park status.

The local Aboriginal community is concerned that Aboriginal sites be protected. They want further surveys conducted prior to implementation in conjunction with traditional owners. The Aboriginal community also seeks a role in the process of authorising tourism, scientific and commercial activities.

An application for a native title determination has been lodged with the National Native Title Tribunal including some of the recommended park area.

Community views

The future management of Killawarra State Forest received much attention in submissions. There was strong support for the proposed addition of this forest to the existing Warby Range State Park. The diversity of habitat that Killawarra State Forest provides, along with the high number of threatened flora and fauna species that it supports, were outlined in submissions as justification for inclusion in the proposed park. The natural diversity of the area, its scenic landscape, threatened species, large size, cultural/historical significance and potential to facilitate and encourage eco-tourism was considered to be worthy of national park classification by many.

Car rally enthusiasts were a source of opposition to the proposed Warby Range State Park. Killawarra State Forest is a popular venue for car rallying events and concern was expressed that this activity would no longer be able to continue.

There were a number of submissions related to fencing timber harvesting and firewood collection and supporting the continuation of these activities in the forest. The view was also put that current management of Killawarra State Forest is satisfactory and should not be changed.

Current and future uses

Apiculture

There are 11 permanent and seven temporary bee sites in the recommended park.

Recreation and tourism

The existing Warby Range State Park is relatively well known, receiving approximately 29 100 visitors per year. In addition, the existing Killawarra State Forest is one of the most popular Box-Ironbark state forests. Most visitors come from nearby Wangaratta. Popular activities include bushwalking, picnicking, sightseeing, cycling, camping, orienteering, nature study and, in Killawarra, car rallying. As with

the Pilot Range (see A1 Chiltern-Pilot National Park), the Killawarra forest is currently an important area for local and other car rally enthusiasts, particularly because it remains drier in winter than other available public land in the district.

The recommended Warby Range State Park will provide increased scope for many of the recreation and tourism activities currently occurring in the existing park, particularly given its close proximity to the regional centres of Wangaratta and Benalla, and the Hume Freeway.

Mining

There are no current mining or exploration licences covering any part of the recommended Warby Range State Park. No new licences would be issued over the recommended park.

Timber harvesting

The net available forest area in the Killawarra forest addition to the Warby Range State Park is 2 102 ha, that is, 1.7% of the total area currently available for timber harvesting.

The main commercial product, currently posts and other fencing materials, will be available from other Box-Ironbark forests to the west, and substitute products. Commercial timber harvesting would not be allowed in the Warby Range State Park, after a six year phase out period (see Recommendation F(i)(i) in Chapter 17).

Approximately 1 000 cubic metres per annum are removed from the existing Killawarra forest as domestic firewood under permit. Some domestic firewood may be produced from the recommended park in the early stages of an ecological management strategy (see Chapter 4).

Domestic firewood collection would not be permitted in the park.

Killawarra State Forest is included as part of the Mid-Murray Forest Management Area. Pending the Government's decision on the ECC's recommendation to include this forest as part of the Warby Range State Park, Killawarra has been included in the proposed forest management plan for this area, zoned primarily as Special Management Zone, with exclusion of timber harvesting in the interim period.

Other uses

Metal detecting is not permitted in the existing Warby Range State Park, and Killawarra forest is of little interest to prospectors. Several small threatened plants and ground-dwelling animals are found in Killawarra forest—including Dookie and narrow-wing daisies, narrow goodenia, and rugose toadlet. Metal detecting would not be permitted in the recommended Warby Range State Park.

Management issues

Pest plants and animals

The existing Warby Range State Park has a medium level of weed infestation, predominantly in the ground layer. A conservation objective, determined within the approved management plan, is to restore ground and shrub layer habitats, particularly those in disturbed boundary areas.

Rabbits are widespread in the park and have a moderate impact on native vegetation. Foxes are known to be present in the park, however their extent and impact is unknown. Other animals, including feral cats and stray cattle, are also of concern.

RECOMMENDATIONS

- B3**
- (a) The Warby Range State Park area of 11 084 ha shown on Map A be used in accordance with the general recommendations for state parks on page 129;
 - (b) metal detecting not be permitted; and
 - (c) car rallying be permitted in Killawarra forest, by arrangement with the land manager.

Information Sources

Context Pty Ltd (1999).

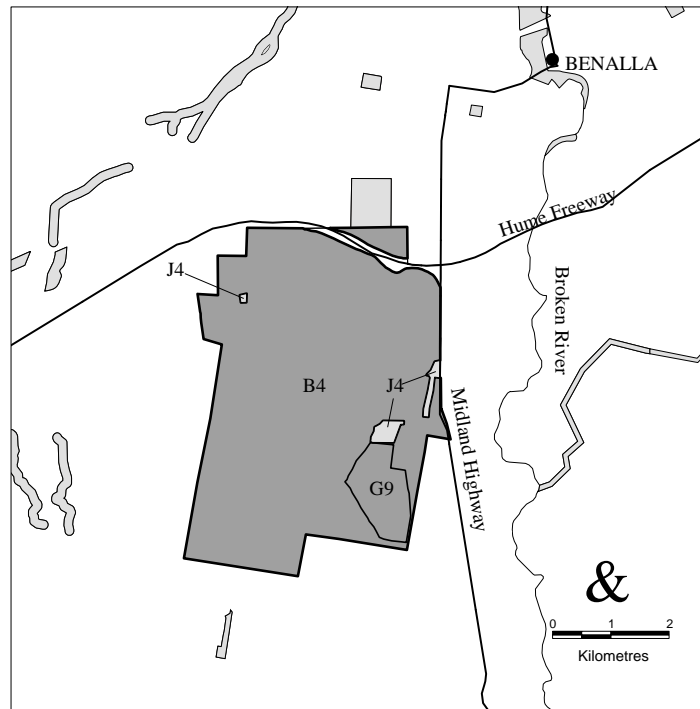
Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Mirimbiak Nations Aboriginal Corporation (2000).

Parks Victoria (1998b).

Parks Victoria (2000).

B4 Reef Hills State Park



Benefits of the park

Biodiversity conservation

The recommended Reef Hills State Park will improve protection of flora and fauna of national significance, with its large number of threatened species and significant vegetation communities.

Recreation and tourism

The park is the only large area of public land close to Benalla, providing local residents with recreation opportunities in a readily accessible natural setting. The change of status is likely to result in increased visitors, as the natural values become more widely known.

Location

Incorporating low hills of sedimentary rock, the park straddles the Hume Freeway about five kilometres south of Benalla.

The recommended Reef Hills State Park covers 2 013 ha; comprising the existing 2 040 ha Reef Hills Regional Park, excluding 27 ha in shooting ranges and immediate environs (see J4), but including the 123 ha now recommended as Reef Hills Reference Area (G9). Most of the existing

safety buffers around the shooting ranges are recommended to be included in the park, with existing restrictions on access maintained by zoning. Currently, Reef Hills Regional Park is scheduled and managed under the *National Parks Act 1975* as 'Reef Hills Park'. Regional parks are usually scheduled and managed under the *Crown Land (Reserves) Act 1978*.

Environmental values

Biodiversity

The area of the recommended park provides habitat for several threatened plant and animal species, notably purple diuris, narrow goodenia, clover glycine, swift parrot, turquoise parrot, regent honeyeater, painted honeyeater, bush stone-curlew, powerful owl, squirrel glider and brush-tailed phascogale.

The park contributes significantly to representation of Alluvial Terraces Herb-rich Woodland/Heathy Dry Forest Mosaic (100% of public land extent of this EVC is in the park), *North-eastern Hills* Box-Ironbark Forest, Heathy Dry Forest, and Plains Grassy Woodland/Gilgai Wetland Mosaic EVCs.

The park includes a 30 ha large old tree site dominated by red box trees.

Aboriginal interests

The recommended park contains several Aboriginal cultural sites and places which need to be properly surveyed prior to implementation, in conjunction with traditional owners.

An application for a native title determination has been lodged with the National Native Title Tribunal including some of the recommended park area.

Community views

The majority of submissions received relating to the proposed Reef Hills State Park expressed support for the proposal. The need to protect the diverse native vegetation and avifauna was a common thread through submissions.

Submissions expressing opposition to the proposed park were almost entirely from car rally enthusiasts, concerned that car rallying events would no longer be able to take place within the park.

Current and future uses

Apiculture

There are four bee sites distributed through the park area.

Mining

One current exploration licence overlaps a small area in the north-west corner of the recommended park. Because the existing regional park is listed on Schedule 3 of the *National Parks Act 1975*, applications for mining or exploration would currently be subject to Section 40 of that Act (see Chapter 7 for further explanation). No new licences would be issued within the park.

Domestic firewood collection

There has been no systematic domestic firewood collection in the existing Reef Hills Regional Park for several years.

Some domestic firewood may be produced from the recommended park in the early stages of an ecological management strategy (see Recommendation R12 and Chapter 4); otherwise domestic firewood collection would not be allowed.

Recreation and tourism

The existing Reef Hills Regional Park is used mostly by Benalla residents for activities such as bushwalking, picnicking, trail bike riding, nature study and camping. Approximately 14 400 visitors use this area each year. The shooting ranges are regularly used, particularly on weekends.

The Reef Hills State Park would provide increased scope for these and other activities, particularly given its proximity to Benalla and the Hume Freeway.

Due to its relatively small size and the availability of alternative areas, car rallies would not be permitted in the recommended park.

Prospecting

The area of the recommended park is of relatively little interest to prospectors. Metal detecting may be allowed in designated zones in the park, in accordance with the general recommendations for state parks.

Management issues

Kangaroo grazing

The existing and potential impact of kangaroo grazing on the natural values in the park requires assessment, monitoring and, if necessary, a program to prevent or reverse any adverse impacts.

Landscape fragmentation

This park is identified as being highly fragmented and is only partly linked to surrounding native vegetation. Management of the park should therefore incorporate measures to reduce internal fragmentation where possible, including rationalisation of the road network and appropriate infrastructure to manage visitor use.

RECOMMENDATIONS

- B4** (a) The Reef Hills State Park area of 2 013 ha shown on Map A be used in accordance with the general recommendations for state parks on page 129; and
- (b) should the current use as shooting ranges of any of the three adjacent areas lapse, they be rehabilitated and added to the park.

Information Sources

CFL (1987).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Mirimbiak Nations Aboriginal Corporation (2000).

Parks Victoria (2000).

B5 Paddys Ranges State Park

The recommended Paddys Ranges State Park covers 1 954 ha; comprising the existing 1 675 ha Paddys Ranges State Park and 279 ha of the adjacent Paddys Ranges State Forest.

Paddys Ranges State Park is well known for its striking wildflower displays and diverse avifauna (over 100 species recorded). The park provides habitat for several threatened species, notably swift parrot (several key sites), painted honeyeater, crimson spider-orchid, and brush-tailed phascogale.

The recommended addition to the existing Paddys Ranges State Park is an important key site for the swift parrot. It is also important for representation of good examples of *Western Goldfields* Box-Ironbark floristic community, and several historic mining sites have been identified in the park. The recommended addition is within an exploration licence.

The existing state park, located close to Maryborough, is a popular destination for walking, bird watching, prospecting, sightseeing, car touring and camping, receiving approximately 5 580 visitors annually.

The park has natural heritage, Aboriginal heritage, mine sites, a eucalyptus still, pioneer graves, a quartz mountain and early buildings. Its recorded natural, historic, social and aesthetic community heritage values make it attractive for both tourism and heritage protection.

The net available forest area covered by the recommended addition to Paddys Ranges State Park is about 200 ha, which is 0.2% of the total area currently available for timber harvesting.

Extensive areas of state forest are generally available for timber harvesting in surrounding areas. Commercial timber harvesting would not be permitted in the recommended park.

The existing park is highly fragmented but is, however, substantially connected to native vegetation in the surrounding state forest. Measures should be put in place, including the rationalisation of the road network, where possible, and the rehabilitation of unrequired roads, to reduce the level of fragmentation.

Community views

Submissions received in relation to the proposed Paddys Ranges State Park were largely requesting that greater protection be given to the area. In particular, there were various calls to increase the size of the proposed park by incorporating adjoining areas of state forest to the south and west of the existing park, on the basis that these areas are of high conservation value and contain various heritage sites of significance.

Several submissions also called for the proposed Paddys Ranges State Park to be upgraded to national park status. In addition to providing greater protection for the area's biodiversity values, it was claimed that national park status would increase awareness of the region, resulting in higher visitor rates.

There were a limited number of submissions from prospectors and firewood collectors who were concerned at loss of access of any areas.

RECOMMENDATIONS

B5 The Paddys Ranges State Park area of 1 954 ha shown on Map A be used in accordance with the general recommendations for state parks on page 129.

Information Sources

Context Pty Ltd (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Parks Victoria (1997a).

Parks Victoria (2000).

NHP National heritage park

National heritage park is a recommended new public land category created principally to recognise and protect outstanding cultural landscapes. Cultural landscapes are those areas where major cultural themes are best represented by virtue of the number, significance and diversity of sites and relics which they preserve, in surroundings essentially intact from the period they represent. National heritage park status would see these areas set aside primarily to conserve their outstanding cultural landscapes, and secondarily to conserve their natural values.

From the start of the Box-Ironbark investigation the ECC has been keen to minimise confusion by working within the existing widely accepted and understood system of public land use categories in Victoria. In some cases, this approach has required some broadening of the usual provisions in some existing categories to provide for local requirements in various parts of the study area. In one case however, the area now recommended as Castlemaine Diggings National Heritage Park, the problem of finding a satisfactory option within the established list of public land use categories has proven intractable.

The ECC's Draft Report proposal for a regional park at Castlemaine drew considerable criticism, particularly from the Castlemaine area. The essential view was that regional park status implied only local significance, with an emphasis on recreation, and failed to emphasise what is really an extraordinarily significant area in the context of the development of modern Australia (see the description of the recommended park which follows). The same problem is also apparent in the historic park category, essentially a variation within the regional park category.

The significance of the Castlemaine Diggings is predominantly historical, but is of a considerably higher order than most other historic parks in Victoria. Existing historic parks are characterised by aggregations of cultural sites and relics, as opposed to cultural landscapes. In addition, recognition and protection of natural and other values is generally peripheral in historic parks.

At the other end of the scale, the primary purpose of national and state parks is the recognition and protection of natural values and, as significant as they are, the natural values of Castlemaine area are not of the order, nor cover the range, which these categories warrant. What is required essentially is a category, similar to national park, for cultural values, and with the scope for appropriate recognition and protection of natural and other values of moderate to high significance.

Role of national heritage park

Accordingly, the ECC envisages national heritage park as a category which primarily brings high levels of recognition and protection to cultural values, especially landscapes, of exceptional quality. Protection will also be provided for other environmental values, especially natural values.

As a result, harvesting of forest products and grazing by domestic stock would generally not be permitted, and new surface mining and exploration would require approval under Section 40 of the *National Parks Act 1975*. National heritage park should be added to the list of public land categories specified as 'restricted' Crown land in the *Mineral Resources Development Act 1990*.

Otherwise, the large number of other activities enjoyed in Box-Ironbark forests would be generally permitted. However, careful zoning and constraints on some activities would be required in key areas, particularly the most significant, sensitive and popular landscapes. Indeed, not only do these sites require protection from disturbance, but pro-active management will be required to restore sites or prevent them deteriorating as a result of exposure to the elements or to human activities.

In addition, one of the most important requirements of national heritage park status is heightened recognition, including promotion (where appropriate), of the cultural heritage it protects. Again, careful planning is required to ensure that this does not compromise the conservation of that heritage.

GENERAL RECOMMENDATIONS FOR NATIONAL HERITAGE PARK

NHP The national heritage park shown on Map A (numbered NHP1) be used to:

- (a) (i) protect the cultural landscapes of the alluvial diggings and quartz mining era and associated settlements, and
- (ii) protect individual relics, sites and places of historical significance;
- (b) protect Aboriginal cultural sites and places;
- (c) conserve and protect biodiversity and natural processes and protect natural landscapes;
- (d) provide opportunities for education, recreation and tourism associated with the enjoyment and understanding of cultural heritage and natural environments;

the following activities generally be permitted:

- (e) bushwalking, car touring, mountain and trail bike riding on formed roads, picnicking and camping;
- (f) nature observation, bird watching and visiting historic features;
- (g) orienteering and rogaining;
- (h) research, subject to permit;
- (i) metal detecting (prospecting) in designated zones defined in a park management plan;
- (j) apiculture on licensed sites, subject to the outcome of research into the ecological impacts of this industry and park management requirements;
- (k) organised car rallies, subject to permit and park management zoning;

and:

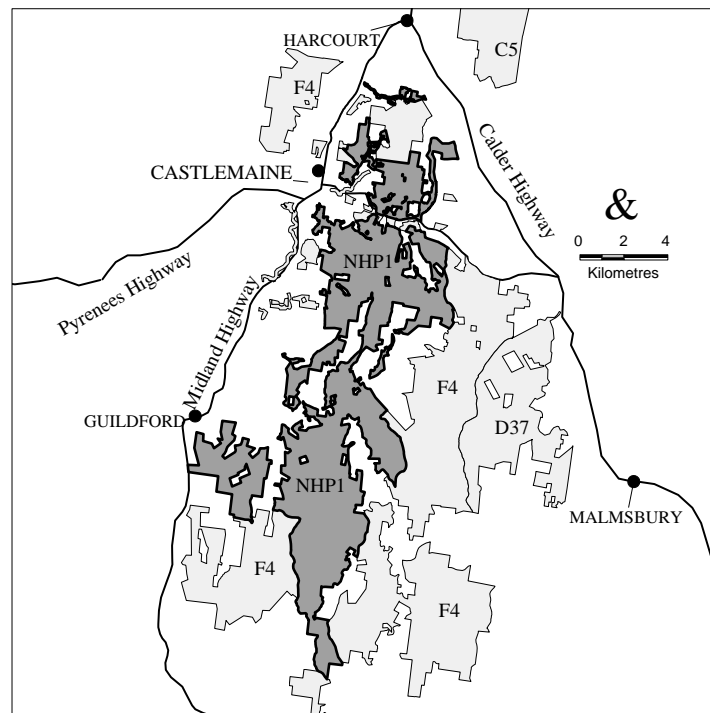
- (l) in accordance with the ecological management strategy recommended in Recommendation R12 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
- (m) (i) exploration and mining be permitted in accordance with the provisions which apply to land on Schedule 4 of the *National Parks Act 1975*, and provisions for restricted Crown land under the *Mineral Resources Development Act 1990*, and
- (ii) exploration and mining operations within existing licences, continue as per the conditions of approval for those licences until they lapse;
- (n) harvesting of timber products and eucalyptus oil, grazing by domestic stock, hunting and the use or carrying of firearms not be permitted;

and:

- (o) the national heritage park be included on Schedule 4 of the *National Parks Act 1975*, and managed by the Department of Natural Resources and Environment; and
- (p) national heritage park be added to the *Mineral Resources Development Act 1990* as a category of restricted Crown land.

Note: Should ecological management (recommendation (l), above) require removal of wood from parks, that wood may be sold.

NHP1 Castlemaine Diggings National Heritage Park



The Victorian goldfields were the cradle of modern Australia, radically reshaping the nation's destiny in the course of a dramatic few decades in the mid 19th century. In many areas though, notably Bendigo and Ballarat, the wealth generated on the goldfields was spent on the spot, building cities and towns which largely obliterated the goldfields themselves. However, the Castlemaine diggings are significant at an Australian scale, in the extent to which their goldfields landscapes have been preserved—that is, the importance of the Castlemaine diggings is not just in the considerable significance of the individual relics and sites themselves but in the cultural landscapes formed where large numbers of sites and relics persist in their original settings and demonstrate a range of cultural themes over several phases of human occupation.

Benefits of the park

Heritage protection

The suite of Aboriginal and gold era sites and relics are compellingly evocative of the area's absorbing history. The recommended Castlemaine Diggings National Heritage Park would protect these sites in this unique landscape and thereby highlight their significance.

As a result, the recommended park would become increasingly popular with 'heritage tourists', attracted by the preeminent suite of significant goldfields era cultural landscapes and sites. The features in the recommended park complement the attractions which are currently promoted in Castlemaine, and provide the opportunity for significant growth in the already substantial local tourism industry.

Biodiversity conservation

The recommended park will protect ten threatened or near-threatened species and their habitat, including the nationally threatened swift parrot, powerful owl, crimson spider-orchid and Fryerstown grevillea. It also contains some of the steepest and least accessible country in the study area, affording protection to a moderate-sized area of large old tree sites.

Recreation and tourism

The recommended Castlemaine Diggings National Heritage Park would be popular with 'heritage tourists', with its unique array of significant sites and landscapes, walking and driving trails, interpretation and guidebook. The 'Diggings Heritage Project' based around Castlemaine and Maldon could develop a single tourism package for the region.

There are a range of features in the area, including Expedition Pass Reservoir, habitat for threatened species, birdwatching, wildflower displays, bush walks, scenic Kalimna Park, the popular Vaughan Mineral Springs reserve and views from several vantage points. These make a major contribution to the overall range of features which would help to further increase the already substantial number of tourists visiting Mt Alexander Shire.

Location

The recommended park covers a total area of 7 442 ha. It comprises the existing Castlemaine–Chewton Historic Area (3 511 ha), 2 744 ha of state forest and uncommitted land near Castlemaine, Guildford and Upper Loddon, Upper Loddon Flora Reserve (820 ha), Vaughan Mineral Springs Reserve (83 ha), Expedition Pass, Crocodile and Golden Point Reservoirs and Water Production Areas (46 ha total), Faraday Education Area (42 ha), and 196 ha of various other public land units. The recommended park would be reserved to a depth of 100 metres below the surface.

Environmental values

Heritage

The recommended park contains numerous highly significant mining sites:

- Specimen Gully, where one of the earliest recorded Victorian gold occurrences was found in July 1851;
- Garfield–Sailors Gully network, with the Garfield waterwheel abutments and Golden Point water race;
- Eureka–Poverty Gully network, around The Monk; the Spring Gully group;
- Red Hill–Loddon water race group;
- Butchers Gully and Sailors Gully–Tubal Caine groups, Vaughan;
- Settlement site at Trapps or Sailors Gully, Chewton, is of significance as a cultural landscape, and as an archaeological area reflecting gold mining and settlement in the Forrest Creek Diggings in the mid-19th century;
- parts of the Golden Gully group, Mosquito Company, Cattles Reef whim shaft, and Perseverance Company sites at Fryerstown; and

- mining era cemeteries at Deadmans Gully, Golden Point; Cemetery Reef Gully, Chewton; Pennyweight Flat, Castlemaine; Deadmans Gully, Fryerstown; and Vaughan Chinese Cemetery.

The important Major Mitchell campsite cairn, Expedition Pass and Golden Point Reservoirs, Crocodile Reservoir, the Welsh Village, and other settlement sites associated with mining are also included. The significant Wattle Gully group at Chewton, mined on and off since the gold rushes, is included in the recommended park.

Vaughan Springs has recorded community heritage values. It is socially significant to the wider community. It is a traditional picnic area with a swimming hole and springs where water can be gathered. It has significant landscape values and the high headwaters constitute an important natural feature. Historically there were Chinese market gardens in the area as well as gold mining.

Biodiversity

The recommended park supports four threatened fauna species: swift parrot, grey-crowned babbler, brush-tailed phascogale and painted honeyeater.

There are six threatened flora species: sharp midge-orchid, crimson spider-orchid, veined spider-orchid, purple eyebright, lanky buttons and Fryerstown grevillea.

Large old tree sites

The recommended park contains two large old tree sites and part of a third totalling 340 ha in area.

Aboriginal interests

There are several Aboriginal sites and places in the park area which are of significant spiritual and cultural importance. The DjaDjaWurung people have a strong continuing relationship with the land in this area.

Aboriginal groups are concerned about the increased risk of impact on cultural and environmental values. Care should be taken to ensure that no damage occurs to these sites. Aboriginal groups believe this area should be more thoroughly surveyed prior to implementation.

The Aboriginal community also seeks a role in the process of authorising tourism, scientific and commercial activities.

Community views

A large number of submissions mentioned the Castlemaine area specifically and the interest of local people in their public lands is particularly high in this part of the study area. While acknowledging the proposed Castlemaine Regional Park as a step in the right direction, nearly all of these submissions expressed disappointment at its size and the status and level of protection it would afford, which were roundly criticised as inadequate for the area's significant values. In particular, many felt that regional park status carried the implication that the area held limited significance or interest for people from outside the region. As well as being inaccurate, it was felt that this perception would undermine the recent and ongoing efforts of the local community to promote the outstanding cultural heritage values of the area. This promotion varies from initiatives to increase recognition at the regional, state, national and even international levels, so that significant values are studied and more securely protected, to more tourist-specific promotion (e.g. as part of the Mt Alexander Diggings project) which link with other attractions in the area to establish Castlemaine as a premier destination for heritage tourists.

The most common local proposal was to upgrade the proposed regional park to national park, with many people nominating all or parts of a large area of public land extending as far as the existing Mt Alexander Regional Park and Maldon Historic Reserve as potential additions. Of these areas, support was strongest for the addition of the Guildford forest–Tarilta Gorge area.

There were a limited number of submissions in opposition to the park. These mainly related to the possibility of restrictions on prospecting in some areas and the removal of domestic firewood collection from the park.

Current and future uses

Apiculture

There are 8 permanent and 17 temporary bee sites in the recommended park area.

Prospecting

The recommended park is of moderate interest to prospectors, mostly in the old alluvial mining areas closer to Castlemaine and Chewton.

It is recommended that metal detecting be permitted in designated zones in the recommended

Castlemaine Diggings National Heritage Park. These zones would be located to avoid significant park values, for example, significant sensitive cultural heritage features and habitats of threatened small ground-dwelling animals and plants which may be damaged as a result of prospecting. These zones should be developed as part of the standard management plan process, in consultation with PMAV. Careful management of prospecting is an ongoing requirement to ensure environmental and cultural values, including Aboriginal sites and places, are not degraded or damaged.

Mining

Two tourist mining authorities, two mining licences, and two work authorities occur at least partly within the areas of the recommended park. These include the Wattle Gully mine at Chewton, now operating as a tourist mine, within the existing historic area. Duketon Goldfields NL operates a carbon-in-pulp treatment plant here, and is continuing to explore the area. Collectively, several exploration licences cover nearly all the recommended park.

The various mining licences, exploration licences and work authorities currently covering the recommended park would be renewable subject to Government approval. Any future new licences or mining operations in the park would be subject to Government decision and in accordance with existing provisions in the *National Parks Act 1975*.

Because the recommended park would only be reserved to a depth of 100 metres, mining below this depth would be outside the recommended park and the standard provisions applying to exploration and mining on unrestricted Crown land would apply to any future underground mining below this depth.

Mining under the recommended park may require surface infrastructure such as air shafts and vents within the reserved area. Such infrastructure should be kept to a minimum, but not unreasonably excluded from the recommended park.

Timber harvesting

The net available productive forest area of durable species covered by the recommended Castlemaine Diggings National Heritage Park is about 450 ha. This is 0.4% of the total area currently available for timber harvesting. The former historic area (3 590 ha) currently provides for limited post and some firewood production, but it was not included in productive forest area calculations.

Commercial timber harvesting would not be permitted in the recommended park. The Fryers, Upper Loddon and Muckleford Forests remain available for timber production.

Approximately 300 cubic metres of fallen timber per annum are currently removed for domestic firewood. Domestic firewood collection would not

be permitted in future. Some domestic firewood may be produced from the proposed park as a by-product of ecological thinning (see Chapter 4). Locally, opportunities for domestic firewood collection remain in Fryers, Upper Loddon and Muckleford State Forests.

RECOMMENDATIONS

- NHP1(a)** The Castlemaine Diggings National Heritage Park area of 7 442 ha shown on Map A be used in accordance with the general recommendations for national heritage park on page 146; and
- (b) the park be reserved to a depth of 100 metres only below the surface.

Note: Ground more than 100 metres below the surface would be outside the recommended Castlemaine Diggings National Heritage Park. The administrative arrangements for any future exploration or mining in these areas would be the same as those which apply generally to unrestricted Crown land. Exploration or mining in these areas may intrude into the recommended national heritage park, only in accordance with general recommendations (m)(i) and (ii) on page 146. However, the location within the recommended national heritage park of minor infrastructure associated with underground mining, notably air shafts and vents, should not be unreasonably denied. At the same time intrusion of such infrastructure should be minimised.

Information Sources

- Bannear (1993b).
Butler (1997).
Context Pty Ltd (1999).
Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
Holland and Cheers (1999).
Mirimbiak Nations Aboriginal Corporation (2000).
Soderquist and Rowley (1995).
Willman (1995).

Some of these public land areas were not considered by the Land Conservation Council in previous investigations, as they were in cities or towns, and therefore excluded from consideration under the relevant legislation.

GENERAL RECOMMENDATIONS FOR REGIONAL PARKS

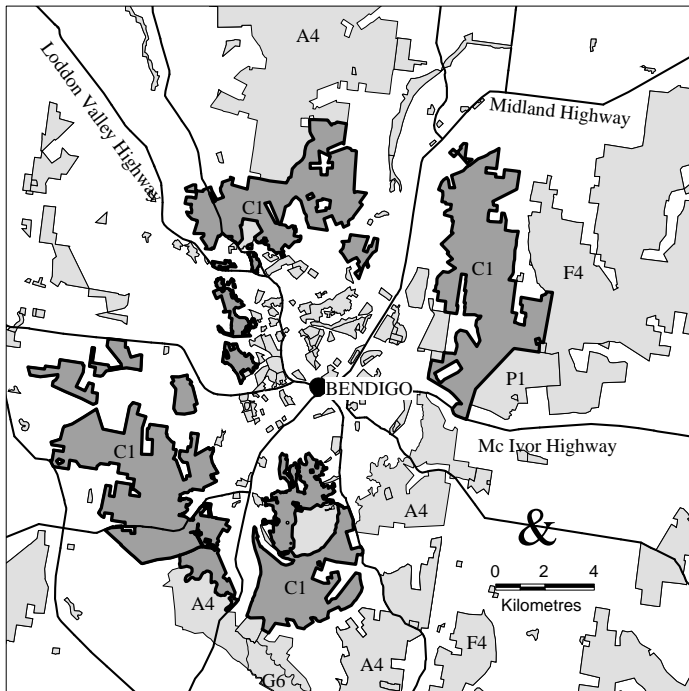
C Regional parks shown on Map A (numbered C2 to C7):

- (a) be used:
 - (i) for informal recreation associated with the enjoyment of natural surroundings by large numbers of people;
 - (ii) to conserve biodiversity and natural features; and
 - (iii) to protect significant historic sites and Aboriginal cultural sites and places;
 - (b) the following activities generally be permitted
 - (i) bushwalking, car touring, picnicking and camping;
 - (ii) nature observation, bird watching and visiting historic features;
 - (iii) orienteering and rogaining;
 - (iv) horse, mountain and trail bike riding on formed roads only;
 - (v) research, subject to permit;
 - (vi) exploration and mining, subject to the approval of the Minister for Environment and Conservation
 - (vii) apiculture on licensed sites, where consistent with the primary uses above and park management requirements;
 - (viii) recreational prospecting and gemstone-seeking, where consistent with the primary uses above and park management requirements, but not where they would disturb protected archaeological relics;
 - (ix) other recreational activities in accordance with a management plan;
- and:
- (c) timber harvesting, grazing and car rallies not be permitted;
 - (d) these parks be subject to management plans to protect biodiversity and significant features;
 - (e) in accordance with the ecological management strategy recommended in Recommendation R12 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
 - (f) unused road reserves be added to adjoining parks where appropriate;
- and:
- (g) regional parks be permanently reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment, except where otherwise specified.

Notes: 1. Should ecological management (recommendation (e) above) require removal of wood from parks, that wood may be sold.
2. Implementation of recommendations and land management should allow flexibility for minor boundary adjustments.

C1 Bendigo Regional Park

An enlargement of the Bendigo area, showing recommendations around the city including this recommended regional park and the recommended Greater Bendigo National Park, is provided as Map D of this report.



The residents of Bendigo are fortunate to live in a large modern rural city that is surrounded closely on all sides by extensive Box–Ironbark forests. The recommended regional park, together with the recommended Greater Bendigo National Park (see A4), would make Bendigo a ‘city within a park’. This location has large areas of indigenous vegetation, which provides a key part of the visitor experience, for example seasonal wildflower displays. The area also contains Aboriginal cultural values and many historic features and associations with gold mining.

Benefits of the park

Biodiversity conservation

The recommended Bendigo Regional Park is an area of high flora and fauna conservation values. It would protect populations of the pink-tailed worm-lizard which is nationally endangered. It would also protect habitat for 15 other threatened flora and fauna species.

Recreation and tourism

The park would be managed in conjunction with the recommended Greater Bendigo National Park, although different provisions would apply for particular uses. These parks would stimulate awareness and appreciation of the diverse range of features offered by bushland in and around Bendigo. Parts of the recommended regional park are already popular with locals for activities such as bushwalking, horse riding, nature observation, cycling and picnicking. It includes much of the established Bendigo Bushland Trail.

Increasingly, the park would be expected to become popular with ‘heritage tourists’ due to its array of significant sites, many of which are linked by trails and roads that allow easy access. Wildflower displays and the opportunity to enjoy passive recreational activities in a natural setting would also attract tourists.

Location

The park, along with the recommended Greater Bendigo National Park, surround Bendigo effectively creating a ‘city within a park’. It incorporates many parcels of public land for which coordinated management is a high priority.

The recommended park covers 8 745 ha—comprising the existing Eaglehawk Regional Park (833 ha); Whipstick uncommitted land (823 ha); parts of the existing Wellsford, Mandurang, and Marong State Forests (2 616 ha, 1 100 ha, and 2 200 ha respectively); Diamond Hill Historic Reserve (450 ha); part of Crusoe-Big Hill Water Production area (230 ha) and several nature conservation reserves, bushland reserves, township and other small parcels (493 ha total). Commonwealth land at Longlea (see P1 page 98) abuts the eastern boundary.

Environmental values

Biodiversity

The recommended park and immediately adjoining public land support pink-tailed worm-lizard (part of the only known Victorian population), populations of several threatened species, including key sites for swift parrot and brush-tailed phascogale, two sites of botanical significance for Williamson's and Ausfeld's wattle, sweet quandong and cane spear-grass, and several fauna refuges.

The recommended park would contribute significantly to representation of Alluvial Terraces Herb-rich Woodland, and Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic EVCs.

Sections of forest within the recommended park contain a remarkable diversity of plant species, particularly within the understorey. In Winter and Spring these plants provide an impressive wildflower display.

Heritage

The recommended park contains:

- features of old mines such as the Moon and New Moon groups, Lightning Hill group, Virginia Hill group, and Prince of Wales group around Eaglehawk;
- New Carshalton Co. and Spargoes Pyrites Works in West Bendigo;
- Diamond Hill Historic Reserve contains numerous old shafts, mullock heaps, footings of crushing plants, tailings, sluice sites, old shelters and other features. It also contains the Glasgow and Golconda group mine sites;
- features of the Coliban Water Supply System especially at the Crusoe and No. 7 Reservoirs; and
- the Mandurang and Wellsford forests have been recorded as having social and aesthetic community heritage values.

Aboriginal interests

There are several Aboriginal sites and places in this recommended park. The local Aboriginal people have a strong continuing relationship with the land in this area. The protection of any Aboriginal cultural sites and places is the main priority for traditional owners.

The local Aboriginal community was supportive of the ECC's general recommendations for regional parks; however, they made some specific comments in relation to some permitted uses. For example, many believe that tourism operators and prospectors should undertake cross-cultural training to ensure they show respect for, and understand the procedures to follow when locating Aboriginal sites and places.

The need for adequate surveys and systematic assessment of Aboriginal cultural sites and places, in conjunction with traditional owners, in parks and reserves is a priority in this area. Traditional owners seek a role in the process of authorising tourism, scientific and commercial activities.

The local Aboriginal community has a good working relationship with mining companies in the area.

Community views

Strong local support for establishment of a Greater Bendigo National Park, comprising most or all of the public land around Bendigo, was evident at public consultative meetings and in submissions received following the release of the Draft Report. Support for the regional park as proposed, or for the public lands close to Bendigo was also evident. There was strong support for continued opportunities for a wide range of local recreation uses, including activities more appropriate for a regional park adjoining a large city, than a national park.

The mining industry is keen to maintain access to the most prospective areas for gold exploration, production and associated infrastructure, especially goldfields that historically have been some of the richest in the world.

Current and future uses

The recommended park embraces public land close to Bendigo, which is popular for a wide range of recreational activities, including some that reflect its near urban setting. The recommended Greater Bendigo National Park (A4) includes areas generally further from the central city with an array of significant biodiversity values, and which is less intensively used for recreation.

The ECC considers this recommended regional park to be ideally located to meet the demands of the Bendigo community and to provide a buffer for the surrounding recommended Greater Bendigo National Park. The recommended regional park itself does not warrant national park status,

although it would also provide protection for natural values. Firewood harvesting would no longer be permitted, however surrounding state forests, such as Wellsford, remain available for both firewood and other timber harvesting. Opportunities for organised pest control shoots may arise at the discretion of the land manager.

Apiculture

There are 8 permanent and 16 temporary bee sites distributed through the recommended park.

Mining

Historically, the Bendigo goldfields were some of the richest in the world, from the great gold rush of the 1850s through to the second half of the 20th century. The area is still highly prospective for gold and consequently there are four mining licences within the area of the recommended regional park. In particular, Bendigo Mining NL holds mining and exploration licences across much of the Bendigo area including parts of the park, and has the potential to become a significant gold producer in Victoria. The Carshalton Portal to its underground mine, and the New Moon site are recommended as earth resources areas adjoining the park. Four other exploration licences cover much of the remaining park area.

Mining and exploration would be permitted in the recommended park, subject to the approval of the Minister for Environment and Conservation, and in accordance with recommendations in Chapter 7, and the *Mineral Resources Development Act 1990*.

Underground mining requires surface infrastructure. Sites for substantial infrastructure may be required for the production stage of mining. This would require separate approval from the government. The principles and guidelines in Chapter 7 should also apply. Sites for minor infrastructure such as air shafts and vents may be located in the park if necessary, but its intrusion should be minimised.

Extractive industries

There are two extractive industry work authorities within the recommended park. The existing work authorities would continue and new extractive industries may be permitted, subject to the approval of the Minister for Environment and Conservation and in accordance with recommendations in Chapter 7, and the *Extractive Industries Development Act 1995*.

Prospecting

Parts of the recommended park, notably the Eaglehawk Regional Park and Marong State Forest, are of moderate to high interest for prospectors.

Recreation and tourism

Abundant natural and historical values close to Bendigo provide outstanding recreational opportunities. Popular activities include use of the Bendigo Bushland Trail, nature study, bushwalking, orienteering, prospecting, gemstone-seeking, picnicking, bicycle riding, horse riding (on formed roads) and walking dogs.

Heritage-based tourism would be expected to become increasingly popular with the establishment of the recommended park.

Timber harvesting

The net current state forest area covered by the recommended park is 5 340 ha. This is 4.2% of the total area currently available for timber harvesting.

Commercial timber harvesting would not be permitted in the recommended park. However, extensive areas of state forest nearby (F4) remain available for timber harvesting (see Chapter 17).

Domestic firewood collection would not be permitted in the recommended park. Firewood permits are currently issued for the collection of fallen timber from parts of the recommended park, particularly in the Wellsford State Forest.

For local residents, opportunities for domestic firewood collection would remain in the adjacent state forest. Some domestic firewood may also be produced from the park as a by-product of thinning for ecological management (see Chapter 4).

Water production

Spring Gully Reservoir catchment, designated for water production, adjoins the recommended park, and contributes valuable habitat to complement the park, but will continue to be unavailable for public access.

Coliban Water is currently reviewing its system through the 'Aqua 2000' project, and the management of any dams not required in future. Crusoe and Number 7 Reservoirs may not be required. Crusoe in particular has high potential for passive water-based recreation. Crusoe Reservoir and its immediate surrounds could be managed separately from the recommended regional park as a community recreation and tourism focus point, and

the City of Greater Bendigo has expressed interest in such use and managing this area.

Crusoe and Number 7 Reservoirs also have significant historical features associated with outlets, spillways and early water treatment works, which should be protected. Measures to ensure safety of these dam walls should aim at maintaining the highest practical safe water level.

Management issues

As with other areas to be managed as parks or reserves close to towns, this recommended park would have several management needs, such as interpretative signs and establishment of appropriate facilities at suitable sites, track

management and control of a minor rubbish dumping problem.

A proposal to extend Bendigo Airport north-south runway to the south is under consideration. The runway and its associated safety area would affect the recommended park. If this proceeds the affected areas should be excised from the park and designated 'services and utilities area'.

The Aboriginal community expressed a desire to be more involved in park management, the location and protection of Aboriginal cultural sites and places, and any interpretation developed as a result. Consultation with traditional owners and participation in public land and water management are encouraged by the ECC (see Chapter 5).

RECOMMENDATIONS

C1 The 8 745 ha Bendigo Regional Park shown on Map A:

- (a) be used to:
 - (i) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments and heritage features;
 - (ii) provide for appropriate recreation facilities;
 - (iii) conserve and protect biodiversity and natural features;
 - (iv) protect significant historic sites and Aboriginal cultural sites and places;
- (b) generally permit the following activities:
 - (i) bushwalking, picnicking and camping;
 - (ii) car touring, trail bike riding and horse riding on formed roads;
 - (iii) nature observation, bird watching and visiting historic features;
 - (iv) orienteering and rogaining;
 - (v) other recreational activities in accordance with a management plan;
 - (vi) exploration and mining, subject to the approval of the Minister for Environment and Conservation (see Note 1);
 - (vii) metal detecting (prospecting), except in designated zones defined in a park management plan;
 - (viii) apiculture on traditionally licensed sites, subject to park management requirements;
 - (ix) walking dogs on leads; and
 - (x) research, subject to permit;

and:

- (c) in accordance with the ecological management strategy recommended in Recommendation R12 in (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
- (d) harvesting of forest products, grazing by domestic stock, hunting and the use or carrying of firearms, and car rallies not be permitted; and
- (e) subject to the 'Aqua 2000' project confirming Crusoe and No. 7 Reservoirs are not required for future water supply purposes, and completion of associated works, these reservoirs and their surrounds be managed as a community recreation and tourism focal point (see Notes 2 & 3).
- (f) the park be permanently reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment. (see Note 4)

continued next page

continued from previous page

- Notes:
1. Underground mining requires infrastructure for the production stage. Location of substantial infrastructure in the park would require separate approval from the government. The principles and guidelines in Chapter 7 should apply. Minor surface infrastructure such as air shafts and vents may also be required. Sites for such infrastructure may be located in the park if necessary, however its intrusion should be minimised.
 2. Certain public land areas now managed by Coliban Water are to be transferred to NRE under these recommendations. Coliban Water should continue to manage storages and channels in the park associated with the supply of water to Bendigo and surrounding towns. In particular: 20 m wide easements/reserves are located along the Spring Gully and Specimen Hill channels, and a short section of the Main Coliban Channel; a 50 m wide easement/reserve lies along the Sandhurst access road and pipelines; and appropriate easements/reserves adjoin the Sandhurst Pipeline, Eppalock Pipeline and other Coliban Water channels and pipelines providing domestic water supply. The park managers and Coliban Water should jointly prepare a management plan for areas with water supply infrastructure, as appropriate.
 3. On completion of the 'Aqua 2000' project, measures to ensure the safety of Crusoe and No. 7 Reservoirs should aim to maintain the highest practical safe water level, and protect historic features.
 4. The area around Crusoe and Number 7 Reservoirs could be separately managed by the City of Greater Bendigo as committee of management, if appropriate.
 5. Part of the park south of Bendigo Airport is under consideration for a runway extension and an associated safety area. If this proceeds, the affected area should be excised from the park and designated services and utilities area, and an isolated area of forest south-west of the rifle range managed as a natural features reserve – bushland area. Alternative public access to the park should be ensured in this location.

Information Sources

Bannear (1993a).

Context Pty Ltd (1999).

CFL (1989b).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Davies (1992).

Davies and Riley (1993).

Mirimbiak Nations Aboriginal Corporation (2000).

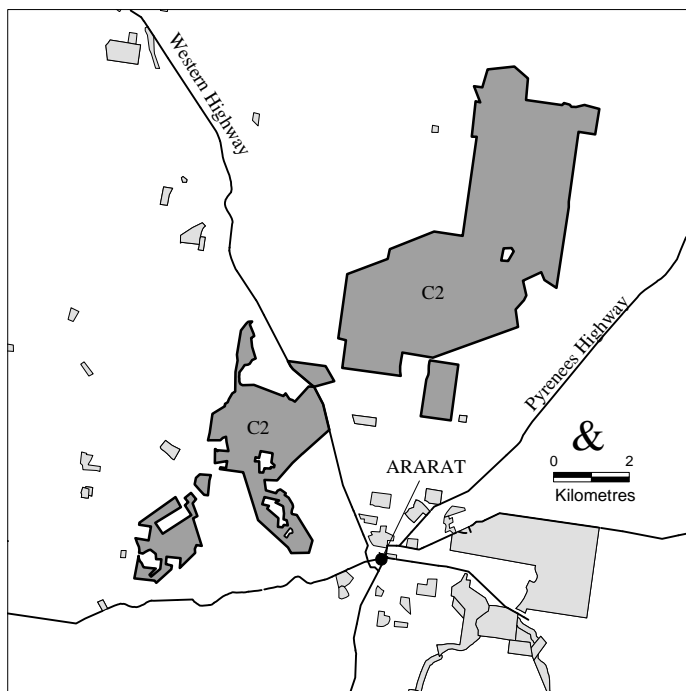
National Parks Service (1996a).

Scientific Advisory Committee, Flora and Fauna Guarantee (1996).

Stone (1996a).

Stone (1996b).

C2 Ararat Regional Park



The recommended Ararat Regional Park has both recreational potential and environmental significance. It provides scenic views as it lies on a low ridge of the Great Dividing Range and offers opportunities for local recreation such as picnics, bird watching, wildflower viewing and half day walks. The recommended park also supports the threatened powerful owl.

Benefits of the park

Biodiversity conservation

The recommended Ararat Regional Park would protect large old tree sites, two threatened species and areas of two threatened EVCs.

Recreation and tourism

The park would provide opportunities for driving, walking, nature observation and picnicking. Several scenic view points overlook both forested and rural settings.

Location

The recommended Ararat Regional Park covers 3 671 ha—comprising the existing Ararat Hills Regional Park (1 000 ha) north-west of Ararat, plus Dunneworthy State Forest (2 550 ha), and uncommitted Crown land (121 ha) to the north of Ararat.

Environmental values

Biodiversity

The park would contribute significantly to representation of four EVCs, notably Grassy Woodland, and Alluvial Terraces Herb-rich Woodland (the largest patch in the study area).

At least two threatened species have been recorded in the recommended park—powerful owl and buloke. See Appendix 1 for the conservation status of threatened species.

Large old tree sites

The recommended park contains three large old tree sites, predominantly of yellow gum, totalling 644 ha.

Aboriginal interests

There are Aboriginal sites and places in this recommended park. The protection of Aboriginal cultural sites and places is the main priority for traditional owners. There is need for the systematic assessment of Aboriginal cultural sites and places, in conjunction with traditional owners.

Aboriginal groups are concerned about the potential impact of increasing tourism on significant cultural sites. They believe that tourism operators should have to undertake cross-cultural training to ensure respect for Aboriginal sites and places, and to understand the procedures to follow when locating any sites. Traditional owners seek a role in the process of authorising tourism, scientific and commercial activities.

An application for a native title determination has been lodged with the National Native Title Tribunal including some of the recommended park area.

Community views

Submissions following the Draft Report were equally divided between those supporting the recommended park, those proposing that the park be upgraded to state park status, and those opposing the park. Submissions opposed to the recommended park mostly supported continued firewood collection for domestic supply and fire protection.

Those specifically supporting the park addition referred to the important EVC representation, large old tree sites and the relatively good condition of Dunneworthy forest. Some supported reservation of the area but proposed it be a state park to give greater emphasis to conservation and protect it from threatening uses.

Other submissions suggested making specific provision for prospecting and orienteering respectively and establishing plantations on cleared public land to assist with future firewood supplies for Ararat.

Current and future uses

The recommended inclusion of Dunneworthy in the reserve system is seen as necessary by the ECC because of its important EVC representation, but this area does not warrant state park status.

Apiculture

There are three permanent and two temporary bee sites in the recommended regional park.

Mining

Three exploration licences cover two thirds of the area of the recommended Ararat Regional Park.

Mining and exploration would be allowed in the recommended park, subject to the approval of the Minister for Environment and Conservation, and in accordance with recommendations in Chapter 7, and the *Mineral Resources Development Act 1990*.

Recreation and tourism

The recommended park has three established picnic areas, two lookouts and several other accessible high points, particularly in the existing park, with impressive views towards the Grampians, Pyrenees and Langi Ghiran. Over much of the recommended addition to the park, large yellow gum and yellow box trees are features of attractive forests on gentle

slopes, and there is potential for half-day walks through the area.

There are significant goldfields, of continuing interest to prospectors, parallel to the Western Highway, in and adjoining the existing Ararat Regional Park, but virtually no history of shafts or alluvial diggings in the Dunneworthy area.

Prospecting and orienteering are generally permitted in regional parks.

Timber harvesting

The net available productive forest area covered by the recommended Ararat Regional Park is 2 003 ha. This is 1.6% of the total area currently available for timber harvesting. The annual harvest in Dunneworthy State Forest has averaged 12 cubic metres for fencing timbers for each of the past five years. Commercial timber harvesting would not be permitted in Ararat Regional Park.

The West Regional Forest Agreement proposed that most of this area be made a Special Protection Zone and that a Special Management Zone would apply to the remainder.

Domestic firewood permits were issued for the collection of fallen timber from the Dunneworthy Forest. Approximately 410 cubic metres each year has been removed under these permits. Domestic firewood collection would not be allowed in future. Some domestic firewood may be produced from the recommended park as a by-product of thinning for ecological management (see Chapter 4). Locally, opportunities for domestic firewood collection remain in the Pyrenees and Mt Cole State Forests. The Rural City of Ararat, and other relevant organisations, could consider use of uncategorised public land east of Green Hill Lake for a woodlot plantation.

Management issues

Ecological thinning

Parts of the Dunneworthy Forest area are characterised by dense stands of relatively small trees. Intense competition may be preventing individual trees from reaching their normal mature stature and the area should be a high priority for ecological management.

RECOMMENDATIONS

- C2**
- (a) The Ararat Regional Park of 3 671 ha shown on Map A be used in accordance with the general recommendations for regional parks on page 152; and
 - (b) in accordance with the ecological management strategy recommended in Recommendation R12 in (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees

Information Sources

Commonwealth of Australia and State of Victoria (2000).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Holland and Cheers (1999).

Mirimbiak Nations Aboriginal Corporation (2000).

C3 St Arnaud Regional Park



The St Arnaud community already enjoys features of the recommended St Arnaud Regional Park—the outlook over the town, picnics at View Point, numerous walking and riding tracks, the Wax Gardens, the forest setting, historic mining sites and Bakery Hill settlement and the old reservoir. Creation of a regional park would see coordinated planning and management, improved facilities, consistent information services that would establish the park identity and increase visitor use and appreciation of the distinctive Box-Ironbark forests.

Benefits of the park

Biodiversity conservation

The recommended St Arnaud Regional Park supports one threatened fauna species, and one threatened plant species.

Recreation and tourism

View Point provides scenic views of St Arnaud township and surrounding countryside. The recommended park is important for local recreation, field naturalist studies, historic site appreciation and prospecting. The old town reservoir provides scope for aquatic activities.

Location

The recommended park covers 957 ha—comprising four township blocks around St Arnaud, including the View Point and Bell Rock areas, a bushland reserve, two small historic and cultural features reserves and 28 ha around the Wax Gardens in state forest.

Environmental values

Biodiversity

The recommended St Arnaud Regional Park would provide habitat for threatened species, including swift parrot and cane spear grass.

The recommended park supports a notable stand of grass trees at View Point and a good population of sticky boronia at Bell Rock.

Heritage

The recommended park contains several significant historic mining sites:

- New Bendigo Company, St Arnaud Gold Mining Company, Brownings Luck Company, and several nearby mines;
- New Bendigo diggings and settlement, Chinese village, and school site; and
- Kershaws charcoal site.

Aboriginal interests

The traditional owners support the protection of this area. They are concerned about major increases in tourism, because of the potentially increased risk of damage to cultural and environmental values.

Aboriginal groups expressed a need for cultural heritage surveys and cross-cultural training for users such as tourism operators and prospectors. They seek a role in the process of authorising tourism, scientific and commercial activities.

An application for a native title determination has been lodged with the National Native Title Tribunal including the recommended park.

Community views

Submissions regarding the proposed park included those supporting the park and those proposing additions to the park. Several submissions proposed upgrading it to national or state park status. There were also submissions received opposing the park, including opposition to any further exclusion from prospecting in this area.

A suggested addition was the Wax Gardens area which includes a fenced area, developed with paths, signs and an interpretation board.

Those opposing the park were concerned about:

- opportunities for future firewood collection reduced by this park, the Stoney Creek Nature Conservation Reserve and the recommended St Arnaud Range National Park; and
- access for camping, hunting and prospecting.

Many in St Arnaud use firewood for heating and cooking and alternatives are, for some, too expensive or unavailable.

Current and future uses

The ECC considers that this recommended park is well located to provide local recreation in a natural setting and protection for biodiversity and cultural heritage values. Upgrading this park to a higher status is not justified.

Apiculture

There is one permanent site and two temporary bee sites distributed in the recommended park.

Mining

Two exploration licences cover the entire recommended St Arnaud Regional Park. Mining and exploration would be permitted in the recommended park, subject to the approval of the Minister for Environment and Conservation, and in accordance with recommendations in Chapter 7, and the *Mineral Resources Development Act 1990*.

Prospecting

The recommended park and its immediate surroundings contain the most significant gold diggings in the St Arnaud region. These diggings are of moderate to high interest to prospectors. The area of the park would remain available for prospecting. Care should be taken to ensure historic and Aboriginal cultural sites are not damaged.

Recreation and tourism

The local community and visitors currently use the scenic lookout at View Point and the picnic spots. The area is also used for bushwalking, cycling, horse riding, nature observation and picnicking.

Camping access in this relatively small area would be determined by the land manager. Hunting is permitted in the state forest areas immediately south of the recommended park.

Timber harvesting

The net available productive forest area covered by the recommended St Arnaud Regional Park is estimated to be 500 ha. This is 0.4% of the total area currently available for timber harvesting. Commercial timber harvesting would not be permitted in the park.

Approximately 400 cubic metres per annum of domestic firewood is currently removed under permit from the park area. Domestic firewood collection would not be allowed in future. Some domestic firewood may be produced from the recommended park as a by-product of thinning for ecological management (see Chapter 4). Locally, timber can be obtained from Moolerr (North St Arnaud Range) Forest (see F1).

Recognising that the provision of firewood is a significant issue, the ECC has reduced the size of a recommended nature conservation reserve at Stoney Creek to allow a larger area of state forest to remain available.

Management issues

As with other areas to be managed as parks or reserves close to towns, this recommended park

would have several management needs such as interpretation signs, establishment of appropriate facilities at suitable sites, track management and control of a minor rubbish dumping problem.

RECOMMENDATION

C3 The St Arnaud Regional Park of 957 ha shown on Map A be used in accordance with the general recommendations for regional parks on page 152.

Information Sources

Bannear (1994a).

Bannear (1997).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Mirimbiak Nations Aboriginal Corporation (2000).

Stone (1999c).

Existing regional parks and minor changes

C4 Maryborough Regional Park

Situated between the Paddys Ranges State Park and Maryborough township, this park is noted for its impressive wildflowers and avifauna and has developed tracks for local informal recreation.

Several submissions were received on this park. Predominantly these recommended enlarging the park by adding other state forest areas in and adjoining the old town boundary. It was claimed that much of the forest within the Maryborough township boundary is not used for timber production or firewood collection and therefore there should be no major opposition. Additions would also assist in the creation of eco-tourism opportunities by effectively surrounding the town with a regional park.

The ECC has recommended an addition of 226 ha, which increases the size of the park to 524 ha. The additions consist of Crown land in the former town boundary of Maryborough and small areas of adjoining state forest. The recommended additions provide Pyrenees Highway frontage and access to the park. The forest is substantially intact with low levels of weed invasion or other disturbance. A popular picnic area beside the Goldfields Reservoir, on Shire of Central Goldfields land, should be managed in conjunction with the recommended park extension. This township land was not included in forest productive area calculations for timber. An exploration licence includes the park and recommended addition.

RECOMMENDATION

- C4** The area of 226 ha shown on Map A be added to the Maryborough Regional Park and the 524 ha park be used in accordance with the general recommendations for regional parks on page 152.

C5 Mt Alexander Regional Park

New studies since publication of the ECC's Resources and Issues Report (1997) have identified vegetation types and large old tree sites at Mt Alexander.

Most of the slopes carry a distinct community of Granitic Hills Woodland EVC, otherwise found in the north-east at Warby Range and Mt Pilot. It is dominated by manna gum, messmate, long-leaf box, river red gum and yellow box trees. Around Mt Alexander this EVC has been substantially cleared.

Mt Alexander is the only known site for the nationally endangered plant—southern shepherd's purse. This reserve also provides important habitat for powerful owl. The whole of Mt Alexander, except for the pine plantation, has been identified as

a high-quality large old tree site, the third largest in the study area. Mt Alexander has four active quarries producing high quality grey granite for monumental and building purposes. This stone splits readily, takes a good polish and has low wastage. Extraction rates should remain low, and opportunities for relocation on private land should be explored.

Historic features of significance include relics of a former silkworm farm and a Valonia oak plantation established to produce acorn tannin for hides. Both are located in the Mt Alexander pine plantation, now managed by Hancock's Victorian Plantations, but to be returned after harvest and revegetation for inclusion in the park. These historic features are to be protected.

RECOMMENDATION

- C5** The 1 240 ha Mt Alexander Regional Park:
- (a) be used in accordance with the general recommendations for regional parks on page 152; and
 - (b) be managed taking into account new information on EVCs and large old trees.

C6 Hepburn Regional Park

This park is mainly located around Daylesford, outside the Box–Ironbark study area. A small area (59 ha) of this park at Mt Franklin is within the Box–Ironbark study area boundary. This area is of social and historical significance as an early natural beauty and recreation spot.

Mt Franklin is an extinct volcano with a large crater. The mountain was part of the Loddon Aboriginal Protectorate and is still highly significant to

Aboriginal people. It is also significant for its early association with pastoral settlement. Apart from some quarrying in the past, the crater area has been managed as a recreation area for nearly a hundred years. The mountain is also recognised for its scientific value and forms part of an important group of volcanic landforms in Victoria.

No change is recommended to the park's status or uses.

RECOMMENDATION

C6 The Hepburn Regional Park of 59 ha (part of the park) be used in accordance with the general recommendations for regional parks on page 152.

C7 Beechworth Regional Park

This park is mainly located around Beechworth, with some sections occurring outside the Box–Ironbark study area. An area of 606 ha is within the Box–Ironbark study area boundary. Currently Beechworth Park is scheduled and managed under the *National Parks Act 1975* and is known, and signposted, as Beechworth Historic Park. About 52 ha of this park, around Woolshed Falls, is recommended for inclusion in the Chiltern–Pilot National Park.

The park contains several EVCs representing a diverse range of vegetation and habitat types,

including Valley Grassy Forest and Granitic Hills Woodland/Rocky Outcrop Shrubland/Herbland Mosaic.

It also provides habitat for nine threatened flora and fauna species, including brush-tailed phascogale, square-tailed kite, barking owl, turquoise parrot, bandy bandy, Dookie daisy, hairy hop-bush, delicate love-grass and yellow hyacinth-orchid.

Beechworth Regional Park incorporates a small section of Reedy Creek and is contiguous with the recommended Chiltern–Pilot National Park.

RECOMMENDATION

C7 The Beechworth Regional Park of 606 ha shown on Map A be managed in accordance with the general recommendations for regional parks on page 152, but retained on Schedule 3 of the *National Parks Act 1975*.

Former Regional Parks

The **Reef Hills Regional Park** at Benalla is now recommended as a state park (see Chapter 15, B4).

Eaglehawk Regional Park at Bendigo is to be included in the recommended Bendigo Regional Park (see Chapter 16, C1).

One Tree Hill Regional Park at Bendigo is to be included in the recommended Greater Bendigo National Park (see Chapter 15, A4).

D Nature conservation reserves

Outstanding natural values make some public lands highly significant for their botanical or wildlife populations and habitats, or both. The reserves below contain examples of indigenous vegetation with considerable floristic or habitat value in a natural or relatively natural state. The primary land use of the areas identified below is for nature conservation. They are set aside to conserve locations with plant species that may be rare or threatened and/or, plant associations or communities that are of particular conservation significance and/or valuable habitat for populations of significant indigenous fauna.

Nature conservation reserves, together with the existing and recommended new parks, make up the core of the protected areas system. They are recommended to be securely reserved and managed primarily to conserve and protect indigenous plant or animal species, communities or habitats. They vary in size but most aim to represent communities or EVCs.

Public appreciation and education about their values is encouraged. Passive recreation activities are also encouraged, particularly those—such as nature study and walking—associated with appreciation of the area. Orienteering, rogaining, other low impact recreation, and camping in the larger reserves, would generally be permitted, subject to management requirements. In some reserves zones for walking dogs on leads may be identified by the land managers.

The values of nature conservation reserves vary but include: occurrences of individual rare or threatened plant species; representative, diverse or intact examples of particular communities; limit-of-range sites; remnants of largely modified land systems; places with recorded presence of rare or threatened fauna or diverse faunal assemblages; and representative examples of habitat.

Chapter 4 (Nature conservation) outlined the crucial need for indigenous plant and animal conservation across the study area. The recommendations in this chapter will contribute to the conservation of many of our most threatened plants and animals. Plant and animal species listed in the descriptions below are of conservation significance and are generally threatened (see Appendix 1).

Previous Land Conservation Council investigations recommended establishment of some 33 flora or flora and fauna reserves across the study area. Many of these are now recommended as nature conservation reserves. The status, objectives of management, and permitted uses of flora and fauna reserves and nature conservation reserves, are similar. Several former wildlife reserves that have been classified as ‘game refuges’ are now recommended as nature conservation reserves. A number of new or enlarged nature conservation reserves are also recommended.

Grazing, harvesting of forest products, hunting (except where organised by the land managers for pest control) and the use and carrying of firearms would not be permitted in these areas. Regarding the forest resource that will become unavailable, as a result of the new reserves, the area of high and medium productivity forest included in each reserve is expressed below as a percentage of the net high and medium productivity forest area currently available for timber harvesting.

Nature conservation reserves are commonly small and have sensitive values. Collection of fallen wood from the ground reduces habitat and is not appropriate. However, from the larger reserves, in particular, some domestic firewood may be produced as a by-product of thinning for ecological management (see Chapter 4). In particular reserves, certain other uses are specifically not permitted, to protect sensitive values.

As with regional parks, these reserves are recommended to be ‘restricted Crown land’ in relation to mining under the *Mineral Resources Development Act 1990*. Mineral exploration and mining may therefore be permitted, subject to the approval of the Minister for Environment and Conservation. Major mining proposals may require an environment effects statement.

Since the Draft Report, the proposed Little Tottington and Eppalock Nature Conservation Reserves are no longer recommended, and the Stoney Creek, Waanyarra and Whroo Nature Conservation Reserves have been substantially reduced in size. Mt Sugarloaf has been increased and several small new nature conservation reserves are recommended.

GENERAL RECOMMENDATIONS FOR NATURE CONSERVATION RESERVES

D Nature conservation reserves shown on Map A (numbered D1 to D68) be used to:

- (a) conserve and protect species, communities or habitats of indigenous animals and plants;
- (b) protect Aboriginal cultural sites and places;
- (c) protect historic features in specific reserves where noted;
- (d) provide for educational and scientific study if consistent with (a) above, and in ways that minimally affect the area;
- (e) provide for passive recreation such as nature study and picnicking, and other recreational activities subject to management requirements, where they are consistent with (a) above, or as otherwise specified;

and:

- (f) low impact exploration for minerals, planned to minimise any impacts on biodiversity values, be permitted with the approval of the Minister for Environment and Conservation, except in the area of the existing Deep Lead Flora and Fauna Reserve (see Recommendation D2);
- (g) mining be subject to Government decision on individual proposals;
- (h) recreational prospecting and gemstone-seeking be permitted except:
 - (i) in areas where it may disturb protected archaeological relics or adversely affect significant natural and community heritage values, and
 - (ii) where specified for particular reserves below;
- (i) grazing, harvesting of forest products, hunting and the use of firearms not be permitted, except as provided for in defined circumstances in other recommendations;
- (j) designated site or dispersed camping be permitted in appropriate locations in the larger reserves (for example Wychitella and Waanyarra), where this will not adversely affect the biodiversity values of the reserve;
- (k) apiculture be permitted except where specified, and subject to:
 - (i) the outcome of research into the ecological impacts of this industry, and
 - (ii) management requirements;
- (l) in accordance with the ecological management strategy recommended in Recommendation R12 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
- (m) unused road reserves be added to adjoining nature conservation reserves where appropriate; and
- (n) unless otherwise specified, they be permanently reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment.

D1 Existing nature conservation reserves

It is recommended that seventeen of the existing flora reserves and flora and fauna reserves (as listed below) be retained but designated as nature conservation reserves. They will be used for effectively the same purposes as previously.

RECOMMENDATIONS

D1 The existing flora and fauna reserves, and flora reserves described below and listed in Appendix 11 be re-designated as nature conservation reserves, and used in accordance with the general recommendations for nature conservation reserves on page 167.

Flora and fauna reserves

Mt Bolangum (2 930 ha)

Mt Hope (106 ha)

Note: The Mt Hope reserve is of local historical significance mainly for its notable role in the Thomas Mitchell expedition.

Flora reserves

Hard Hills (15 ha)

Gowar (120 ha)

Gowar South (23 ha)

Dalyenong West (16 ha)

Alex Chisholm (16 ha)

Inglewood (1 200 ha)

Walmer South (15 ha)

Walmer (13 ha)

Metcalf (300 ha)

Dohertys Pine (Rochester West) (10 ha)

Runnymede (240 ha)

Costerfield (10 ha)

Gobarup (300 ha)

Big Hill (Longwood) (62 ha)

Upotipotpon (5 ha).

D2–D68 Recommended new or enlarged nature conservation reserves

Recommended new or enlarged nature conservation reserves are described below. Full descriptions are provided of three major reserves, with short descriptions of the others.

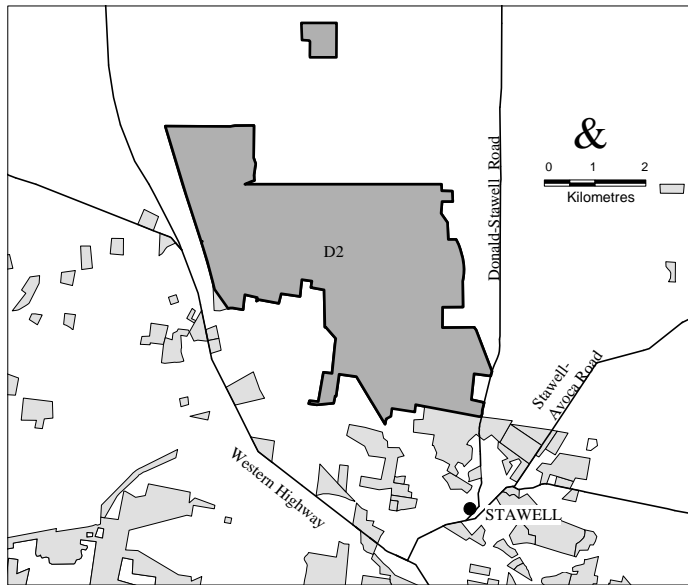
Aboriginal interests

Aboriginal groups indicated that there are numerous known cultural sites and places in existing and recommended nature conservation reserves.

Traditional owners support the protection of these sites and expressed a need for cultural heritage surveys in these reserves. Cross-cultural training was proposed for users, such as field naturalists, tourism operators and prospectors, to ensure respect for Aboriginal sites and places and so that they understand the procedures to follow when sites are located.

Applications for native title determinations have been lodged with the National Native Title Tribunal including some of the recommended nature conservation reserve areas.

D2 Deep Lead Nature Conservation Reserve



The recommended Deep Lead Nature Conservation Reserve (1 823 ha) is one of the most important sites for nature conservation in Victoria. It supports at least 21 threatened species, including three plant species not found anywhere else.

Benefits of the reserve

Biodiversity conservation

The recommended Deep Lead Nature Conservation Reserve would significantly improve protection of the outstanding biological diversity of this compact area; most notably, the exceptional number of threatened and non-threatened plant species, especially orchids which are highly susceptible to disturbance.

Location

The recommended Deep Lead Nature Conservation Reserve includes the main block of public land north of Stawell, extending north from within the township boundary, together with the small isolated Germanina Mine block a few kilometres further north again. The reserve covers 1 823 ha—comprising the existing Deep Lead Flora and Fauna Reserve (1 120 ha), ‘The Ironbarks’ Hardwood Production Area (390 ha), Deep Lead Education Area (260 ha), Germanina Mine Bushland Reserve (33 ha), and the Three Jacks Sanctuary (20 ha). The existing Deep Lead Flora and Fauna Reserve is scheduled and managed under the *National Parks Act 1975*. It is recommended that the reserve, including the existing flora and fauna reserve, extend to a depth of 100 metres only below the surface.

Environmental values

Biodiversity

The flora of this recommended reserve is of exceptional species-richness, particularly in orchid species, partially reflecting the unusual overlap of environmental characteristics near the junction of the Greater Grampians, Goldfields and Wimmera bioregions (see Map 4.1 in Chapter 4).

The recommended reserve is a significant site for tawny spider-orchid (only known site), Pomonal leek-orchid (only known site), grass-lily *Caesia* sp. aff. *calliantha* (undescribed—only known site), McIvor spider-orchid (one of three known sites) and squirrel glider (the most important site for the small isolated Stawell area population).

At least 16 other threatened species, including at least six nationally threatened species, are also found in the area.

The recommended reserve would make a significant contribution to the representation of Alluvial Terraces Herb-rich Woodland, Heathy Woodland, and Sedge-rich Woodland (largest and highest quality patch in the study area).

It contains the largest and highest quality example of Box–Ironbark Forest EVC in the Wimmera bioregion, and at the western extent of its range.

Heritage

Named for its succession of deep lead mines, the recommended reserve contains several historic mining and related sites, including the relatively undisturbed and intact alluvial mining landscape of the Four Post Diggings site and the Darlington and Germania Mine sites.

Community views

Many submissions mentioned the Deep Lead area, including 'The Ironbarks', and highlighted its flora and fauna values. There was considerable support for the protection of the areas containing Box-Ironbark communities, particularly sensitive areas with high ground layer diversity. Several submissions proposed greater protection from mining and that all exploration and mining proposals affecting the reserve be subject to independent public scrutiny. A number of submissions proposed that this reserve be upgraded to national or state park status to protect outstanding flora values.

Several submissions supported the continuation of mining and prospecting in the reserve. There was opposition to the reserve based on potential restrictions placed on mining and prospecting.

Current and future uses

The ECC is recommending additions to the existing Deep Lead Flora and Fauna Reserve to protect the exceptional species richness and diversity of plant species in the area, particularly as a key site for a high number of threatened species.

Apiculture

There are two permanent bee sites and one temporary site distributed through the recommended nature conservation reserve area.

Mining

There are no mines operating in the area of the recommended Deep Lead Nature Conservation Reserve. However, Victoria's largest gold mine, the Stawell Gold Mines underground mine, is a short distance to the south and the mine's line of reef extends under the recommended reserve. Both the existing Deep Lead Flora and Fauna Reserve and the new area recommended for nature conservation reserve are covered by a current exploration licence.

Surface exploration may be allowed in areas recommended for addition to the existing Deep Lead Flora and Fauna Reserve, in accordance with recommendations in Chapter 7, and subject to approval by the Minister for Environment and Conservation, in accordance with the *Mineral Resources Development Act 1990*. Surface mining would not be permitted in the recommended reserve.

Exploration and mining more than 100 metres below the surface would be outside the recommended reserve and subject to the standard provisions for unrestricted Crown land. Mining under the reserve may require surface infrastructure such as air shafts and vents within the recommended reserve. Such infrastructure should be kept to a minimum but not unreasonably excluded from the reserve.

Prospecting

The Deep Lead area is of some interest to prospectors because of its gold history but the proportion of shallow alluvial gold found in the area is low relative to other more favoured Box-Ironbark goldfields. Prospecting is a significant threat to populations of threatened orchids and other herbaceous plants at Deep Lead Nature Conservation Reserve and would not be permitted. Partial exclusion of prospecting from specific parts of the recommended reserve would not be feasible in this case. Compliance with partial exclusion would be difficult for the land manager to achieve and unlike other parts of the study area, rare herbs are widespread at Deep Lead and continue to be discovered in new locations. In addition, recovery of some species will require weed-free undisturbed sites into which they can expand.

Prospecting will be allowed in other Box-Ironbark public land blocks near Stawell.

Timber harvesting

'The Ironbarks' contains 346 ha of productive forest. However, under a Flora and Fauna Guarantee Action Statement for McIvor spider-orchid, timber harvesting is currently prohibited. The nearby Glynwylln State Forest and part of Illawarra State Forest remain available for commercial timber harvesting.

Domestic firewood permits are currently issued for the collection of small volumes of fallen timber for 'pensioner firewood' only. Domestic firewood collection would no longer be allowed in 'The Ironbarks'. Some domestic firewood may be produced from the recommended reserve as a by-product of ecological thinning (see Chapter 4). Locally, alternative opportunities for domestic firewood collection would remain in Glynwylln and Illawarra State Forests.

The West Regional Forest Agreement identifies this area as a Special Protection Zone.

Recreation

Adjoining Stawell and the Western Highway, the recommended Deep Lead Nature Conservation Reserve is currently a moderately popular destination for passive and active bush recreation, including tourism and recreation associated with its significant nature conservation values which are well known to field naturalists. The existing reserve receives about 1 700 visitors each year.

Management issues

Tracks

Minor tracks render areas unsuitable for orchids and also increase off-road vehicle movements which can destroy orchid sites. Unused minor tracks should be permanently closed and rehabilitated where necessary. Public use of other minor tracks should be minimised and continued effort would be required to minimise all off-road vehicle movements.

Protection of orchid populations

The diversity of orchids at Deep Lead attracts many orchid fanciers, particularly in Spring, requiring careful management to prevent trampling of sites. Illegal collection of rare orchids, and firewood collection and associated damage by vehicles, are significant threats to orchid populations. Visible ranger presence and active management are required to minimise damage.

RECOMMENDATIONS

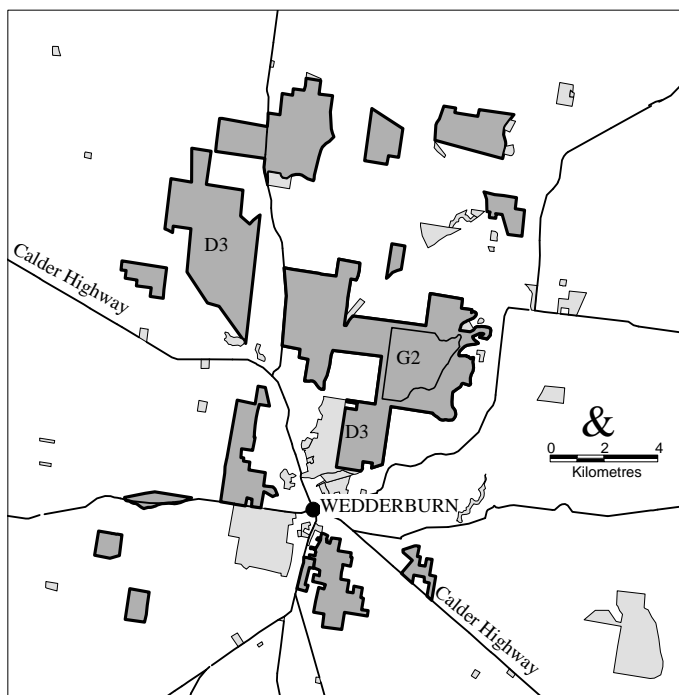
- D2**
- (a) The Deep Lead Nature Conservation Reserve area of 1 823 ha shown on Map A be used in accordance with the general recommendations for nature conservation reserves on page 167;
 - (b) the nature conservation reserve extend to a depth of 100 metres only below the surface,
 - (c) surface mining not be permitted (see Note below);
 - (d) prospecting not be permitted;
 - (e) the area of the existing Deep Lead Flora and Fauna Reserve, to a depth of 100 metres, remain in Schedule 4 of the *National Parks Act 1975*; and
 - (f) new sections of the recommended Deep Lead Nature Conservation Reserve be reserved under the *Crown Land (Reserves) Act 1978*.

Note: Ground more than 100 metres below the surface would be outside the recommended Deep Lead Nature Conservation Reserve. The administrative arrangements for any future exploration or mining in these areas would be the same as those which apply generally to unrestricted Crown land. Exploration or mining in these areas may intrude into the recommended nature conservation reserve, only in accordance with standard provisions applying to nature conservation reserves or Schedule 4 *National Parks Act 1975* areas, as appropriate. However, the location within the recommended nature conservation reserve of minor infrastructure associated with underground mining, notably air shafts and vents, should not be unreasonably denied. At the same time intrusion of such infrastructure should be minimised.

Information Sources

Backhouse and Jeanes (1995).
 Commonwealth of Australia and State of Victoria (2000).
 Context Pty Ltd (1999).
 Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
 Hills and Boekel (1996).
 Venn (1992).

D3 Wychitella Nature Conservation Reserve



The recommended Wychitella Nature Conservation Reserve encompasses one of the most significant areas of Box-Ironbark mallee in Victoria with diverse and unusual flora and fauna communities, including the only remaining population of malleefowl in the study area and at least 12 other threatened species.

Benefits of the reserve

Biodiversity conservation

The recommended Wychitella Nature Conservation Reserve would secure protection of habitat for the only remaining population of malleefowl in the study area. The reserve would also protect the distinctive flora and fauna of the Wedderburn mallee block, including another 12 threatened species and unusually rich communities of mallee eucalypts, birds and reptiles.

Recreation and tourism

This reserve will continue to be one of the most popular destinations in Victoria for prospecting, as well as remaining popular for bird watching and picnicking.

Location

The recommended reserve surrounds the town of Wedderburn, extending north to Wychitella. It covers 6 300 ha—comprising Wychitella Flora and Fauna Reserve (3 470 ha), Wedderburn Eucalyptus Oil Production Area (1 904 ha), bushland reserves (454 ha), The Granites Scenic Reserve (330 ha), Mt Egbert Education Area (90 ha), public land water

frontages (32 ha) and various uncommitted public land parcels (20 ha). The 460 ha Korong Vale Reference Area (G2) is not part of the recommended reserve although it is geographically within it.

Environmental values

Biodiversity

The recommended Wychitella Nature Conservation Reserve contains flora and fauna assemblages of biogeographic significance, including the co-occurrence of four mallee tree species, a large number of reptile species and the most diverse suite of mallee-dependent bird species in the study area.

This area contains 13 threatened species including malleefowl (the only population in the study area; formerly widespread), Kamarooka mallee, dainty phebalium, cane spear-grass, sweet quandong, sikh's whiskers (orchid) and woodland blind snake.

The recommended Wychitella Nature Conservation Reserve would contribute significantly to representation of four EVCs—Grassy Woodland, *Low Rises* Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic and Broombush Mallee (35% of the extent of this EVC is in the conservation reserve system).

Community views

The majority of responses on this reserve were in favour of adding surrounding state forest areas to the reserve and proposed that this area then be upgraded to a national or state park. Predominantly they referred to the need to protect the outstanding biodiversity values, including unique and diverse flora and fauna assemblages, wildflower displays including many species of orchids and the presence of threatened species including the last remaining malleefowl population in the study area. Several also called for the removal of perceived detrimental activities, namely mining and prospecting.

Several submissions advocated that links be incorporated between reserve fragments, corresponding with the recommended 'Conservation Management Networks' (see Chapter 4 and Appendix 12) and that strategically located private land be purchased to achieve this.

Several submissions opposed the proposed reserve, including eucalyptus oil producers, specifically opposing the reduction in harvest areas. Others opposing the reserve included prospectors wanting to ensure continued access. Other submissions proposed that existing access for miners and prospectors be maintained because they are apprehensive about the perceived inconsistent application of land managers' discretion. Continuation of existing camping access was sought. It was also proposed that orienteering be added as a listed recreational activity.

Current and future uses

Despite the undoubted biodiversity values of the area, the ECC believes that, given its size and fragmented nature, the most appropriate reservation status is that of nature conservation reserve. The ECC considers however that this recommended reserve is essential to secure protection for the only remaining population of malleefowl in the study area and to promote recovery of a range of species. Its significance to the conservation of distinctive flora and at least 13 threatened species justifies the reservation of areas previously available to eucalyptus oil producers.

Apiculture

There are 27 temporary and one permanent bee sites distributed through the recommended reserve.

Eucalyptus oil harvesting

Currently, eucalyptus oil harvesting occurs over approximately 140 ha in the Wedderburn Eucalyptus Oil Production Area (1 904 ha).

As detailed in Chapter 12, eucalyptus oil harvesting is a significant threat to the existence and ultimate recovery of threatened and other species. In particular, malleefowl populations require large contiguous areas of suitable habitat. Eucalyptus oil harvesting would not be permitted in the Wychitella Nature Conservation Reserve.

Two areas of state forest near Wedderburn have not been included in the reserve and remain as state forest to be available for eucalyptus oil harvesting.

Grazing

About half the 32 ha of public land water frontage recommended to be included in the reserve is currently licensed for grazing. Grazing by domestic stock will not be allowed.

Mining

There are six current mining licences in the area of the recommended Wychitella Nature Conservation Reserve, and three exploration licences cover around one half of the recommended reserve area. Mining and exploration may be permitted in the recommended Wychitella Nature Conservation Reserve, subject to the approval of the Minister for Environment and Conservation, and in accordance with recommendations in Chapter 7, and the *Mineral Resources Development Act 1990*.

Prospecting

The Wedderburn public lands are one of the most favoured prospecting areas in Victoria with prospecting tourism making a very significant contribution to the local economy. Several thousand visitors per year are attracted here. The significance of the area to prospectors is recognised and access to the additional reserve areas is recommended to continue. Prospecting activities should continue to be monitored and land managers should retain the power to exclude prospecting where this conflicts with the reserve's values.

Recreation and tourism

The recommended reserve is well suited for low-impact and nature-based recreation as it surrounds the town of Wedderburn and contains scenic features at Mt Egbert (The Granites), diverse flora

and fauna, several historic features such as the former Government battery and established picnic areas.

Orienteering is generally permitted in nature conservation reserves and camping may be permitted in designated areas subject to the land manager's approval.

Timber harvesting

Most of the Wedderburn forests recommended for addition to the reserve consist of Broombush Mallee EVC, and are unproductive for wood products. However, 418 ha of high productivity forest is included—0.3% of the total area currently available for harvesting.

The main forest area at Wedderburn, with Box-Ironbark Forest EVC (total area 393 ha) and another 470 ha with mallee and Box-Ironbark species, remains available for wood production and domestic firewood. Kingower and Moliagul State Forests remain available for commercial timber harvesting and domestic firewood collection.

Management issues

Adjacent freehold land

Although the recommended Wychitella Nature Conservation Reserve is fragmented, the public land blocks are largely linked by freehold land with substantially intact native vegetation. Management for nature conservation in the recommended reserve would be enhanced by cooperative arrangements with adjacent private landholders (as recommended in Chapter 4).

Support for the 'Conservation Management Network' concept is encouraging, and will require community and landholder support.

Erosion

Some tracks within the recommended reserve are severely eroded leading to habitat degradation.

Introduced pests

Red foxes and feral cats prey upon malleefowl and their eggs, as well as other native fauna, while rabbits damage soil and vegetation. Continuing control of these introduced species is a high priority in the recommended reserve.



Malleefowl

The malleefowl was once widespread around mallee patches through the central-west of the study area and as far south as the Brisbane Ranges. It no longer occurs south or east of the Wedderburn area. The next closest population is found 100 km to the northwest. The major conservation objective for the malleefowl in Victoria is to double the population size in the 20 years from 1994. If the malleefowl is to avoid extinction as a Box-Ironbark species, let alone recover, significant active management will be required. Providing long-term security of habitat for the Wedderburn population is an urgent prerequisite for such management.

RECOMMENDATIONS

- D3**
- (a) The 2 830 ha area recommended for addition to the existing Wychitella Flora and Fauna Reserve be used in accordance with the general recommendations for nature conservation reserves on page 167; and reserved under the *Crown Land (Reserves) Act 1978*;
 - (b) prospecting continue to be permitted in these recommended additions; and
 - (c) the existing Wychitella Flora and Fauna Reserve remain reserved as at present.

Information Sources

Bannear (1997).

Benshemesh (1994).

Butler (1997).

CFL (1988).

Context Pty Ltd (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

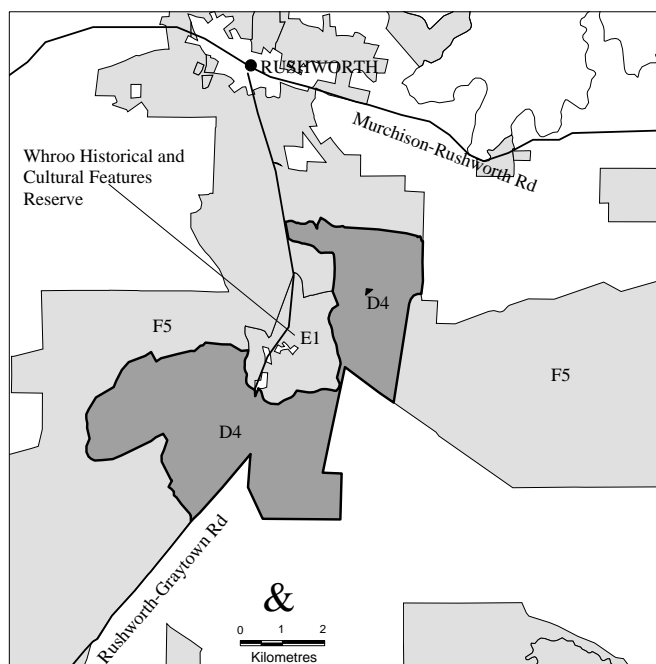
Gell (1985).

Simpson *et al.* (1988).

Stone (1979).

Stone (1997).

D4 Whroo Nature Conservation Reserve



The recommended Whroo Nature Conservation Reserve supports a range of threatened flora and fauna species. The co-occurrence of four threatened orchids is of particular interest. It is of national significance as it is a key site for swift parrot and supports four other threatened fauna species and six threatened flora species.

Benefits of the reserve

Biodiversity conservation

The recommended Whroo Nature Conservation Reserve would protect ten threatened species.

Recreation and tourism

The recommended reserve area is popular with prospectors and offers bird watching opportunities.

Location

The 2 298 ha of Rushworth State Forest surrounding Whroo Historic Area (E1) is recommended to become Whroo Nature Conservation Reserve.

Environmental values

Biodiversity

Flora and fauna assemblages of significance include the co-occurrence of four threatened greenhood orchid species, Kamarooka mallee, swift parrot, squirrel glider, grey-crowned babbler and bush stone-curlew.

The recommended reserve contains two complete fauna refuge sites and part of one other site.

Heritage

Aside from the excellent natural values, the recommended reserve has significant social, historic,

aesthetic and Aboriginal cultural heritage values which should be protected.

Community views

Many submissions were strongly in support of including this area as part of a large consolidated national park in the Rushworth-Heathcote area. There were proposals to consolidate the previously proposed Mt Black State Park, Mt Ida Nature Conservation Reserve, Whroo Nature Conservation Reserve and linking state forest into such a park. Some submissions were from national park supporters proposing other combinations of additional reserves to be included in a large national park. Several submissions specifically supported the nature conservation reserve recommendation, however, they wanted the reserve enlarged to include additional Broombush Mallee EVC areas.

Many submissions clearly opposed the recommendation and largely supported continued access, particularly to timber resources. Concern was raised about the future of the local timber and eucalyptus oil plantation industries, access to firewood, a perceived increase in fire danger and community access. Others opposed the recommendations because of potential restrictions placed on car rallies. Some submissions sought specific provision for orienteering. Several submissions called for no

further exclusions from prospecting and mining and it was suggested that exploration and small-scale mining be permitted, subject to satisfactory environment effects statement outcomes.

Local Aboriginal people were concerned to maintain unrestricted access to the area for traditional ceremonial practices.

Current and future uses

The ECC is recommending that this area be added to the reserve system for its significant natural values and to protect the habitat of ten threatened species. Importantly, this reserve remains connected to the recommended Heathcote-Graytown National Park by contiguous areas of state forest.

The recommended reserve has been reduced by 1600 ha since the Draft Report, such that a substantial additional area remains as available state forest for local timber production.

Apiculture

There are 5 permanent and 2 temporary bee sites distributed through the recommended nature conservation reserve area.

Eucalyptus oil harvesting

Currently, eucalyptus oil harvesting occurs over approximately 70 ha of the Rushworth State Forest (F5) surrounding Whroo Historic Area. Forty hectares to the west of Whroo Historic Area (E1) would remain available for eucalyptus oil harvesting.

As detailed in Chapter 12, eucalyptus oil harvesting represents a significant threat to the existence and ultimate recovery of a number of threatened and other species within the recommended Whroo Nature Conservation Reserve. Harvesting would not be permitted within the recommended reserve. Most areas recommended to be included in the reserve would be subject to a six-year phase out period, except that harvesting should cease immediately from Cheong's and two nearby small

patches, totalling 7 ha. Note that several areas cut for eucalyptus oil are now recommended to be excluded from this reserve.

Mining

There are two exploration licences covering all the recommended reserve. Mining and exploration may be allowed in the recommended reserve, subject to the approval of the Minister for Environment and Conservation, and in accordance with recommendations in Chapter 7, and the *Mineral Resources Development Act 1990*.

Prospecting

Many prospectors visit the Whroo public lands. No changes are recommended for prospecting in this area.

Recreation

Car rallies are generally not permitted in nature conservation reserves and there are large areas of state forest surrounding the reserve where this activity may occur. Orienteering is generally permitted in nature conservation reserves.

Timber harvesting

The net available productive forest area covered by the recommended Whroo Nature Conservation Reserve is about 1 540 ha. This is 1.2% of the total net forest area currently available for timber harvesting. Commercial timber harvesting would not be permitted in Whroo Nature Conservation Reserve. The adjacent Rushworth State Forest (F5) remains available for commercial timber harvesting.

Approximately 420 cubic metres of domestic firewood per annum is currently collected under permit from the area. Domestic firewood collection would no longer be permitted. Some domestic firewood may be produced from the recommended reserve as a by-product of thinning for ecological management (see Chapter 4). Locally, opportunities for domestic firewood collection remain in the Rushworth State Forest.

RECOMMENDATIONS

- D4** The recommended Whroo Nature Conservation Reserve area of 2 298 ha be reserved under the *Crown Land (Reserves) Act 1978*, and used in accordance with the general recommendations for nature conservation reserves on page 167.

Information Sources

Backhouse and Jeanes (1995).
Butler (1997).
Context Pty Ltd (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
Mirimbiak Nations Aboriginal Corporation (2000).
Stone (1987).

D5–D68 Other recommended nature conservation reserves

D5 Lonsdale

This 759 ha block north-west of Stawell incorporates existing uncommitted land (state forest) characterised by high quality, species-rich, open grassy woodland with large, widely-spaced yellow box and river red gum trees. It provides habitat for several threatened species, notably rising star guinea-flower, hairy tails, corkscrew spear-grass, squirrel glider, barking owl, swift parrot, painted honeyeater and bush stone-curlew. It contributes to representation of *Western Goldfields* Heathy Woodland, Plains Grassy Woodland and Grassy Woodland EVCs.

NRE described Lonsdale as a ‘community forest’—commercial operations were excluded, although domestic firewood collection was allowed under permit. The net available productive forest area covered by the recommended Lonsdale Nature Conservation Reserve is 413 ha. This is 0.3% of the total net productive forest area currently available for timber harvesting. The West Regional Forest Agreement identifies Lonsdale as a Special Protection Zone.

D6 Illawarra

This 580 ha block is part of a hardwood production block (state forest) west of Stawell. River red gum, yellow box and yellow gum trees dominate the overstorey. It includes two large old tree sites and one fauna refuge site, and provides habitat for swift parrots. It contributes to representation of Sedge-rich Woodland and Plains Grassy Woodland EVCs.

The net available productive forest area covered by the recommended Illawarra Nature Conservation Reserve is approximately 410 ha. This is 0.3% of the total net productive forest area currently available for timber harvesting. The *West Regional Forest Agreement* identifies the eastern part of Illawarra as a Special Protection Zone. The western part of Illawarra State Forest, and Glynwylln State Forest, remain available for timber harvesting.

D7 Jallukar

This 1 165 ha block west of Ararat, currently hardwood production (state forest), is characterised by high-quality, species-rich, open woodland with large yellow gum, yellow box and river red gum

trees. A large old tree site occupies the entire block and the site provides habitat for threatened species, notably corkscrew spear-grass and barking owl. It contributes to representation of Plains Grassy Woodland, Heathy Woodland, Alluvial Terraces Herb-rich Woodland and Creekline Grassy Woodland EVCs.

NRE described Jallukar as a ‘community forest’, being a local domestic firewood source. The net available productive forest area is 292 ha. This is 0.2% of the total net productive forest area currently available for timber harvesting. The western parts of Illawarra State Forest, and other small local forests, remain available for timber harvesting. The West Regional Forest Agreement identifies Jallukar as a Special Protection Zone.

D8 Morrl Morrl

This 1 991 ha block incorporates the existing Morrl Morrl Flora Reserve (191 ha) and hardwood production (1 800 ha state forest) northwest of Navarre. The predominant trees are grey box, red ironbark, yellow box and yellow gum. A large old tree site occupies almost the entire block and the site provides habitat for threatened species; notably, spreading eutaxia, veined spider-orchid, powerful owl, barking owl and swift parrot. It contributes to representation of several vegetation communities, including Grassy Woodland, *Western Goldfields* Heathy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs.

NRE described the Morrl Morrl block as a ‘community forest’. It was previously a domestic firewood source for Stawell, but commercial firewood operations are excluded. The net available productive forest area covered by the recommended Morrl Morrl Nature Conservation Reserve is 1 206 ha. This is 0.95% of the total net productive forest area currently available for timber harvesting. The West Regional Forest Agreement identifies Morrl Morrl as a Special Protection Zone.

D9 Joel Joel

This 260 ha block east of Stawell incorporates the existing Joel Joel Bushland Reserve (257 ha) and a road reserve on its southern boundary (3 ha). It is characterised by open forest with many mature grey

box trees and provides habitat for threatened species; notably, buloke, swift parrot and powerful owl. It contributes to representation of various vegetation communities, including Grassy Woodland EVC.

D10 Navarre

This 4 ha block west of Navarre contains a scattering of large yellow gum trees and is characterised by diverse, high quality vegetation. It incorporates an area of uncategorised public land and provides habitat for threatened species, notably spreading eutaxia and buloke. It contributes to representation of Grassy Woodland EVC.

D11 Big Tottington

This 2 120 ha block is in a hardwood production area (state forest) north of Navarre, with high quality vegetation and grey box, yellow box and yellow gum the predominant trees. It incorporates two large old tree sites and two fauna refuges and provides habitat for threatened species; notably, swamp diuris, powerful owl and swift parrot (key site). It contributes to representation of several vegetation communities, including Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVC.

The net available productive forest area covered by the recommended Big Tottington Nature Conservation Reserve is 1 383 ha. This is 1.1% of the total net productive forest area currently available for timber harvesting.

Little Tottington, proposed as a nature conservation reserve in the Draft Report, is now recommended as state forest, increasing the available productive area. Its biodiversity values are to be protected in state forest management (see Recommendation F1)

D12 Landsborough Hill

This 1 044 ha block north of Landsborough incorporates hardwood production area (state forest) with yellow box, long-leaf box, red stringybark and red box being the predominant trees. It includes two large old tree sites and two fauna refuges and provides habitat for powerful owl and swift parrot. It contributes to representation of several vegetation communities in the reserve system.

The net available productive forest area covered by the recommended Landsborough Hill Nature Conservation Reserve is 795 ha. This is 0.6% of the

total net productive forest area currently available for timber harvesting. The West Regional Forest Agreement identifies this area as a Special Protection Zone.

D13 Landsborough

This 3 314 ha block, with large yellow box, red stringybark, long-leaf box and red box trees, includes the existing 1 831 ha Landsborough Flora and Fauna Reserve and 1 483 ha of hardwood production (state forest). It incorporates five large old tree sites and provides habitat for the powerful owl. It contributes to representation of several vegetation communities, including Valley Grassy Forest/*Slopes Box* Grassy Woodland Complex and Alluvial Terraces Herb-rich Woodland EVCs.

The net available productive forest area covered by the recommended Landsborough Nature Conservation Reserve is approximately 1 090 ha. This is 0.9% of the total net productive forest area currently available for timber harvesting.

D14 Stoney Creek

Stoney Creek is a 605 ha block in hardwood production area (state forest) south of St Arnaud, with yellow gum, yellow box and grey box the predominant trees. It includes part of one fauna refuge and provides habitat for threatened species; notably, Goldfields grevillea, swift parrot and powerful owl. It contributes to representation of several vegetation communities, including Grassy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs.

The net available productive forest area covered by the recommended Stoney Creek Nature Conservation Reserve is about 390 ha. This is 0.3% of the total net productive forest area currently available for timber harvesting. In the Draft Report this reserve was proposed to be 1 600 ha. It has been reduced to provide additional available area for timber production in response to views in submissions.

D15 Stuart Mill

Stuart Mill is a 2 480 ha block in state forest south of St Arnaud. It includes two large old tree sites and two fauna refuges. It provides habitat for threatened species; notably, powerful owl and squirrel glider. It contributes to representation of several vegetation communities, including Grassy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs.

Significant historical features are the puddler at Carapooee West, and Swantons battery and cyanide vats, which are to be protected.

The net available productive forest area covered by the recommended Stuart Mill Nature Conservation Reserve is 1 417 ha. This is 1.1% of the total net productive forest area currently available for timber harvesting.

D16 Redbank

Redbank is a 1 176 ha block in uncommitted land (state forest) northwest of Avoca. It includes two large old tree sites and provides habitat for the threatened broad-lip leek-orchid. It contributes to representation of several vegetation communities, including Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic and Valley Grassy Forest EVCs.

The net available productive forest area covered by the recommended Redbank Nature Conservation Reserve is 945 ha. This is 0.7% of the total net productive forest area currently available for timber harvesting.

D17 Dalyenong

This 2 570 ha block with large grey box and yellow gum trees, incorporates the existing Dalyenong Flora Reserve (1 450 ha) and 1 120 ha of hardwood production area (state forest), west of Bealiba. A large old tree site occupies almost the entire addition and two fauna refuges are also present. It is a key site for swift parrot and provides habitat for other threatened species; notably, powerful owl, barking owl and woodland blind snake. It contributes to representation of several vegetation communities, including Grassy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs.

The net available productive forest area covered by the recommended Dalyenong Nature Conservation Reserve is 1 015 ha. This is 0.8% of the total net productive forest area currently available for timber harvesting. Several small sugar gum plantations are present. These may be harvested in the future, and should be revegetated with indigenous species using seed of local provenance.

D18 Tunstalls

Tunstalls is a 1 640 ha block in hardwood production area (state forest) north of Bealiba. It includes one large old tree site and two fauna

refuges and provides important habitat for swift parrot (key site). It contributes to representation of several vegetation communities, including Grassy Woodland EVC.

The net available productive forest area covered by the recommended Tunstalls Nature Conservation Reserve is 1 388 ha. This is 1.1% of the total net productive forest area currently available for timber harvesting.

D19 Wehla

This 312 ha block incorporates the Wehla Historic Reserve (62 ha) and 250 ha of hardwood production area (state forest). It includes two fauna refuges and provides habitat for swift parrot. It contributes to representation of several vegetation communities, including Alluvial Terraces Herb-rich Woodland EVC.

The net available productive forest area covered by the recommended Wehla Nature Conservation Reserve is 83 ha. This is less than 0.1% of the total net productive forest area currently available for timber harvesting.

D20 Moliagul

Moliagul is a 530 ha block that incorporates existing state forest. It includes two large old tree sites and one fauna refuge and provides habitat for powerful owl and is a key site for swift parrot. It contributes to representation of several vegetation communities.

The net available productive forest area covered by the recommended Moliagul Nature Conservation Reserve is 404 ha. This is 0.3% of the total net productive forest area currently available for timber harvesting.

D21 Lexton

This is a 243 ha block in a hardwood production area (state forest), north of Lexton. It has large yellow box, long-leaf box, grey box and river red gum trees. A large old tree site occupies the entire block and three fauna refuges are also present. It contributes to representation of several vegetation communities, including Creekline Grassy Woodland and Alluvial Terraces Herb-rich Woodland EVCs.

The net available productive forest area covered by the recommended Lexton Nature Conservation Reserve is 60 ha. This is less than 0.1% of the total net productive forest area currently available for timber harvesting.

D22 Bung Bong

Bung Bong is a 420 ha block in hardwood production (state forest) area, east of Avoca. It provides habitat for the threatened weak daisy, and contributes to representation of several vegetation communities, including Alluvial Terraces Herb-rich Woodland EVC.

The net available productive forest area covered by the recommended Bung Bong Nature Conservation Reserve is 168 ha. This is less than 0.1% of the total net productive forest area currently available for timber harvesting.

D23 Talbot

This 174 ha block is in hardwood production area (state forest), southwest of Maryborough. It is characterised by species-rich vegetation and large old eucalypts. It includes one fauna refuge and provides habitat for threatened species; notably, trailing hop-bush and clover glycine. It contributes to representation of several vegetation communities, including Alluvial Terraces Herb-rich Woodland and Creekline Grassy Woodland EVCs.

The net available productive forest area covered by the recommended Talbot Nature Conservation Reserve is 118 ha. This is less than 0.1% of the total net productive forest area currently available for timber harvesting.

D24 Caralulup

Caralulup is a 1 400 ha block in uncommitted land (state forest), south of Maryborough. It includes two large old tree sites and two fauna refuges. It provides habitat for powerful owl and brush-tailed phascogale and contributes to representation of several vegetation communities, including Alluvial Terraces Herb-rich Woodland, Grassy Woodland and Creekline Grassy Woodland EVCs.

The net available productive forest area covered by the recommended Caralulup Nature Conservation Reserve is 757 ha. This is 0.6% of the total net productive forest area currently available for timber harvesting.

D25 Dunach

This 494 ha block is in a hardwood production area (state forest), south of Maryborough. It includes one fauna refuge, and provides habitat for several threatened species; notably, sharp midge-orchid, scented bush-pea, square-tailed kite, painted

honeyeater, swift parrot and brush-tailed phascogale. It contributes to representation of several vegetation communities, including Alluvial Terraces Herb-rich Woodland and Grassy Woodland EVCs. It also contains the well preserved, but abandoned, Charlie's Steam House site which should be protected. It has historic and scientific significance due to its association with the production of eucalyptus oil.

The net available productive forest area covered by the recommended Dunach Nature Conservation Reserve is 150 ha. This is 0.1% of the total net productive forest area currently available for timber harvesting.

D26 Timor

Timor is a 735 ha block in hardwood production area (state forest) north of Maryborough. It has a species-rich understorey and one fauna refuge and provides habitat for threatened species; notably, Williamson's wattle, and leafy templetonia, and includes swift parrot key sites. It contributes to representation of several vegetation communities, including Grassy Woodland EVC.

The net available productive forest area covered by the recommended Timor Nature Conservation Reserve is 539 ha. This is 0.4% of the total net productive forest area currently available for timber harvesting.

D27 Havelock

This 1 779 ha block is in hardwood production area (state forest), north of Maryborough. It has a species-rich understorey, and includes one large old tree site and four fauna refuge sites while providing habitat for threatened species; notably, small milkwort, spreading eutaxia and leafy templetonia, and includes key sites for swift parrots. It contributes to representation of several vegetation communities, including Grassy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs.

The net available productive forest area covered by the recommended Havelock Nature Conservation Reserve is 1 545 ha. This is 1.2% of the total net productive forest area currently available for timber harvesting.

D28 Waanyarra

Waanyarra is a 2 927 ha block that contains high quality vegetation. It incorporates the existing Tarnagulla Flora Reserve (1 152 ha), hardwood production area (state forest) (1 630 ha), and township land (145 ha). It includes three fauna refuge sites and provides habitat for threatened species; notably, cane spear-grass, dainty phebalium, swamp diuris and powerful owl, and includes key sites for the swift parrot. It contributes to representation of several vegetation communities, including *Northern Goldfields* Heathy Woodland, Grassy Woodland and Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVCs. It also contains a eucalyptus distilling site of historic and scientific significance which should be protected.

The net available productive forest area covered by the recommended Waanyarra Nature Conservation Reserve is about 1 290 ha. This is 1.0% of the total net productive forest area currently available for timber harvesting.

A number of submissions expressed support for the protection of the area within the reserve as proposed in the ECC's Draft Report. Some believed the area more worthy of state park status due to its large size and biodiversity values, and perceptions that the area was being damaged by mineral exploration and mining activities.

Opposition came from timber cutters and recreational prospectors who wanted continued access. The area was identified as being part of a significant goldfield. Others called for the area to remain state forest to limit restrictions on prospecting and camping.

Significant amendments have been made to the recommended reserve in response to submissions from user groups. The ECC has recommended a considerably smaller area than the 6 307 ha reserve proposed in the Draft Report. Timber harvesting would continue in a larger area of state forest and prospectors would continue to have access.

D29 Mt Korong

This 465 ha block east of Wedderburn incorporates the existing Mt Korong Scenic Reserve and is characterised by steep, rocky granite hills that provide diverse reptile habitat. The site also provides habitat for threatened species; notably, Deane's wattle, inland pomaderris and turquoise parrot.

D30 Mysia

This 4 ha site north-east of Wedderburn incorporates existing uncategorised public land and represents a significant remnant of Northern Plains Grassland EVC. It provides habitat for threatened species; notably, pale spike-sedge, hairy tails, long eryngium, Rohrlach's bluebush, bottle bluebush and dwarf bluebush. It contributes to representation of Plains Grassy Woodland EVC.

D31 Bells Swamp

This 10 ha site incorporates the Bells Swamp Wildlife Reserve, near Eastville. It supports good stands of river red gum. It contributes to representation of Plains Grassy Woodland EVC.

D32 Leichardt

This 33 ha site incorporates the existing Bullock Creek Streamside Reserve north-west of Bendigo, and is characterised by grassy woodland and riparian vegetation in good condition. It contributes to representation of Plains Grassy Woodland EVC.

D33 Wilsons Hill

This 21 ha site incorporates part of the existing Wilsons Hill Bushland Reserve near Marong, and provides habitat for threatened species, notably, cane spear-grass and leafy templetonia. It contributes to representation of various vegetation communities, including Grassy Woodland EVC.

D34 Shelbourne

Shelbourne is an 840 ha block in hardwood production area (state forest) west of Bendigo. It is a key site for brush-tailed phascogale, swift parrot and contributes to representation of several vegetation communities.

The net available productive forest area covered by the recommended Shelbourne Nature Conservation Reserve is 712 ha. This is 0.6% of the total net productive forest area currently available for timber harvesting.

D35 Muckleford

Muckleford is a 543 ha block in hardwood production area (state forest), south of Maldon. It includes three fauna refuge sites, and provides habitat for several threatened species; notably, weak daisy, crimson spider-orchid and brush-tailed phascogale, and includes a key site for swift parrots. It contributes to representation of several

vegetation communities, including Alluvial Terraces Herb-rich Woodland EVC. It also has recorded social and historic community heritage values.

The net available productive forest area covered by the recommended Muckleford Nature Conservation Reserve is 397 ha. This is 0.3% of the total net productive forest area currently available for timber harvesting.

D36 Kaweka

This 3 ha block within Castlemaine township was originally private land donated by the owner to the Crown, to be kept as a wildflower reserve. This reserve has a committee of management that actively manages the block. It is a representative example of Heathy Dry Forest EVC that includes an intact understorey of high quality.

D37 Fryers Ridge

This 2 149 ha block near Taradale incorporates the existing Fryers Ridge Flora Reserve (1 427 ha), 586 ha of hardwood production area (state forest), and 136 ha beside the adjoining aqueduct. The addition has two large old tree sites, and provides habitat for several threatened species; notably, clover glycine, dwarf geebung, broad-lip leek-orchid, maroon spider-orchid, naked beard-orchid, Fryerstown grevillea and creeping grevillea. It contributes to representation of several vegetation communities, including Valley Grassy Forest EVC.

The net available productive forest area of durable species covered by the recommended Fryers Ridge Nature Conservation Reserve is 65 ha; much of the remaining hardwood production area has mixed species forest.

D38 Taradale

This 191 ha block incorporates the existing Taradale Bushland Reserve. It provides habitat for several threatened species; notably, brush-tailed phascogale, mat flax-lily, crimson spider-orchid, Williamson's wattle, naked beard-orchid, early golden moth, Fryerstown grevillea, creeping grevillea, and tall wallaby-grass. It contributes to representation of several vegetation communities.

Several submissions referred to the current biodiversity-orientated management of remnant Box-Ironbark vegetation on private land adjoining this reserve, and its use as a wildlife corridor to Metcalfe State Forest.

D39 Pilchers Bridge

This 2 274 ha block incorporates the existing Pilchers Bridge Flora and Fauna Reserve (620 ha) and 1 654 ha of uncommitted land (state forest), south-east of Bendigo. It includes one large old tree site and seven fauna refuges and provides habitat for several threatened species; notably, powerful owl, bush stone-curlew, swift parrot (key site) and brush-tailed phascogale. It contributes to representation of several vegetation communities, including Valley Grassy Forest and Creekline Grassy Woodland EVCs.

The net available productive forest area covered by the recommended Pilchers Bridge Nature Conservation Reserve is 853 ha. This is 0.7% of the total net productive forest area currently available for timber harvesting.

D40 Salomon Gully

This 20 ha site in Bendigo incorporates the existing Salomon Gully Flora Reserve (19 ha) and a small adjacent parcel of township land (1 ha). It contains a diverse and relatively intact understorey which includes Ausfeld's wattle.

Part of this reserve may be required for surface infrastructure associated with underground mining.

D41 Jackass Flat

The existing Jackass Flat Flora Reserve (54 ha) has been extended with several parcels of township land (17 ha in total) to create this 71 ha site in Bendigo. It contributes to representation of various vegetation communities, including Grassy Woodland and Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic EVCs.

D42 Whipstick

Eighty-three hectares of former freehold land was recently presented to the Crown in exchange for public land lost to mining near Fosterville. This block is recommended as a nature conservation reserve abutting the existing Whipstick State Park. The block contains populations of grey-crowned babbler and Williamson's wattle.

D43 Mt Sugarloaf

This 660 ha block is in hardwood production area (state forest) east of Bendigo. It has species-rich vegetation and widely-spaced large trees. It includes one fauna refuge and provides habitat for several

threatened species; notably, buloke, clover glycine and brush-tailed phascogale. It also includes a prominent strike ridge in Ordovician sandstone of regional geological and geomorphological significance. It contributes to representation of several vegetation communities, including Heathy Woodland EVC. It also has recorded social community heritage values.

The net available productive forest area covered by the recommended Mt Sugarloaf Nature Conservation Reserve is about 500 ha. This is 0.4% of the total net productive forest area currently available for timber harvesting. This area has been increased from 455 ha since the Draft Report, to avoid the difficulty of managing small areas of state forest around the margin.

D44 Axedale

These blocks, totalling 3 ha, are adjacent to the former railway reserve adjoining Axedale cemetery. They are recommended as a nature conservation reserve to complement the existing Axedale Flora and Fauna Reserve on City of Greater Bendigo land. These blocks provide habitat for several threatened species; notably, grey-crowned babbler. Together these blocks will contribute to the representation of the threatened Grassy Woodland EVC in the reserve system.

Eppalock Nature Conservation Reserve, proposed in the Draft Report, is now recommended as state forest. Its biodiversity values are to be protected in state forest management (see Recommendation F4).

D45 Crosbie

This 2 060 ha block incorporates hardwood production and uncommitted land (state forest), north of Heathcote. It includes five large old tree sites and three fauna refuges. It provides habitat for several threatened species; notably, Ausfeld's wattle, regent honeyeater, grey-crowned babbler, powerful owl and the westernmost extent of a squirrel glider population which extends north-east into New South Wales. It is also a key site for swift parrot. It contributes to representation of several vegetation communities, including Grassy Woodland and Alluvial Terraces Herb-rich Woodland EVCs.

The net available productive forest area covered by the recommended Crosbie Nature Conservation Reserve is 1 265 ha. This is 1.0% of the total net productive forest area currently available for timber harvesting.

D46 Spring Plains

This 1 315 ha block is in hardwood production area (state forest), south of Heathcote. It includes one large old tree site and provides habitat for several threatened species; notably, swift parrot and powerful owl. It contributes to representation of several vegetation communities in the reserve system including Creekline Grassy Woodland EVC.

The net available productive forest area covered by the recommended Spring Plains Nature Conservation Reserve is about 840 ha. This is 0.7% of the total net productive forest area currently available for timber harvesting.

D47 Tooborac

Tooborac is a 330 ha block of state forest, north of Pyalong. It includes one large old tree site and two fauna refuges. It provides habitat for the powerful owl and contributes to representation of several vegetation communities.

The net available productive forest area covered by the recommended Tooborac Nature Conservation Reserve is 75 ha. This is less than 0.1% of the total net productive forest area currently available for timber harvesting.

D48 Spring Creek

Spring Creek is a 401 ha site that incorporates part of the existing Mt Black Flora Reserve (58 ha) and 343 ha of Rushworth–Heathcote State Forest, west of Nagambie. It includes one large old tree site and one fauna refuge and provides habitat for several threatened species; notably, powerful owl, brush-tailed phascogale and squirrel glider. It contributes to representation of several vegetation communities, including Creekline Grassy Woodland EVC.

The net available productive forest area covered by the recommended Spring Creek Nature Conservation Reserve is 137 ha. This is 0.1% of the total net productive forest area currently available for timber harvesting.

D49 Murchison-Rushworth Disused Railway

This 69 ha site incorporates part of the disused rail reserve between Murchison and Rushworth. It contains vegetation of high conservation significance, provides an important link between remnant vegetation patches on public land, and parts contain fauna refuges. The reserve also

provides habitat for threatened species; notably, grey-crowned babbler and Ausfeld's wattle. It contributes to representation of various vegetation communities, including Plains Grassy Woodland, Grassy Woodland, Gravelly-Sediment Broombush Mallee/Box–Ironbark Forest Mosaic, and Alluvial Terraces Herb-rich Woodland/Plains Grassy Woodland/Gilgai Wetland Mosaic EVCs. With its recorded natural and historic values, this reserve may also provide opportunities for the establishment of a rail (walking) trail in the future.

D50 Mangalore

This 78 ha reserve, listed as an existing nature conservation reserve in the Draft Report, is now recommended as an expanded reserve to incorporate boundary changes as a result of the duplication of the Goulburn Valley Highway. The duplication removed 1.5 ha from the western boundary, but 14 ha of former freehold land with indigenous vegetation adjoining the eastern perimeter was added. Threatened species recorded in or adjacent to the recommended reserve include swift parrot, brush-tailed phascogale, squirrel glider, bush stone-curlew and shiny wallaby-grass, and declining woodland birds such as Gilbert's whistler and hooded robin also occur there.

D51 Arcadia

Located east of Arcadia, this existing 8 ha bushland reserve provides habitat for several threatened species; notably, leafy templetonia, yellow-tongue daisy and bush stone-curlew. This block contributes to the representation of the endangered Plains Grassy Woodland EVC in the reserve system.

D52 Gum Swamp

This 16 ha shallow wetland with river red gums, incorporates the existing Gum Swamp Wildlife Reserve north of Euroa. It contributes to representation of several EVCs, including Plains Grassy Woodland in the reserve system.

D53 Tamleugh

These blocks, totalling 22 ha, consolidate adjacent bushland reserves at Tamleugh. They provide habitat for several threatened species; notably, white cypress-pine, leafy templetonia, grey-crowned babbler, bush stone-curlew and squirrel glider. The recommended reserve contributes to the representation of various vegetation communities in the reserve system, including Grassy Woodland EVC.

D54 Shire Dam Swamp

The 25 ha existing Shire Dam Swamp Wildlife Reserve, north-west of Violet Town is recommended as a nature conservation reserve. This shallow swamp contains river red gum and grey box trees. It contributes to representation of Plains Grassy Woodland/Gilgai Wetland Mosaic EVC in the reserve system.

D55 Gowangardie

This 3 ha reserve south of Gowangardie incorporates two separated parcels of crown land, the existing Gowangardie Flora Reserve (2 ha) and the bushland reserve to the south (1 ha). Together these blocks are recommended as a nature conservation reserve recognising their importance in providing habitat for several threatened species; notably, bush stone-curlew, grey-crowned babbler, squirrel glider and leafy templetonia. These blocks contribute to the representation of Alluvial Terraces Herb-rich Woodland EVC in the reserve system and also contain a disjunct occurrence of Broombush Mallee EVC that includes green mallee.

D56 Caniambo

This 11 ha existing bushland reserve, located south-east of Gowangardie, contains significant flora values, notably small scurf-pea and slender tick-trefoil. The block also provides habitat for the grey-crowned babbler and contributes to the representation of Alluvial Terraces Herb-rich Woodland EVC and Plains Grassy Woodland EVC in the reserve system.

D57 Baddaginnie

This 15 ha existing bushland reserve, west of Benalla, has significant flora values, providing habitat for several threatened species, including leafy templetonia and swamp billy-buttons. The block also provides habitat for the threatened squirrel glider. It contributes to the representation of Plains Grassy Woodland/Gilgai Wetland Mosaic EVC in the reserve system.

D58 Nathalia

This 183 ha site along the Broken Creek, from Narioka Reserve west of Nathalia to Paynes Bridge east of Numurkah, contains wide tree cover in some sections and historical values. It incorporates an existing streamside reserve (22 ha), an area of public land water frontage (154 ha), and the Narioka

recreation reserve (7 ha). It includes some areas carrying mature trees with good quality understorey. It supports regionally significant plant species and provides potential habitat for superb parrot. It provides habitat for spreading eutaxia and contributes to representation of Pine Box Woodland/*Riverina Plains* Grassy Woodland Mosaic EVC, and Plains Grassy Woodland/Gilgai Wetland Mosaic EVC.

D59 Numurkah

This 638 ha reserve, comprising four sections, incorporates a large area of public land water frontage along Broken Creek and the lower reaches of Nine Mile Creek (521 ha), a streamside reserve (80 ha), a section of the Numurkah–Picola disused railway line (19 ha), Naringaningalook bushland reserve (9 ha), the existing Numurkah rifle range (6 ha) and recreation reserve (3 ha). Some areas retain vegetation cover of regional significance including mature trees and good quality understorey. This recommended reserve provides habitat for several threatened species, including squirrel glider, leafy templetonia, small scurf-pea, tough scurf-pea, long cryngium, buloke and mallee golden wattle. It contributes to representation of Creekline Grassy Woodland, Plains Grassy Woodland/Gilgai Wetland Mosaic, Plains Grassy Woodland and Pine Box Woodland/*Riverina Plains* Grassy Woodland Mosaic EVCs.

D60 Yabba South

Yabba South is a 31 ha block north-west of Dookie incorporating an existing bushland reserve. It provides habitat for various rare and threatened species, including corkscrew spear-grass, spurred spear-grass, leafy templetonia and leafy wallaby-grass. It also contributes to representation of Plains Grassy Woodland and Pine Box Woodland/*Riverina Plains* Grassy Woodland Mosaic EVCs.

D61 Wattville

This 39 ha site along the Nine Mile Creek north-east of Dookie has a wide water frontage, mature trees and mostly native groundcover. It incorporates an area of public land water frontage and provides a rare example of a natural creek system. It provides habitat for several threatened species; notably, white cypress-pine, spurred spear-grass and swift parrot. It is an important historical site and contributes to representation of Plains

Grassy Woodland and Creekline Grassy Woodland EVCs in the reserve system.

D62 Boxwood

This 52 ha block on hilly terrain east of Dookie supports extensive open woodland of grey box and red box trees, and includes buloke. It contributes to representation of the highly depleted Grassy Woodland EVC. This block incorporates the existing Boxwood Historic Reserve. Historic features are the result of a limestone mine worked in the 1930s and include an exploration shaft, adit, the foundations of a crushing plant and remnants of a kiln. These sites are to be preserved. A series of open cuts along a calcite vein are also of geological interest.

D63 Youarang

This 217 ha block is situated along the Broken Creek and comprises four sections. It consolidates 173 ha of public land water frontage and two existing bushland reserves (44 ha). The reserve is characterised by old growth woodland, mature trees and mostly native understorey. It provides habitat for threatened species, including spreading eutaxia, southern cane-grass, buloke, leafy templetonia and spurred spear-grass, and has historic values. It contributes to representation of Creekline Grassy Woodland, Plains Grassy Woodland and Plains Grassy Woodland/Gilgai Wetland Mosaic EVCs in the reserve system.

D64 Tungamah

This 883 ha reserve consolidates public land water frontages (165 ha), the existing Tungamah Swamp and Rowan Swamp wildlife reserves (536 ha), a bushland reserve (20 ha), streamside reserve areas (22 ha) and a further 140 ha of public land including uncategorised public land, road reserves and other small parcels. This recommended reserve provides habitat for many threatened species, including red-chested button-quail, barking owl, grey-crowned babbler, plains leek-orchid, bluish raspwort, buloke, woolly buttons, small scurf-pea, pale spike-sedge, smooth minuria, leafy templetonia and spurred spear-grass. It contributes to the representation of Creekline Grassy Woodland, Grassy Woodland, Plains Grassy Woodland/Gilgai Wetland Mosaic and Plains Grassy Woodlands EVCs in the reserve system.

D65 Mt Meg

Mt Meg consists of eight existing bushland reserves which, with the existing Mt Meg Flora Reserve, form the recommended Mt Meg Nature Conservation Reserve (total area 440 ha). Nine threatened species have been recorded in these blocks, including narrow goodenia, umbrella grass, scaly greenhood, northern sandalwood, bush stone-curlew, and carpet python (key site). Although these public land blocks are scattered, there is much native vegetation on freehold land linking them. This district, known as the Chesney Vale Hills, may be well suited as a location for a Conservation Management Network (see Recommendation R14 in Chapter 4).

D66 Wangaratta Common

Wangaratta Common is a 74 ha block located within the Wangaratta township and currently managed as a conservation reserve. It consists of two distinct segments—28 ha of *River Red Gum* Grassy Woodland and 46 ha of *Northern Plains Eastern Grassland (wet)*. Although not strictly Box-Ironbark vegetation communities, the grassland EVC in particular is highly depleted and significant.

The woodland section is dominated by river red gum, including several large trees. The grassland section provides habitat for purple diuris and small chocolate-lily, both of which are threatened.

D67 Cookinburra

This 88 ha block west of Wodonga incorporates the existing Indigo Upper Bushland Reserve and supports a large population of the vulnerable smooth Darling-pea. It contributes to representation of several vegetation communities, including Grassy Woodland EVC.

D68 Fell Timber Creek

This 144 ha block west of Wodonga incorporates land previously owned by the Albury–Wodonga Development Council, recently handed over to the Victorian Government. The whole reserve is 245 ha, part of which is outside the study area. It contains steep hills with rock exposures and a high-quality ground flora. The vulnerable smooth Darling-pea is present, as are various vegetation communities, including Grassy Woodland and Valley Grassy Forest EVCs. This area is managed as part of the McFarlanes Hill unit in the Albury–Wodonga regional parklands.

RECOMMENDATIONS

D5–D68 The recommended reserves listed and described above be used in accordance with the general recommendations for nature conservation reserves on page 167.

Information Sources

Bannear (1997).

Butler (1997).

Context Pty Ltd (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

Holland and Cheers (1999).

Lumsden *et al.* (1997).

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E Historic and cultural features reserves

The Box–Ironbark public lands have a rich and interesting background. After a long Aboriginal history, the area was settled and mostly cleared by European colonists. Many uses or activities have affected the landscape: gold rushes and continued mining; timber harvesting for firewood, mine timbers, sleepers and fencing; apiculture; eucalyptus oil and charcoal production; water supply; roads and railways. More recently, issues of soil erosion and conservation, military training, nature conservation and tourism have had effects on the area.

Locations with obvious connections to historical activities or events, such as relics or even just recorded associations, allow visitors to understand and appreciate past land uses, and gain a different perspective on current activities. Several studies have been carried out in the Box-Ironbark study area, within the original West RFA boundary, with the support of the Commonwealth Government. These identified and systematically assessed the significance of historic places and cultural heritage across the Box–Ironbark landscape.

The following recommendations designate the areas that are:

- most significant;
- represent a major historic or cultural theme; or
- provide opportunities for community education about historic activities and events.

These areas are recommended as historic and cultural features reserves recognising that their primary land use is to protect historic and cultural features and extend public knowledge.

Other historic and cultural features are contained in parks, other reserves and state forest. Such places should be recognised when managed primarily for other purposes. Certain significant features have been specifically identified in the detailed descriptions of those sites.

The historic and cultural features reserves are available for a range of recreation activities where these do not adversely affect the historical and cultural features. With expert advice, land managers will prepare management plans to guide management and use. These plans identify zones with different management needs, areas with

specific heritage or environmental values requiring protection, and necessary management actions.

As with the regional parks, these recommended reserves are to be ‘restricted Crown land’ in relation to mining, under the *Mineral Resources Development Act 1990*. Mineral exploration and mining may be permitted, subject to the approval of the Minister for Environment and Conservation.

The Land Conservation Council recommended, and Government approved, nine historic areas and 36 other historic reserves in its various earlier investigations covering the Box–Ironbark area, including 12 historic and cultural features reserves in the *Historic Places South-western Victoria Special Investigation*. Additional material about relevant sites has been collected for this investigation.

Historic mining sites which provide the physical traces of the 1850s gold rush are fragmented and relatively few. Much of the gold rush landscape has been transformed or obliterated either by natural events, or by settlement, forest operations, and/or subsequent phases of gold mining. Gold-bearing quartz reefs have been repeatedly reworked, while extensive areas of the most fruitful alluvial tracts have been removed by hydraulic sluicing. The recommendations below include significant mining sites with features from the initial gold rushes, later stages of mining and secondary processing of the ore.

Chapter 5 of this report discusses and makes recommendations relating to Aboriginal cultural sites and places, and Chapter 6 discusses non-indigenous cultural heritage, including guidelines for the management of cultural heritage values and general recommendations.

Community views

The protection of significant historic and cultural features received considerable attention in public submissions. Examples of such features were Aboriginal sites and places, particular cultural landscapes, historic Chinese mining and settlement sites, historic mines and mining sites, structures such as bridges and buildings, and relics of past timber harvesting operations.

There was significant support for greater emphasis on managing and protecting historic and cultural features. Many submissions strongly supported the

establishment of a national park in the Castlemaine area, in part to recognise the significant cultural heritage and historic features of the Mount Alexander Diggings. This is addressed in detail in Chapters 6 and 15.

Many submissions proposed specific sites or structures in their area for inclusion in historic and cultural features reserves. Some proposed that sites be enlarged to adequately protect them from active uses on adjoining public land. It was also proposed by a number of people that appropriate interpretive signage should be mandatory at all historic and cultural features reserves.

Achieving a balance

Protection of significant historic and cultural features in the study area is achieved through recognition in zoning or prescriptions in state forest or inclusion of sites in parks or reserves, followed by appropriate management. The primary focus in this category is the establishment of historic and cultural features reserves. These measures would augment the protection relics and objects now have under the *Heritage Act 1995*, the *Archaeological and Aboriginal Relics Preservation Act 1972* and the (Commonwealth) *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

The ECC's recommendations would contribute substantially towards establishing a system of high-level parks and reserves that would protect these areas and their important features. Acknowledging the significant community support and the value of the features in the Castlemaine area, the ECC has recommended the establishment of the Castlemaine Diggings National Heritage Park (see NHP1 Chapter 15). Not only would this recommended park recognise and protect this highly significant cultural heritage landscape and natural values but it would also provide a unique opportunity for the development of tourism based on interpretation of these features.

Management plans should be prepared, in accordance with the Burra Charter, for the recommended places.

The ECC did not systematically assess townships for historic buildings and structures on public land. Accordingly in this investigation, the ECC has not made recommendations to include any such places in historic and cultural features reserves. Numerous buildings in townships across the study area, particularly those from the gold era, are of historic merit—some have been assessed and are included on the Victorian Heritage Register or the National Trust Register. Heritage studies of towns and municipalities that have not been assessed would be valuable, to ensure that significant buildings are appropriately managed. Some buildings are noted in other ECC recommendations in Chapter 18 dealing with community use areas and services and utilities.

The ECC has recommended the enlargement of some reserves to adequately protect them from operations on adjoining public land.

In addition to the features included in other parks and reserves, the important Maldon, Moliagul, Percydale and Whroo goldfields and 32 existing historic areas and reserves are recommended to be retained as historic and cultural features reserves. Some 15 new historic and cultural features reserves are also recommended. In addition, the ECC has identified and listed 14 significant features in state forest, and numerous other features, which should be protected through the forest management planning process or by prescription.

Since the Draft Report, the ECC has recommended that the status of several historic sites be altered. The area containing the Pearl, Pearl East and Stanfield Mine workings area is mostly now uncategorised public land, with the historic features and their immediate surrounds recommended to be protected by the land managers. The Woodbrook Road Bridge is recommended to be protected by the managers of the railway and road at the site, and Dysart Siding has been removed as it is not on public land.

GENERAL RECOMMENDATIONS FOR HISTORIC AND CULTURAL FEATURES RESERVES

Historic and cultural features reserves shown on Map A (numbered E1–E30) be used:

- (a) primarily, to protect places with significant historic values, including remnant historical features such as buildings, structures, relics or other artefacts;
- (b) (i) to conserve indigenous flora and fauna, except where incompatible with protecting the above values, and
(ii) to provide opportunities for recreation and education, where appropriate in the context of present use and management;
- (c) to provide protection for, where present:
 - (i) cultural values, including aesthetic and social values, and
 - (ii) scenic landscape and natural values;

and:

- (d) low impact exploration for minerals, planned to minimise any impacts on significant cultural heritage values, be permitted with the approval of the Minister for Environment and Conservation (see Note 2);
- (e) mining be subject to Government decision on individual proposals (see Note 2);
- (f) prospecting and gemstone-seeking be permitted except in areas where they may disturb protected archaeological relics or adversely affect Aboriginal cultural values or significant historic features;
- (g) timber harvesting not be permitted;
- (h) the re-use of buildings, including for community uses, be permitted where appropriate, with any modifications subject to the approval of the land manager;
- (i) conservation management plans or conservation and action strategies for the historic and cultural features be prepared by the land manager;
- (j) unused road reserves be added to adjoining historic and cultural features reserves where appropriate;
- (k) the areas referred to in recommendations E1 to E16 be permanently reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment;

and:

- (l) the areas referred to in recommendations E17 to E31 be protected through forest management planning and managed by the Department of Natural Resources and Environment.

- Notes:
1. The reserves consist either of the relevant Crown parcel alone, or in broadacre public land, the area of the features to be protected plus, generally, the area within 100 m (for areas of state significance) or 50 m (for areas of regional significance) of the features. Larger or smaller radii may be appropriate in some cases; this should be determined in management plans specific to the site.
 2. In relation to exploration and mining proposals, provisions for a buffer around specific features, principles for consideration of particular proposals, and where appropriate compensation, are to be determined by Government. Surface infrastructure such as air shafts and vents may be required for underground mining. Sites for minor infrastructure may be located in these reserves if necessary, provided historic features are not damaged and intrusion is minimised.
 3. The ECC is aware of a proposal for Bendigo Regional Institute of TAFE to carry out a management planning project using several historic mining sites around Bendigo, considering issues such as renewed mining, protection of historic features, promotion and interpretation, visitor use and management, safety, fire and pest plant control, and future use and ownership, within the framework of the ECC's recommended uses.
 4. While NRE is identified as the land manager, in several cases sites are now or could be managed by other State Government bodies, by local government and/or by committees of management. Provided the historic and cultural features are protected, such arrangements are appropriate. Expert advice should be sought from relevant heritage organisations such as NRE Historic Places Section and Heritage Victoria.
 5. The historic and cultural features reserves E7 – E14 are located in urban Bendigo. Owing to their small size, they are not labelled on Map A or Map D. The ECC holds Crown descriptions of these blocks.

E1 Existing historic and cultural features reserves

Thirty two existing historic areas and reserves are recommended to be retained, but designated as historic and cultural features reserves. They will be used for effectively the same purposes as previously.

Historic and cultural features reserves

- Hand in Hand Cyanide Works, Deep Lead (8 ha) (includes the Band of Hope Mine Workings)
- Leviathan Cyanide Works, Stawell (5 ha)
- North Magdala Co. Mine, Stawell (0.2 ha)
- Moonlight/Magdala Mine, Stawell (3 ha)
- Oriental Co. Mine, Stawell (1 ha)
- Three Jacks Co. Mine, Stawell (1 ha)
- Great Western Lead Mine, Great Western (5 ha)
- Long Gully Shallow Lead, Armstrong (11 ha)
- Bell Rock Co. Mine, St Arnaud (3 ha)
- Lloyd's whip shaft and mud-brick structure, Stuart Mill (13 ha)

Historic areas

- Percydale (1 272 ha)
- Moliagul (1 010 ha)
- Maldon (2 520 ha)
- Whroo (490 ha)

Historic reserves

- Glendhu, south of Landsborough (40 ha)
- Landsborough (16 ha)

- Lower Homebush, north-east of Avoca (1 ha)
- Nine Mile, west of Wedderburn (12 ha)
- Tipperary Hill, north-west of Maryborough (5 ha)
- Timor, north of Maryborough (7 ha)
- Simson, north of Maryborough (5 ha)
- Majorca, south-east of Maryborough (16 ha)
- Kong Meng, north of Majorca (20 ha)
- Goldsborough, north-west of Dunolly (7 ha)
- McIntyre, north of Moliagul (38 ha)
- Rheola Hill, Rheola (72 ha)
- Gooseberry Hill, east of Dunolly (1 ha)
- Wild Dog Diggings, east of Dunolly (24 ha)
- Wanalta Weir, west of Rushworth (5 ha)
- Bailieston, north-west of Nagambie (111 ha)
Note: the northern parcel has been revoked.
- Murchison Water Water trust pump, south of Murchison (1 ha)
- Chiltern Valley Extended Mine, west of Chiltern (10 ha)

Notes:

1. The remaining 49 ha of the former Fosterville historic reserve is recommended to become state forest. The most significant historic features present in this reserve were archaeologically recorded before being removed for the Fosterville open cut mine.
2. Several of the above historic areas and reserves have recorded community heritage values (historic, natural, social aesthetic, Aboriginal); for example, the Maldon, Moliagul and Whroo Historic Areas and Timor Historic Reserve.

RECOMMENDATION

E1 The existing historic and cultural features reserves, historic areas and historic reserves described above and listed in Appendix 11 be used in accordance with the general recommendations for historic and cultural features reserves on page 190.

E2–E16 Recommended historic and cultural features reserves

E2 Alma Lead Cyanide Works

This 11 ha site at Timor testifies two main periods of cyaniding, from approximately 1897 to World War One and from circa 1937 to the mid-1950s. The site consists of large raised sand dumps with four, poorly preserved seven metre diameter cyanide vat depressions and some small concrete mounting beds.

E3 Bristol Hill

The 26 ha Bristol Hill Reserve at Maryborough has social, historic and aesthetic values. The primary features are the 1932/33 memorial lookout tower, trees and landscaping. The octagonal reinforced concrete tower has a spiral stair of bluestone from the old Maryborough Gaol. It was built to commemorate gold mining pioneers of the district. Located on a prominent hill immediately west of Maryborough, it is a popular tourist site. Open cuts and remnants of mullock heaps and whim platforms reflect mining history of the site. The Shire of Central Goldfields manages this reserve.

E4 Janevale Monier Bridge

This bridge, constructed over the Loddon River at Laanecoorie in 1911 (0.5 ha), was one of the earliest concrete bridges in Victoria. It is of national significance as a rare and early example of reinforced concrete technology. The bridge is associated with the pioneering concrete firm Monier, and the innovative engineer Sir John Monash. The braced concrete trestles demonstrate a transition from earlier arched concrete bridges to modern beam and pylon construction. Management of this bridge could be delegated to the Shire of Loddon, which maintains the road.

E5 Pickpocket Diggings

These 5 ha diggings at Strangways, south of Newstead, feature relatively undisturbed cement workings with remains of an extensive, shallow open cut. Several collapsed adits and large dumps of washed gravel and pebbles are present. A Chinese water race lies around the hill above the open cut.

E6 South Frederick the Great

This 13 ha mine site at Sebastian failed to prove remunerative and operated only from 1935 to 1938. Features at the site include: a capped shaft still

surrounded by its mullock paddock; concrete foundations of a ten-head battery; and a circular concrete pad, probably a stand for a gas-producer cylinder. The latter documents important technology in the construction and use of gas-producers for mining in the 1930s.

E7 Deborah Company

Deborah Company at Golden Square, Bendigo (0.5 ha) features remnants of well preserved mining artefacts including: a winding engine and steel poppet-head with tubular legs; a workshop with engine blocks; and a twenty-head battery containing concrete machinery footings, floors and engine beds.

The intact chimney stack adds further interest. The mine is capped and is not used commercially, however Bendigo Mining NL has plans to re-open the mine in 2001, to a depth of 600 metres.

E8 North Deborah

North Deborah at Bendigo (1 ha) contains well preserved mine foundations, including a winding engine site with poppet-head, over a shaft covered by a metal grille, three concrete winding engine beds, and an intact nine-metre high circular chimney stack built with hand made bricks. The mine operated commercially from 1937 to 1945. Although the mine is uncapped, it is used by Bendigo Mining NL for ventilation and de-watering of Central Deborah mine.

E9 Central Deborah Tourist Mine

This 0.5 ha tourist mine at Golden Square, Bendigo, operated commercially from 1939 to 1954, yet now acts as a tourist attraction, managed by the Bendigo Trust. It consists of a winding engine site with well preserved and restored features including a winder, air compressor foundations, portions of the ore bin, sections of mine buildings, an air receiver and boiler, and a poppet-head. Parts of the mine measure 300 metres in depth.

E10 Victoria Hill

This 14 ha site at Victoria Hill, West Bendigo, contains features representing several stages of gold mining, including Ballerstedts which has long narrow open cut remains from one of Bendigo's premier mines in the late 1850s/60s, and Lansells

180, containing well preserved late 19th century mine foundations. Victoria Hill has been interpreted and is managed as a historic reserve. In addition, the adjoining area containing a poppet-head and Central Nell Gwynne Mine relics is included.

E11 Royal George Company

This 16 ha Royal George Company mine site at Sparrowhawk consists of a concrete winding engine bed with protruding mounting bolts, foundations of a chimney stack, and a collapsed shaft with scattered bricks and remnants of a baling pond. A mullock heap thirty metres long and eight metres high extends from the shaft.

E12 Comet Shaft, KK Shaft, and Comet Diggings

The 7 ha site, the Comet Hill reef workings and mine at Bendigo, dating from the 1850s/60s until 1913, demonstrates a sequence of mining over time, with remains of winding engine beds, a filled shaft, mullock heap, and an open-cut present. The KK Shaft has the remains of an H-shaped brick engine bed with protruding bolts, and a tailings dump.

E13 Johnson's Nos. 1 & 2 Mines and Golden Age Mine, Garden Gully

The Johnson's Nos. 1 & 2 mines represent one of Bendigo's main mines from the 1870s, with the winding engine beds demonstrating three phases of use from 1870 to the 1920s. The 13 ha site has remains of a powder magazine, other buildings, a dam, and mullock heap. The Golden Age Mine has well preserved winding engine beds, a stone wall, mullock heaps, and there are fragmentary remains of the Princess Dagmar Mine.

E14 Chinese Diggings

The Chinese Diggings site at White Hills, Bendigo was worked from 1852 to the 1930s. Numerous well preserved round and rectangular shafts remain of the sinkings through the hard cemented white alluvial gravels here. This 4 ha site contains most of the remaining shafts near Bendigo associated with Chinese miners.

E15 Echuca & Waranga Trust Irrigation Pump & Channel

The United Echuca & Waranga Water Trust was formed in 1881. The Trust's surviving pump structure, at the junction of Stuart Murray Channel and Goulburn River, is of state significance for its role in early irrigation. It is the oldest known irrigation pump housing in Victoria, and is rare for its age and type. It is also one of the first major designs of the noted engineer Stuart Murray. This 5 ha site consists of a brick shaft 13.7 metres deep with timbered water tunnel, sluice gate and concrete engine and boiler bases.

E16 Days Mill

Days Mill, south of Murchison, is probably the best preserved and most complete example of a stone flour mill from the 19th century, operating from the 1860s to the late 1890s. The 5 ha site also contains a wide range of domestic and farm buildings and artefacts, assembled by one family over three generations. These provide a record of farming and flour milling as well as rural life in Victoria. Days Mill is also recognised as having significant historic and social community heritage values.

RECOMMENDATIONS

E2–E16 The recommended reserves described above be used in accordance with the general recommendations for historic and cultural features reserves on page 190.

E17–E30 Historic and cultural features in state forest

The ECC has identified the following sites in state forests as having historic and cultural values. These sites and their values should be protected through forest management planning.

E17 Wet Patch Lead

This 1.5 ha site, Wet Patch Lead in the Pyrenees Ranges, contains puddling machine hut sites, and associated dams and dumps of gravel. At the head of the gully are well preserved original shallow alluvial workings.

E18 Three Grain Gully

This 1.5 ha site, Three Grain Gully at Moliagul, is one of the sites in the area between Moliagul and Dunolly which, after gold was discovered in 1855, became known as Inkerman diggings. They were rushed for gold several times over the years. The first Inkerman Rush in July 1855, was associated with Three Grain Gully. The remains of alluvial workings consist of a wide band of sinkings and mounds stretching for about 2.5 km. The sinkings are well-defined, intense, and located in a distinct band. A cemetery was established next to the site. The earliest marked grave in the cemetery is dated May 1859.

E19 Bet Bet Lead

This 1.5 ha site was worked periodically between 1854 and early in the 20th century. The site has a rare puddler, the only one of its design found in the central Victorian goldfields.

E20 Almedia Reef

This 1.5 ha site, Almedia Reef at Dunolly, contains the remains of 22 stone structures ranging from surface mounds to fireplaces. It also contains dumps of 19th century rubbish from settlements associated with mining. Remnants of reef workings, including open-cutting, several shafts (filled in) and small mullock heaps, are also present.

E21 Wild Duck Lead Diggings

This 1.5 ha site, Wild Duck Lead Diggings at Dunolly, contains an unusually well preserved puddler. The outer mound of the puddler is approximately 3.5 metres wide and is raised about one metre above ground level. The puddler is in good condition, with the edges of the inner mound and puddling trench still precisely cut. This

appearance suggests that it was used during the 20th century, probably during the 1930s. This puddler is important for estimating the age of more weathered and older, mid to late 19th century puddlers.

E22 Possum Gully Cement Workings

Possum Gully Cement Workings at Amherst contain a variety of relics documenting alluvial mining operations. These include a long stretch of cement lead workings along the gully, with some distinct shaft sinkings through the cement cap, open-cutting and tunnelling. The 2.5 ha site also contains puddling dams connected with the cemented lead workings, and a weathered puddler on a well-preserved site.

E23 White Horse Gully

This gully at Maryborough is an interesting reference point for studying the evolution of shallow alluvial mining. The 2.5 ha site has an embankment marking the interface between ‘new’ and ‘old’ alluvial mining landscapes. To the north is a bare rehabilitated gully, recently extensively strip-mined, and to the south is an old, extensively surfaced or puddled gully.

E24 Battery Dam and Bull Gully Eucalyptus Distilling Site

This 5 ha site at Maryborough had a gold mining history of alluvial and cyanide extraction. A battery and subsequent eucalyptus distilling site were also located here. This site documents the sequence of uses through time, including alluvial gold mining (puddling machine site), quartz gold processing (battery site), and distillation of eucalyptus oil (four distillation vats and condensing pits of an unusual construction). The name Thomas Rice is synonymous with the discovery of gold in Maryborough; the ruins of his house have been identified by the local community, as being culturally significant. Aboriginal, historic, and social community heritage values have been recorded here.

E25 North German Gully

This 2.5 ha site at Majorca contains three weathered puddlers. The largest, 20 ft in diameter is the least weathered and has a pronounced inner mound and deep puddling trench with sheer sides. This site illustrates the continuity of puddling, and how certain gullies and dams tended to be favoured puddling locations.

16 Regional parks, nature conservation reserves, and historic and cultural features reserves

Regional parks, and reserves for nature conservation and historic and cultural features designate public land for particular uses. General recommendations for each of the three categories are made in this chapter, as well as information and recommendations for specific parks and reserves.

C Regional parks

A regional park is an area of public land, readily accessible from urban centres or a major tourist route, set aside primarily to provide recreation for large numbers of people in natural or semi-natural surroundings. Regional parks are generally of at least 1 000 ha and are managed by NRE, through Parks Victoria.

Regional parks have significant value for nature conservation as habitat, for representation of Box–Ironbark vegetation, as well as for their cultural heritage features in particular areas. Regional parks are included as part of the conservation reserve system.

The fragmentation of Box–Ironbark public land and hence its high extent of boundary with private land, and its closeness to many towns, provides an accessible setting for everyday forest use for ‘local recreation’; for walking, riding, running, and exercising dogs. Regional parks have some development for informal recreation; some existing parks are intensively used. They often have vehicle and walking tracks, riding trails, viewing platforms, picnic and barbecue facilities, fireplaces, toilets and interpretation material. These parks are generally available for a range of recreation activities, including orienteering, horse riding on open tracks, prospecting and gemstone seeking. Regional parks do not include sportsgrounds with constructed arenas, or sites exclusively used for one recreation activity. Such recreation areas are described in Section J in Chapter 18.

Park management plans are prepared to guide land managers. These plans identify zones with different management needs, areas with specific environmental or heritage values requiring protection, locations for facilities, and necessary management actions.

Other uses

In relation to mining, these parks are recommended to be ‘restricted Crown land’ under the *Mineral Resources Development Act 1990*. The parks may be used for mineral exploration and mining, subject to the approval of the Minister for Environment and Conservation. Major mining proposals may require an environment effects statement and compliance with obligations under native title legislation. Refer to Chapter 7 for a full explanation.

Apiculture and recreational prospecting generally continue, subject to management plan provisions. Bee sites should be located away from recreation nodes. Grazing is not usually permitted in these parks.

Felling of dead trees for firewood and collection of fallen wood from the ground reduce habitat and are not permitted. Other timber products are similarly not available. Some domestic firewood may be produced from the recommended parks as a by-product of ecological management (see Chapter 4).

Additional regional park areas

Eaglehawk Regional Park at Bendigo is to be included, with state forest and township land around Bendigo, in the recommended Bendigo Regional Park. Another new regional park is recommended at St Arnaud. A substantial addition is recommended to the Ararat Regional Park and a small addition is recommended to the Maryborough Regional Park.

The ECC endorses the existing regional parks at Beechworth (Historic Park), Mt Alexander and Hepburn. Reef Hills Regional Park at Benalla is now recommended as a state park.

E26 Gardners Gully

This 1.5 ha site, Gardners Gully at Muckleford, features a puddler, a bank of washed gravel and remains of a single-roomed mud brick house. The 19th century weathered puddler is 22 ft wide and adjoins a massive bank of washed gravel. This bank, presumably an accumulation from a succession of puddlers, measures 50 metres long, 20 metres wide and stands 2 metres high.

E27 Thornhill Reef

This 1.5 ha site, Thornhill Reef at Green Gully, was reputed to be the most successful 19th century quartz mining operation in the Muckleford area, operating from 1856 to the late 1880s. The site has historical and scientific significance, derived mainly from the survival of different kiln types. It is the only mine so far discovered where there is a range of small below ground kilns and large above ground quartz roasting kilns. This range may provide evidence of the evolution of the quartz treatment process. It is a rich archaeological site. The site has two largely intact roasting kilns in a structure 16 metres by 4 metres, and 4 metres high. There are also five below-ground kilns of varying shapes and sizes. A mullock heap may contain another roasting kiln.

E28 Green Gully

Green Gully (1.5 ha) at Muckleford contains rare remnants from shallow reef mining and four partly bulldozed mullock paddocks with numerous shallow shafts, and alluvial sinking artefacts.

E29 Welcome Reef Mine Site

This 1.5 ha site, at Redcastle, was the richest in the area. It retains considerable integrity and illustrates operations of a late 19th century gold mine. It contains a shaft and flattened mullock paddock, remains of a blacksmith's shed with a stone forge, a poppet-head leg, battery stumps, stone floor and footings, arrangement of bedlogs and iron bolts for a stone boiler setting, and a stack base from the former boiler house.

E30 Poverty Diggings

Poverty Diggings at White Hills (1.5 ha), Rushworth, contains the remains of two puddling machines. One, protected by a swamp, is quite well preserved but requires some management. There is also a large embankment of washed gravel surrounding the puddler, possibly indicating the scale of operation of puddling.

RECOMMENDATIONS

E17–E30 The areas described above, which have historic and cultural significance, be protected through the NRE forest management planning process.

E31 Other historic sites in state forest

Various other historic features occur within state forests. Those of at least regional significance should be protected through the forest management planning process or by prescription during forest operations.

RECOMMENDATION

E31 The historic sites in state forests listed in Chapter 17 be protected through the forest management planning process or through prescriptions during forest operations.

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17 State forests and forest management

Clearing for agriculture, gold rushes, timber harvesting and other uses, have considerably reduced the original extent of the Box-Ironbark forests and woodlands. With careful management, over time the forests can produce more value-added timber, and retain more large trees for habitat.

Over the last 150 years, large volumes of Box-Ironbark timber have been consumed for mining purposes, firewood and charcoal production. The cut of large trees for railway sleepers was also very high, peaking in the 1890s with a resurgence in the 1960s. Many towns in the study area have historically used and continue to use the Box-Ironbark forests for industrial and recreational purposes. These forests and woodlands are now fragmented remnants of a once more-or-less continuous ecosystem. Because so little remains, it is imperative that the forests are managed appropriately to protect and sustain their natural values. This report recognises this need by providing for new parks and reserves across the study area and also making recommendations related to management of state forest.

The current forests have a high number of relatively small trees, as a result of previous harvesting. The ECC's vision is for the development of a more natural forest comprising more open stands with a substantially greater density of large trees (i.e. larger than 60 cm diameter) than the average of 2.1 per hectare currently present. Numerous medium and small trees would also be present.

Forest management, particularly in state forests where timber harvesting and other uses continue, is clearly an important component of nature conservation in the Box-Ironbark study area. This chapter discusses forest management and biodiversity conservation in the 120 950 ha total area of state forest (see Chapter 8 for matters related to timber production and the Glossary for an explanation of technical forestry terms).

Operations are by selection-felling with only marked trees cut, rather than by clear-felling. Sawlog operations cut trees from 45 cm to (in practice) 60 cm diameter, and up to now sleepers have also been cut from sawlog-size trees. Post

cutters harvest trees up to 40 cm diameter, mostly for sawing into split posts, and other fencing products, and cut smaller dimension wood, producing round posts. Firewood is produced as a by-product of sawlog harvesting and post cutting, from heads of felled trees and thinning of small stems, and from numerous commercial or domestic firewood-only coupes. The firewood coupes are marked by forest officers for heavy thinning, to encourage faster growth of retained stems into post and sawlog size trees.

A forest management model developed by NRE Forests Service¹ has predicted that for sawlogs and fencing timbers, the level of cut could increase, because these forests have been cut in recent years at a rate that is below the sustainable yield level. Although it is not easy to determine the actual level of under-cutting, it has been confirmed by field staff as being a deliberate management strategy to encourage the growth of larger and, hence, more valuable trees. Stand improvement following past thinning operations would also be expected to lead to increased availability of these higher quality products.

The model was developed using the Box-Ironbark Timber Assessment² (BITA) which provides detailed data on standing timber, growth, species, origin, stocking, potential products, productivity, habitat characteristics and forest management.

The recommendations in this report would reduce the area of state forest available for wood production in Bendigo FMA by 39%. The modelled estimates (see Table 17.7) indicate that following the ECC's park and reserve proposals, production from the remaining state forests could provide sufficient timber to meet the current harvest levels of sawlogs and fencing products, but there would need to be a reduction in the volume of firewood harvested of about 14%. Some concerns have been

expressed about cutting the same volume of sawlogs and fencing material from a reduced area.

An alternative approach is to assume that a 39% reduction in productive forest area would cause a comparable reduction in harvested volume below the current levels. The ECC's response to the model's predictions, and the views of the Council's economic consultants, are explained in Box 8.1 in Chapter 8.

The characteristics of Box-Ironbark timbers are discussed in Chapter 8, and their capacity for value-adding, through kiln-drying, to produce magnificent high-grade products such as furniture wood. The ECC was keen at the outset of this investigation to endeavour to (at least) maintain the Rushworth sawmilling enterprise, with the expectation that a high percentage of the output would be kiln-dried. The recommendations in this report provide for a reduction in sleeper harvesting but no reduction in sawlog harvesting, with as much as possible directed to kiln-dried value-added uses.

The ECC believes that, in the longer term in these highly fragmented public forests, the community would be best served by shifting firewood production to be sourced mainly from plantations on freehold land, and from coupes within state forest in conjunction with harvesting of higher-value products such as sawlogs and fencing material. This is already likely to occur to some extent as the current cycle of heavy thinning for firewood in high and medium productivity forests will be completed within about 15 to 20 years. This thinning process should result in increased numbers of coupes for higher value products in future, and a 20-year time frame would allow a sufficient period to establish producing firewood plantations on private land.

Firewood is also likely to be available in the short and medium term from parks and reserves where thinning may be used as an ecological management tool.

Typically, the Box-Ironbark public forests are on relatively poor soils in terms of depth, structure, and moisture holding capacity, and on the better soils common on nearby private land, plantations can produce merchantable firewood in 12 to 15 years. A decision to reduce firewood-only operations from public forests would also encourage investment in private plantations.

17.1 Forest management planning and zoning

NRE will carry out forest management area (FMA) planning for the Bendigo and Horsham FMAs following Government consideration of the ECC's recommendations. This will include preparation of detailed zoning for the remaining state forest area, and amending prescriptions as necessary. FMA planning may further reduce the productive area of state forest (and hence volumes of timber products) available.

Forest management plans address biodiversity conservation through:

- protection of a significant proportion of the forest in dedicated conservation reserves or protective zoning;
- specific conservation measures for threatened and sensitive fauna; and
- control of processes that may affect biodiversity.

FMA zoning commonly identifies Special Protection Zones (SPZs), Special Management Zones (SMZs), and General Management Zones (GMZs). The latter forest is available for timber production, although not all is productive.

Zoning or management guidelines provide protection for additional areas with particular values such as rare ecological vegetation classes, habitat for threatened flora or fauna including forest owls, recreation sites, and high sensitivity landscapes.

The FMA planning process will take into account the pattern of public land use established after Government consideration of these recommendations, the requirements of the *Flora and Fauna Guarantee Act 1988*, policy directions in the *National Forest Policy Statement*³ and Victoria's *Biodiversity Strategy*,⁴ and the national forest reserve criteria.⁵

Box-Ironbark state forests are located in various FMAs, as follows:

- Bendigo FMA—Big and Little Tottington, St Arnaud Range, Wedderburn, Dunolly—Inglewood, Maryborough, Bendigo, Castlemaine, Maldon, Rushworth–Heathcote, and small adjoining forests;
- Horsham FMA—Jallukar, Illawarra, Lonsdale, The Ironbarks, Glynwylln and Morrl Morrl forests, around Stawell;

- Midlands FMA—Dunneworthy north of Ararat, Pyrenees Ranges, and part of Dry Diggings forest near Hepburn;
- Mid-Murray FMA—Killawarra forest near Wangaratta; and
- North East FMA—Barambogic forest south of Chiltern.

Note that while the Pyrenees Ranges are within the Midlands FMA, the Pyrenees were included with Bendigo FMA in the Box-Ironbark Timber Assessment, and in the forest modelling.

Horsham FMA was included in the West Regional Forest Agreement⁶ (refer also to Chapter 1). The West RFA has Lonsdale, Illawarra (part), Jallukar, The Ironbarks, and Morrl Morrl forests proposed as SPZs, effectively the same outcome for timber production as ECC's recommended nature conservation reserves. Glynwylln and part of Illawarra remain as state forest, the former as SMZ.

Midlands FMA plan⁷ was published in 1996; however it requires review following completion of the West RFA. The RFA has about two-thirds of Dunneworthy as SPZ, with the remainder SMZ (this differs from ECC's recommendation for a regional park). Three large SPZs in the northern Pyrenees have boundaries coincident with the recommended Landsborough and Landsborough Hill Nature Conservation Reserves, although the RFA has additional SPZs elsewhere in this forest. There are two small SPZs in Dry Diggings forest.

A proposed FMA plan⁸ for Mid-Murray forests—mainly concerned with river red gum forests and woodlands, but including Killawarra forest—has recently been released. It has five small SPZs for regent honeyeater and grey-crowned babbler habitat, and buffers along Irishtown and Chinamans Creeks, with most of the forest as GMZ. This contrasts with the ECC's recommended addition of Killawarra to the Warby Range State Park.

North East FMA plan⁹ was completed in early 2001. It identifies SPZs in the northern and eastern Barambogic forest areas that ECC recommends as additions to the Chiltern–Pilot National Park.

FMA plans outline the detailed basis for forest utilisation and management. Subsequently, wood utilisation plans identify specific areas designated for harvesting. For example, the 2001/2002 wood utilisation plan¹⁰ for Bendigo FMA identifies: 8

coupes for sawlogs, sleepers and residual logs; 34 coupes for fencing materials (mainly for farm fence-posts); and 92 firewood-only coupes (some of which were cut for posts or logs one or two years previously). Coupe plans designate localised features for protection, including steep slopes, stream buffers and proposed wildlife corridors between areas of retained habitat. In the past, one or two coupes were cut for sawlogs, and two coupes for sleepers each year. The residual log coupes contain relatively small volumes of lower quality sawlogs, which have been tendered in the last two to three years, for value-adding.

The *Code of Forest Practices for Timber Production (Revision No. 2)*¹¹ aims at ensuring timber production that:

- promotes an internationally competitive industry;
- is compatible with the conservation of the wide range of environmental values associated with the forests; and
- promotes ecologically sustainable management of native forests.

The revised Code was adopted by the Victorian Parliament in 1997, under the *Conservation, Forests and Lands Act 1987*. It sets out requirements for:

- establishing and tending forests, including regeneration, use of local species and seed sources;
- timber harvesting, including coupe plans, wood utilisation plans, and protection through prescriptions of flora and fauna, water quality, landscape values and soil stability; and
- road construction and drainage.

The Code is implemented through FMA plans, wood utilisation and coupe plans, and prescriptions.

Prescriptions

Forest management prescriptions¹² provide a framework for harvesting operations, including protection of defined types and numbers of hollow-bearing or other habitat trees or trees in particular size classes. These prescriptions aim to integrate wildlife conservation with wood production requirements.

In the late 1980s, detailed harvesting prescriptions specifying the protection of habitat trees were introduced to the Box-Ironbark forests for the first time. These prescriptions had the following aims:

- to protect most large trees (greater than 60 cm) currently in forest stands;
- to provide for recruitment into larger size classes by protecting additional trees in smaller size classes;
- to provide access to a small proportion of larger diameter trees for harvesting of high quality sawlogs; and
- to retain trees with hollows or the potential to form hollows.

These prescriptions were the basis of the classification of merchantable and retained trees used in the Box-Ironbark Timber Assessment and are reproduced in Appendix XIII of the ECC's Box-Ironbark Forests and Woodlands Investigation Resources and Issues Report (1997).

The prescriptions require that, on average, at least two large (greater than 60 cm diameter) trees, two medium trees (40 to 60 cm), and two small trees (20 to 40 cm) per hectare be retained across each coupe harvested, and for each such tree not available, two trees in the next lower size class must be protected. All trees greater than 80 cm in diameter are now fully protected. Tree diameter is measured at breast height over bark.

In addition, the following are also excluded from harvesting:

- sites known to contain rare, vulnerable or endangered species or, communities of flora or fauna of statewide significance requiring protection;
- other sites with significant conservation values requiring protection;
- trees regularly used by gliders (particularly squirrel gliders) for food;
- buffer strips along the banks of designated streams, either 30 metres wide (permanent streams) or 10 metres wide (temporary streams);
- cultural heritage sites of historical or archaeological significance requiring protection;

- forest adjoining developed recreation sites, certain other assets or actively eroding gullies;
- yellow box trees and trees on the NRE Register of Significant Trees; and
- dead standing trees above certain minimum sizes.

The BITA² shows that, on average, only 2.1 trees per hectare larger than 60 cm diameter occur in the forest (see Table 17.1). Under the current prescriptions, Forests Service has indicated that, effectively, all trees larger than 60 cm are excluded from harvesting.

Most hollow-bearing trees are not suitable for commercial purposes. Trees with canopy hollows are first priority for selection as retained habitat trees. In practice, trees with obvious hollows are generally retained in harvesting operations. These protective prescriptions have been developed in the light of both existing management objectives and the present structure of the forest.

Changes over time necessitate that a multi-disciplinary, adaptive management approach be taken to implementation and review of forest habitat prescriptions, taking into account:

- newly available research outcomes
- operational experience
- changes in the structure of forest stands
- changes to management objectives.

Different approaches need to be developed and adopted as new scientific findings are made about wildlife behaviour, forest ecology, silviculture and harvesting techniques, and as new modelling techniques are developed. Administrative and regulatory changes may also require changes in the nature or content of prescriptions.

The need for flexibility means that it is generally not appropriate for this report to make detailed recommendations about the content of prescriptions. However, the recommendations and general guidelines in this chapter provide a durable framework for development of prescriptions in the future.

The ECC has made specific recommendations with respect to increasing the number of larger trees in the forests. These provisions generally reflect current practices with, in some cases, minor modifications.

17.2 Biodiversity conservation in state forests

Effects of past uses

Victoria's Box-Ironbark forests have been extensively disturbed since European settlement. Widespread cutting and clearing for fuel, construction and mining timbers occurred during the gold era in the second half of the 19th century. Heavy demand for timber products during and after the two world wars and in association with the expansion of the railways also led to over-harvesting.

During most of the last 100 years, forest management practices designed to encourage rapid growth of the regenerating forest led to the removal of many older trees that escaped removal during the gold rushes. Also removed were trees with perceived 'defects', including hollows, which were judged unlikely to produce future sawlogs. Today's forest is recovering from the combined effect of these disturbances.

The Box-Ironbark forests are characterised by: very large numbers of small (less than 20 cm diameter) coppice and seedling stems of 20th century origin; a large cohort of 30 to 60 cm diameter trees in dense stands that mostly originate from gold era cutting; and from subsequent harvesting. As quantified in Table 17.1, trees over 60 cm diameter are now rare.

The net effect of the gold rush cutting and subsequent silvicultural operations is that, in many places, trees originating after the gold era are generally of good form having been specifically retained for sawlog production. Hollow-bearing trees of any size are rare because of the impact of the gold rushes and because they have been selected against in subsequent culling operations.

Tree hollows

There is a large amount of scientific evidence on the importance of hollow-bearing trees for wildlife species that use hollows for nesting and roosting (refer to Chapter 4). Table 17.2 summarises the occurrence of canopy and base hollows per hectare, and Appendix 14 shows hollow size and type by tree diameter and species¹³. Given the rarity of hollows in the landscape, particularly large canopy hollows, it is important that existing large trees, including those with hollows, receive high levels of protection and that there is recruitment of smaller hollow-bearing trees to become larger in the future. Better understanding of processes initiating and

promoting formation of hollows in this forest type is important for future management of this wildlife resource. NRE has provided some observations on the processes of hollow formation. Further research into hollow formation is required, and the results used in development and review of prescriptions.

Large old trees

'Old growth forest', as defined in most other Victorian forests, is virtually absent from Box-Ironbark forests, because of their history of clearing and heavy use in the gold rushes, followed by intensive selective harvesting. However, individual large Box-Ironbark trees exist that are over 400 years old. Large old trees, those greater than 60 cm diameter, pre-date the gold rushes. These rare trees have escaped subsequent cycles of harvesting or silviculture because they were too big, non-commercial, or located in areas remote from major townships.

There is strong research evidence that large trees, whether they bear hollows or not, are more important for wildlife than smaller trees. Larger trees contribute to a more open forest structure, produce more nectar more reliably than small trees, and provide a greater diversity of surfaces for foraging and nesting (see Chapter 4). Large trees also contribute to the recreation values in forests for their scenic appeal, and cultural heritage value by representation of the original forest structure.

Large old tree sites

Changes to the forest, from being dominated by large trees to comprising mostly young trees, have almost certainly contributed to the decline of many animals dependent on large trees for their survival. Those areas still containing a reasonable number of large old trees are now important areas of wildlife habitat. Large old tree sites (previously known as mature tree sites) were identified during systematic field studies of Box-Ironbark public land, conducted for NRE¹⁴ and the ECC.¹⁵

Some 108 large old tree sites were identified. The studies applied criteria relating to the size and abundance of trees that are larger than average. These sites reflect places with more large trees, tree hollows, large crowns and other features valuable for fauna and include some of the few remaining individual trees larger than 80 cm in diameter.

Table 17.1 Average number of tree stems per hectare and basal area in each size class

	Tree size class				Total
	< 20 cm	20-40 cm	40-60 cm	> 60 cm	
Number of stems per ha	392	91	13.5	2.1	499
Average basal area (square metres per hectare)	3.88	5.48	2.33	0.86	12.6

Tree size classes (diameter at breast height over bark).

Source: BITA report² and BITA data from NRE, for Bendigo FMA.

Table 17.2 Number of hollows per hectare by hollow type in each size class

Hollow type and size	Canopy hollows per ha Tree size class					Base hollows
	< 20 cm	20-40 cm	40-60 cm	> 60 cm	Total	
Hollow size						
2-5 cm	0.2	1.2	0.6	0.5	2.5	5.1
5-20 cm	0.2	1.3	2.0	1.9	5.4	9.2
>20cm	0	0.1	0.2	0.4	0.7	1.8
Total	0.4	2.6	2.8	2.8	8.6	16.1

Tree size classes (diameter at breast height over bark)

Source: BITA Report, Bendigo FMA² (replaces BITA Report Table 5.7 following reanalysis of data).

Large yellow box trees

Yellow box constitutes only 3% of total basal area across the Bendigo FMA² and yet 13.2% of the total area of large old tree sites in Bendigo state forests was dominated by yellow box.¹⁴ In other Box-Ironbark forests, yellow box has been found to be dominant or co-dominant on 85% of the total area of large old tree sites nominated.¹⁵

The preservation of large yellow box trees is due to their exclusion from harvesting since the 1920s because of their value for apiculture. They are more common in the west of the study area where gold era clearing was less complete. Yellow box commonly grows on valley sites with deeper soils and more moisture and in Valley Grassy Forest EVC where growth rates are faster. However large yellow box trees also occur on some rocky ridges in Hillcrest Herb-rich Woodland EVC sites.

Gullies

Gullies are important for plants and animals. These areas carry vigorous, more diverse vegetation and are relatively moist with deep soil associated with broad flat-bottomed drainage lines. Gullies often

retained the only high quality forest, after settlers cleared the highest quality land in the broad valleys and the plains for agriculture. Other remaining forest and woodland areas are generally on higher ground with poor, shallow soils.

Recent research^{16,17} has found that moist gully areas within Box-Ironbark forests contain both a greater diversity and relative abundance of birds than adjacent slopes and ridges. Arboreal possums and small mammals such as yellow-footed antechinus have also been found to be more common in gullies than in other areas. Hollow-using birds also appear to preferentially occupy gullies. Nectar-feeding species concentrate in gullies rather than on ridges. These areas are particularly valuable because they are uncommon and occupy only a relatively small area within the Box-Ironbark study area.

Three studies^{15,18,19} identified potential fauna refuges within Box-Ironbark forests based on moist gullies. Timber harvesting in such areas would modify key habitat elements by removing larger trees, allowing more sunlight on the ground, disturbing the understorey and reducing the value for fauna.

Buffer strips along streams

Under current prescriptions, buffer or filter strips are rarely applied to Box-Ironbark forest watercourses and drainage lines on the basis that they are generally ephemeral, only carrying flowing water for short periods after the local catchment is wet. As outlined above however moist soil in drainage lines can provide favourable habitat conditions, without necessarily carrying flowing water. The short duration flows are often ‘flash’ responses to heavy rainfall and any disturbed soil present may be subject to erosion. Varying degrees of gully erosion have already occurred in many drainage lines from past uses. The present prescriptions specify buffer strips of 30 metres from designated (permanent or major temporary) streams, 10 metres from designated temporary streams, and 10 metres from gullies with sides at least 50 cm high. There may be a need to better protect temporary watercourses by designation and application of buffers or filter strips. These prescriptions should continue and be subject to the normal review process under forest management planning.

Forest structure

Original distribution of large trees

Several papers based on historical accounts suggest that, pre-European settlement, Box-Ironbark forests in many areas carried from 20 to 30 large trees per hectare.^{20,21} From the BITA data², trees greater than 60 cm in diameter have an average basal area of 0.41 square metres per tree (derived from Table 17.1) and an average diameter of 72 cm. On a fully stocked site (20 square metres per hectare basal area²), 30 such large trees per hectare would account for about 60% of basal area. The remaining basal area would be taken up by numerous smaller trees plus some trees much larger than the average.

Current forest structure

The forest structure has been highly altered since pre-European settlement times, with an average now of almost 500 stems per hectare, most being

less than 25 cm diameter. Subdivisions within the forest management areas, called working circles (see Figure 17.1 below) have been assessed to illustrate the distribution of tree sizes in current forests. Figure 17.2 shows the present distribution of basal area by tree size class for each working circle in the BITA study area.

Virtually all areas are highly modified. Forests in the Castlemaine and St Arnaud working circles are probably the most and least altered areas respectively. In Castlemaine (working circle 5), there are on average 776 stems per hectare present (see Table 17.3). The total basal area is dominated (79%) by small trees, 10 to 25 cm in diameter. Trees over 45 cm account for only 8% of basal area. In contrast, in St Arnaud (working circle 1), there are on average 229 stems per hectare. There are about equal proportions by basal area of small, medium (30 to 40 cm) and larger trees. Table 17.4 quantifies the substantial variation in stems per hectare by diameter class between working circles.

Future forest structure

Under the ECC’s vision for the Box-Ironbark forests, the stand structure in the longer term would more closely approximate pre-European settlement conditions. More large and medium trees would benefit wildlife and would allow an increase in the relative proportion of sawlogs in comparison to other products, leading to increased value-adding for commercial timber harvesting.

Box-Ironbark forests are slow-growing, so changes will take many years to achieve. At current growth rates, a 40 cm diameter tree will take about 60 years² to grow to 60 cm. It is important to understand that while this is a long period in human terms, it is only a moment in the life of the forest.

Accordingly, an important component of forest management over coming decades is the need to address the recruitment of more large trees across the forest. Such recruitment must exceed the anticipated mortality of large trees so that there is an actual increase in large tree numbers.

Figure 17.1 Working circles in Bendigo FMA

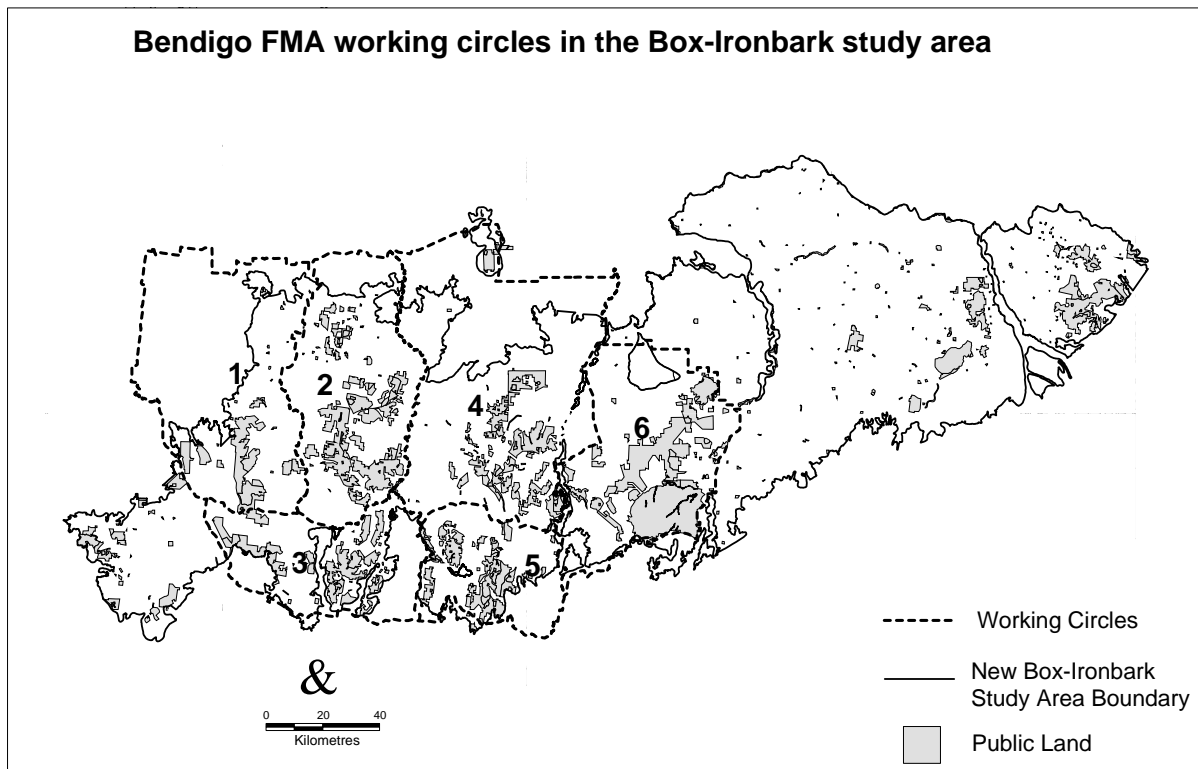


Figure 17.2 Basal area by tree diameter in each working circle in the BITA study area

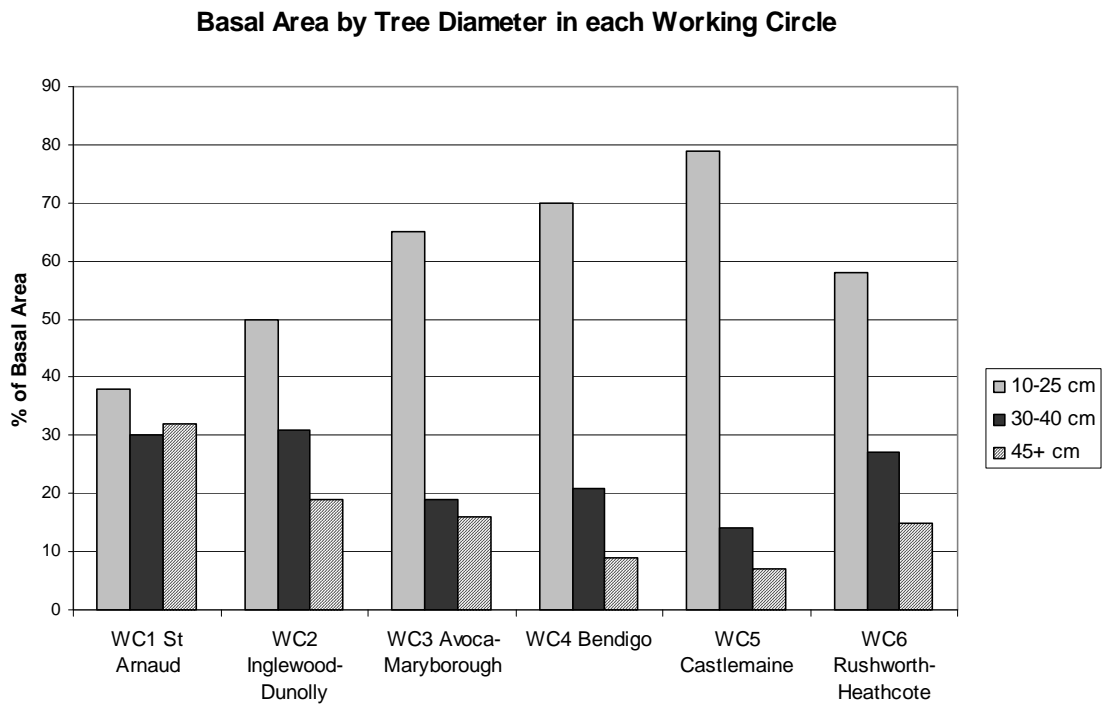


Table 17.3 Average number of stems per hectare and basal area by work centre

Work centres (and relevant working circle number)	Number of stems per hectare	Basal area (square metres per hectare)
1 St Arnaud	229	12.5
2 Inglewood–Dunolly	321 Inglewood	9.4 Inglewood
	358 Dunolly	12 Dunolly
3 Avoca–Maryborough	595 Avoca	19 Avoca
	780 Maryborough	9 Maryborough
4 Bendigo	574	11.7
5 Castlemaine	776	14.5
6 Rushworth–Heathcote	420 Rushworth	12.4 Rushworth
	439 Heathcote	13.2 Heathcote
Average for BITA area	499	12.6

Source: BITA Report, Bendigo FMA² Basal areas are rounded.

Note: A work centre is the location of an NRE office dealing with forest management.

Table 17.4 Number of stems per hectare by diameter class in each working circle

Working circle	< 20 cm	20-40 cm	40-60 cm	> 60 cm	Total
1 St Arnaud	117	86	18	3	224
2 Inglewood–Dunolly	207	85	13	0	305
3 Avoca–Maryborough	582	82	13	1	678
4 Bendigo	451	65	9	0	525
5 Castlemaine	607	84	6	0	697
6 Rushworth–Heathcote	300	100	12	0	412

Source: NRE; data from the Box-Ironbark Timber Assessment, Bendigo FMA

Note: Table 17.3 includes all relevant BITA data; Table 17.4 excludes data from forest assessment plots in recommended parks and reserves, and hence the totals differ slightly from Table 17.3. Numbers are rounded.

Thinning

The maximum diameter growth on individual Box-Ironbark stems is achieved when stands are maintained at less than fully stocked densities (20 square metres per hectare basal area). Diameter growth in fully or over-stocked stands is very low and recruitment into large size classes relies on reducing competition through death or removal of individual trees. Natural self-thinning in Box-Ironbark forests is slow because trees are tolerant of extreme conditions so tend to persist through droughts and fires.

Carefully conducted thinning therefore has an important role to play in producing timber for harvest and achieving the ECC's vision for stands with more than the present density of large diameter trees. The practice can benefit both timber

production and wildlife values. Ecological thinning or other treatment is widely recognised as desirable in many areas within parks and reserves, as silvicultural thinning is in state forests, to ensure that medium-sized trees can grow with reduced competition from smaller trees. Note that thinning in parks and reserves is to be driven purely by ecological needs while thinning in state forests will be a mix of ecological needs and stand improvement for timber production.

17.3 Other forest values

Cultural heritage

Numerous historic and cultural sites and places are located in state forest areas. Many of the historical sites are mining locations identified in studies of gold mining heritage²² across Victoria. Others were identified and assessed in RFA studies funded by

the Commonwealth Government. Studies assessed forest activities²³ (e.g. various camps, charcoal and eucalyptus oil production sites), sawmill and tramway sites,²⁴ places relating to water supply, transport, recreation and other historical themes²⁵, and community heritage values.²⁶

Such sites contribute to our knowledge of the past and some are parts of networks of historical sites that can be interpreted and visited as a group. Zoning or prescriptions in state forest management protect significant sites. Key historic sites to be protected for each state forest are listed following the recommendations. Numerous other historic features occur in forests, not all of which are listed. Significant historic features should be appropriately protected through the forest management planning process.

Recreation and tourism

State forests will continue to provide opportunities for a broad range of recreational activities. Chapter 10 outlines the various public land recreational activities and many of these occur in state forest. Tourists visit state forests to enjoy driving, picnic sites, scenic and historical features, walking and other activities. Orienteering, for example, utilises extensive areas of forested land in both parks and state forest. Car rallies are generally not suited to parks but are commonly run in state forests particularly in the Rushworth–Heathcote area.

Only a very limited area of state forest is actually cut each year in selective harvesting operations. There are many areas where there has been very little recent disturbance. These include particular sites where threatened species are known to occur. State forests also contain many occurrences of rare plants and naturalists and wildflower observers will continue to visit these areas.

17.4 Aboriginal interests

Many Aboriginal cultural sites and places are located in state forests. All Aboriginal cultural sites and places are protected by State and Commonwealth legislation and it is an offence under these Acts to disturb or destroy a site or move a relic without permission from the relevant Aboriginal community.

Aboriginal groups generally support the ECC's recommendations for state forests. There are numerous Aboriginal sites and places throughout state forests and the protection of these sites is a main priority for traditional owners. There is a need

for the systematic assessment of sites and places, in conjunction with traditional owners.

Aboriginal groups also expressed the view that Government should consult their communities more with regard to forest management. They seek greater participation in forest planning and management, and their perception is that acknowledgement of their traditional and continuing relationship with the land is often inadequate.

Traditional owners seek a role in the process of authorising tourism, scientific and commercial activities. They believe that cross-cultural training is necessary for forest management staff, tourism operators and prospectors to ensure respect is shown for Aboriginal sites and places, and that the procedures to follow near such places are understood.

Applications for native title determination lodged with the National Native Title Tribunal include some state forest areas.

The Aboriginal community expressed a desire to be more involved in forest management, the location and protection of Aboriginal cultural sites and places, and any interpretation developed as a result. Consultation with traditional owners and participation in public land and water management are encouraged by the ECC (see Chapter 5).

17.5 Community views

Submissions from the timber industry wanted continued access, for timber harvesting, to the Rushworth—Heathcote and Dunolly—Inglewood State Forests, the recommended St Arnaud Range National Park, Kooyoora and Paddys Ranges State Parks and many proposed nature conservation reserves which were seen as important to the timber industry.

Changes to current management practices were seen as unnecessary by some who considered them sustainable. Several submissions supported the multiple-use of Box-Ironbark forests with timber production and biodiversity conservation given equal weight. The same interests also expressed the view that Box-Ironbark forests were now adequately managed for maintenance of biodiversity.

Many submissions supported continued firewood harvesting, and collecting, in specific proposed parks and reserves. Submitters from several towns including St Arnaud, Tarnagulla, Rushworth and Heathcote were concerned about continued

domestic firewood collection. Many submissions criticised the timber resource modelling based on the BITA data, saying it overstated available resources. There was concern about the potential for job losses in the industry if the ECC's proposals were implemented. Improving forest management through establishment of an advisory committee, recognising the knowledge of those who work in the forest, was advocated. This committee would advise on such matters as the appropriate age for thinning, consistency of tree-marking, accuracy of volume estimates and would include representation from the range of forest users.

Conservation of biodiversity in Box-Ironbark forests and removal of activities perceived as detrimental to conservation were also priorities in many submissions. There was strong support for moving eucalyptus oil, timber and firewood production from Box-Ironbark forests to plantations on private land or, to previously cleared public land, and phasing these industries out of state forests.

Numerous submissions called for protection of large old trees, increased areas in parks and reserves, protection in general for Box-Ironbark forests and woodlands, improved forest management and tighter forest regulation and prescriptions. Use of forest-sourced firewood for heating should generally be reduced according to various submissions.

17.6 Management issues

Ecological vegetation classes (EVCs)

A key issue, the representation of EVCs in reserves, is discussed in Chapter 4 (Nature conservation).

Ecological regeneration

Past practices (some dating back to the gold era) have contributed to the decline of a significant number of flora and fauna species. Although many of the practices have now changed, this documented decline appears to be continuing. Substantial areas with relatively numerous large trees need to be firmly protected in parks and reserves to provide core areas for conservation. In state forest, additional general measures are necessary to assist in reversing the decline of numerous threatened species, particularly fauna.

Tree hollows

Apart from actual clearing of vegetation, loss of large hollow-bearing trees is probably the single greatest factor in the decline of numerous Box-Ironbark fauna species. Analysis of the BITA

hollows data¹³ shows that large trees are few in number but they do contain most hollows and particularly the larger hollows which are required by many species. Large trees provide a range of other values, including reliability of flowering and nectar flows, diversity of foraging substrates, and presence of loose bark. It is important that management plans for state forests protect existing large trees and increase the large tree numbers.

Large old tree sites

Many of the large old tree sites identified during systematic field studies^{14,15} have been included in the recommended parks and reserves. However, other sites remain in state forests. These large old tree sites reflect places that would be expected to have more tree hollows, trees with large crowns and other features valuable for fauna. The ECC considers that they should, as a general principle, be excluded from harvesting.

Fauna refuge areas and gullies

The fauna refuge studies^{15,18,19} identified limited areas with comparatively deeper soils in gullies. Timber harvesting operations should be excluded from identified high value fauna refuges and drainage lines with a defined channel should have at least a filter strip.

Forest structure

An objective of the recommendations in this chapter is to enable the forest to develop a substantially greater density of large diameter trees than the current existing average of 2.1 trees per hectare over 60 cm diameter. These issues are addressed in broad guidelines for forest management on page 217.

Grazing

Grazing is recognised as a current threat to the condition of extensively depleted EVCs on the northern plains. Grazing is limited in extent in Box-Ironbark vegetation types but occurs in remnants of Plains Grassy Woodland EVC on the margins of river red gum forests. The proposed Mid-Murray Forest Management Plan which partly overlaps the investigation area indicates that grazing practices in Box-Ironbark EVCs in some state forests, for example along the Goulburn River, will be reviewed in light of their high conservation values, with the view to modifying or excluding grazing practices as necessary.

17.7 Achieving a balance

The Box-Ironbark forests and woodlands, compared with most other Victorian forests, are very depleted and fragmented and what remains is highly modified. Because of these factors much more comprehensive conservation measures are required to reduce the risk of further regional fauna and flora extinctions.

The goal of managing the Box Ironbark forests to encourage development of forest stands with a greater density of larger diameter trees can achieve both environmental benefits, through provision of better quality habitat, and economic benefits through increased availability of larger and hence higher-value sawlogs.

The ECC believes that biodiversity is best protected through a system of dedicated conservation reserves coupled with appropriate forest management outside conservation reserves.

This report recommends a combination of new parks and reserves in key areas and management of remaining state forest such that:

- biodiversity conservation is given an increased emphasis in forest management; and
- forest habitat and timber values improve over time.

Several different ways of achieving this goal were considered. The main task was to provide the required level of protection for natural and heritage values while limiting the effect on present and future industries.

The ECC recognises that these areas contain significant timber resources, but they also have biodiversity values of great significance. The ECC's view is that it cannot provide adequately for biodiversity conservation and also retain all timber resources available for harvesting.

A key issue was the size and location of parks and conservation reserves and the restrictions that would then be required on harvesting operations in state forest areas. The recommendations in this report were developed after considerable consultation and detailed consideration of a number of options.

This report recommends new areas of parks and conservation reserves, with numerous changes made since the Draft Report in response to community input. Parks and reserves near towns,

proposed in the Draft Report, have been reduced making additional local areas available for forest products including firewood. In particular, the proposed Heathcote Regional Park and the Little Tottington and Eppalock Nature Conservation Reserves are no longer recommended; the Whroo, Waanyarra and Stoney Creek Nature Conservation Reserves have been substantially reduced. Accordingly, larger areas of state forest are recommended to be available near Heathcote, Rushworth, Tarnagulla and St Arnaud to provide for domestic firewood and commercial operations. Also recommended are broad guidelines for forest management. It is intended that these guidelines be used by forest managers in developing detailed prescriptions for future operations.

Forestry operations will continue in the remaining state forests. The recommendations aim at ensuring sufficient state forest will be available to maintain the existing Box-Ironbark sawlog industry, with at least the current level of harvesting. The forest will also provide opportunities for harvesting of other important wood products such as fencing and firewood.

Current firewood collection and harvesting arrangements for forests included in recommended park and nature conservation reserves would not be allowed to continue, except where transitional provisions are established (for example, completion of current coupes) and for parks and reserves where firewood may be produced from proposed ecological management operations.

The ECC has recommended that firewood-only coupes be reduced over time, in favour of harvesting of firewood in conjunction with higher-value products such as sawlogs and fencing material. The expectation is that the reduced volume of sawlogs available from public land will encourage private investment in plantations. The associated public benefits for biodiversity conservation in state forests, and potential benefits for salinity prevention, may also justify incentives from Government. Plantations would lead to increased regional employment through establishment, tending and later, harvesting. Net employment effects are not easily quantified, but the combination of new plantations with the firewood harvesting phase-down should at least be employment neutral. The progress of plantation establishment should be periodically reviewed in order to assess the

appropriate level of firewood harvest in state forest and particularly the need for firewood only coupes.

Thinning as part of ecological management in parks and reserves may continue beyond 15 years, in which case firewood from this source may be available.

The ECC also recommends that sawlog-quality trees, now cut for railway sleepers, be available for value-added uses rather than be committed for sleepers. In some cases in the past, when batches of ‘sleeper’ logs became available, NRE has put them up for tender. That method could be used for the volume cut for sleepers in recent years; it would encourage value-adding users to bid for these high quality logs.

The ECC recognises that the need for substantial additional protected areas in the Box-Ironbark forests is long overdue. The ECC is however required to balance the competing demands on the forest and to consider social and economic issues, including the likely impacts on those now employed in Box-Ironbark timber industries. The final recommendations are intended to achieve this balance.

As previously explained, many timber industry workers in the Box-Ironbark forests work part-time. Some 300 people hold forest operators’ licences, of whom around 160 regularly operate commercially in forest coupes. Most are not occupied full-time in harvesting and selling forest produce, although timber cutting may be their major or only income. In order to allow comparison between industries—tourism, for example, also has many part time workers—and to assist in gauging the scale of industry support likely to be required, the ECC’s economic consultants carried out a survey to determine full time equivalent jobs (FTEs) for each of the forest products. While those numbers are used in economic comparisons, the consultants and the ECC are fully aware that behind each FTE there are between two and three active cutters, and several others who cut wood from time to time.

The ECC is also aware of a scheduling factor affecting the identification of sawlog and fencing coupes over the next few years. While the recommended parks and reserves include mixtures of productive and unproductive forest, and recently harvested and less-recently harvested areas, they do contain some mature timber resources that would have been scheduled for harvesting in the next 10 to 15 years. This may provide some difficulties for NRE in re-scheduling coupes for larger dimension products over that period.

Timber resource modelling

Estimates of timber harvesting potential for the Box-Ironbark region have been modelled by NRE for the BITA study area (based on Bendigo FMA – see Appendix 13). The modelling was independent of the ECC, and was carried out by NRE staff with expertise in this approach.

The BITA data and the model used to estimate the potential impacts of the ECC recommendations contained a series of assumptions. These were based on the best available information at the present time, but further refinement of the data and assumptions may result in future changes to the estimates.

Timber supply levels are subject to change based on periodic reviews of sustainable yield. The estimates in this report do not include any changes to the net productive area resulting from forest management planning processes.

Therefore, timber resource analyses undertaken for these recommendations are not to be interpreted as a revision of the legislated sustainable yield rate. Sustainable yield can only be reviewed after changes have been made to the land area available for timber harvesting as a result of the finalisation of all planning processes. This includes changes resulting from forest management zoning as well as recommended tenure changes.

Table 17.5 Available state forest area before and after ECC proposals

Area of state forest	BITA area (ha)	Other forests (ha)	Total area (ha)
Gross area before ECC proposals	190 790	14 705	205 495
Net area before ECC proposals	116 075	11 065	127 140
Gross area after ECC proposals	118 305	2 645	120 950
Net area after ECC proposals	71 040	2 095	73 135

Notes: 1. The BITA area is Bendigo FMA plus the northern Pyrenees State Forest.

2. Net area is gross area less Code of Forest Practices exclusions and non-productive or low productivity areas, and areas otherwise unavailable.

The baseline model was applied to productive, available forests within the gross state forest area of 190 790 ha in the BITA area. This area includes hardwood production sites, uncommitted Crown land, and eucalyptus oil production areas. The southern Pyrenees State Forest, although included in the BITA study, is outside the Box-Ironbark study area and is excluded. References to the Bendigo FMA below include the northern Pyrenees.

The gross state forest area before ECC proposals in Table 17.5 is about 5 400 ha less than the area published in the Draft Report. The earlier number included existing historic areas that were available for limited timber production. The revised areas are from a new NRE area statement for Bendigo FMA, which accounts for all forest productivity strata and non-productive areas, and has accurate data for the southern Pyrenees exclusion.

A substantial part of the Bendigo FMA is either:

- of low productivity (very slow-growing)
- unproductive (e.g. rocky sites)
- unavailable (mainly through Code of Forest Practices exclusions or prescriptions), or
- not durable species (e.g. mallee in the north, stringybark in the south).

Omission of those areas leaves a net available area of 116 075 ha of high and medium productivity forest. Other forests in both the west and east of the Box-Ironbark study area (but outside Bendigo FMA) add a further 14 705 ha, of which 11 065 ha are available for timber harvesting. This brings the total available productive forest in the study area to 127 140 ha, before any changes due to the recommendations in this report (see Table 17.5 above).

While the ECC has recommended numerous large old tree sites for inclusion in reserves—on habitat conservation grounds—the Council has not preferentially sought to include high productivity forest in reserves. This is illustrated by the similar proportions of high and medium productivity forest (net forest) in total forest area before and after these recommendations.

Bendigo FMA provides 92.8% of the total forest area and modelling for those forests dominates the overall outcome. The growth of Box-Ironbark forest species has not been modelled in the forests outside this FMA but the range of growth rates would be similar to the modelled area.

After the ECC's recommendations, a total of 73 135 ha of productive forest would be available, with 71 040 ha of this in Bendigo FMA. For Bendigo FMA, these recommendations would mean a reduction of 39% in available forest area. About 4 970 ha more state forest would be available than was proposed in the ECC's Draft Report.

Model review and revision

Following criticism that the initial model estimates published in the Draft Report were too high, the ECC requested that NRE review the model. NRE subsequently commissioned consultants to review the methods, assumptions and processes used in the BITA and modelled resource availability analysis, and also to consider issues of concern related to transfer of model predictions to implementation in the field.

The consultants reported²⁷, among other things, that:

- the BITA data collection processes and methods were appropriate and consistent with similar work in other areas;
- generally the assessment and subsequent modelled analysis were well based and produced calculated yields that can be used at the strategic level in determining the impact of proposed changes;
- given the large number of plots, it was reasonable to expect that plots have adequately covered any intrinsic variability within strata;
- the impact of forest management planning and harvest scheduling issues need to be considered separately;
- there was little indication that the assessment or the basic model would overestimate wood availability;
- further reductions in available area or modifications in prescriptions will reduce yields, as could the introduction of zoning to protect flora and fauna as part of subsequent FMA planning; and
- analysing data to determine local management and scheduling requirements should provide an assessment of the implications of ECC's reserve proposals on the supply of timber products.

Following this review, NRE revised the model with the main variation being allowance for current practice in actual implementation of prescriptions in the field. Limited audits conducted recently on harvested areas indicate that the number of trees

currently retained either as habitat or as growing stock in the 40 to 60 cm diameter class are in excess of the required number of trees to be retained as habitat in accordance with the prescriptions. This indicates that there are potentially a significant number of trees available to grow into the 60 to 80 cm class and that, in effect, the current prescriptions in relation to retained trees are being exceeded.

Accordingly, in its revised model, NRE approximated the effect of current practices on available timber yields by modelling a forest structure similar to working circle 1, with a greater number of larger trees and fewer smaller stems. This is the kind of forest structure that could be expected to result from the continued application of current practices, resulting in a real increase in the numbers of large trees across the forest. The revised model produced new estimates for the baseline yields and effects of ECC's recommendations for each product (see Tables 17.6 and 17.7).

The model assumed average values for tree growth rate for each working circle, which is appropriate given the large body of BITA data collected. NRE has advised however that the model is sensitive to changes in growth rate, and accordingly the outcome should be interpreted conservatively.

Outcomes from the revised modelling were substantially lower than the original modelling. They suggested that, after implementation of the parks and reserves recommended in this report and with current management prescriptions, the following volumes of wood could be sustainably harvested:

- around 1 830 cubic metres (net of defect and utilisation losses) of sawlogs;
- around 6 200 cubic metres of fencing products; and
- around 33 640 cubic metres of firewood.

Average annual harvest volumes for the period 1993/94 to 1998/99 for Bendigo FMA were:

- 780 cubic metres of sawlogs and 500 cubic metres of sleepers (total 1 280 cubic metres net)
- 4 100 cubic metres of fencing timbers
- 39 300 cubic metres of firewood.

Estimates were provided for the overall Bendigo FMA as well as for individual working circles within that area. The modelled estimates predicted that the available state forest could continue to supply at

least the present harvests of sawlogs and fencing timbers, but that a reduction of about 14% would be expected in firewood volume. Note that an additional withdrawal of wood resources is likely to occur following subsequent forest management area planning.

Following receipt of the social and economic consultants' Stage 3 report²⁸, the ECC adopted an alternative approach to assessing the effects of its recommendations. Box 8.1 in Chapter 8 (page 69) outlines the ECC's approach, which is considered to be cautious. In summary, the consultants assessed the effect of ECC's recommendations by reducing the future volume harvested for each product below the current actual cut, in proportion to the reduction in net available productive forest, that is, around 39% reduction for the Bendigo FMA. The implications of this change are outlined below.

Social and economic assessment

The ECC's recommendations will have an impact on individual cutters and may have a regional economic impact. The ECC commissioned economists to assess the recommendations for their social and economic effects, to assist the Council in finalising its recommendations and to advise in general terms on appropriate measures to support those potentially affected. A summary of the consultants' report²⁸ is contained in Appendix 5. The following summarises the consultants' key outcomes.

The Stage 3 social and economic report updated data in the Stages 1 and 2 reports, and reviewed the Stage 2 report's assessment of the effects of ECC's recommendations. While making numerous changes, the Stage 3 report endorsed the basic approach and analysis in the Stage 2 report as sound. The Stage 1 report analysed the details provided by individual timber harvesting and milling enterprises from various towns in the Study Area. This provided an indication of the average levels of labour productivity, revenues and costs per unit of timber harvested, and has been augmented by information collected in the Stage 3 social and economic survey, and in the subsequent employment survey. The Stage 2 report assessed ECC's Draft Report proposals.

For Bendigo FMA, timber volumes have been averaged for the six years 1993/94 to 1998/99 as this represents a relatively stable period of harvesting.

Table 17.6 Summary of timber modelling and analysis by NRE¹

Revised baseline — net available productive forest area and modelled product volumes before recommended ECC changes
(all trees greater than 60 cm diameter retained; average growth rates applied in each working circle)

Working circle	Net available area hectares	Sawlogs gross cubic metres	Sawlogs net cubic metres	Fencing products cubic metres	Firewood cubic metres	Total cubic metres
1	13 425	1 007	808	1 723	9 302	11 833
2	30 888	1 012	814	3 108	16 675	20 597
3	21 032	460	366	1 127	5 934	7 427
4	18 776	298	238	1 461	7 950	9 649
5	5 691	48	38	214	1 151	1 403
6	26 263	828	658	2 261	12 112	15 031
Total	116 075	3 653	2 922	9 894	53 124	65 941

- Notes: 1. These are the current net available forest areas and modelled wood product volumes for forests in Bendigo FMA plus the northern Pyrenees State Forest, prior to the proposed changes recommended in this report. High and medium productivity forests are included; low productivity, non-durable species, and unproductive forests are excluded. All trees 60 cm diameter and larger are to be retained unharvested. Totals include net sawlogs, fencing products and firewood.
2. There are an additional 11 065 ha (8.7%) of net available area outside Bendigo FMA for which there are only partial or no resource estimates. Yield records indicating the volumes are outlined in Chapter 8.

Table 17.7 Summary of timber modelling and analysis by NRE¹

ECC changes—net available productive forest area and modelled product volumes following ECC recommended changes
(all trees greater than 60 cm diameter retained; average growth rates applied in each working circle)

Working circle	Net available area hectares	Sawlogs gross cubic metres	Sawlogs net cubic metres	Fencing products cubic metres	Firewood cubic metres	Total volume cubic metres
1	3 280	250	200	420	2 280	2 900
2	21 572	710	570	2 150	11 640	14 360
3	14 040	590	470	1 196	6 480	8 146
4	10 738	170	140	827	4 550	5 517
5	4 560	40	30	170	920	1 120
6	16 850	530	420	1 437	7 770	9 627
Total	71 040	2 290	1 830	6 200	33 640	41 670

- Notes: 1. These are the modelled net available forest areas and wood product volumes for forests in Bendigo FMA plus the northern Pyrenees State Forest, following the proposed changes recommended in this report. High and medium productivity forests are included; low productivity, non-durable species, and unproductive forests are excluded. All trees 60 cm diameter and larger are to be retained. The modelled changes involve the reduced area of available forest. Totals include net sawlogs, fencing products and firewood. Note that an additional withdrawal of wood resources will occur following FMA planning.
2. There are an additional 2 095 ha of net available area outside Bendigo FMA.
3. Excluding harvesting from large old tree sites and 'excellent' quality fauna refuges in state forests would reduce the predicted fencing product and firewood volumes by a further 1.7%, and sawlogs by 1.3%, such that the overall impact is about 39% for sawlogs and fencing products, and about 38% for firewood.

Table 17.8 summarises the net economic contribution, total volume cut and total full-time equivalent (FTE) jobs, and product shares, in the commercial harvest of timber from Box Ironbark forests of the study area. This reveals a total economic contribution of about \$460 000 per year for harvesting the 48 000 m³. Based on the Stage 3 social and economic survey, net economic contributions by product are \$63 per cubic metre for sawlogs, \$17 per cubic metre for posts and \$7 per cubic metre for firewood.

In the firewood industry, much of the employment is taken up by part-time firewood cutters. In the consultants' view it is not appropriate to include domestic firewood collectors in job figures. It is

likely that there will be a continuing strong demand for firewood from native forests in the region, particularly in the vicinity of regional cities and towns. In the event that local supplies became more scarce, consumers within the study area would have to pay increased prices for firewood, or move to substitutes such as gas or electricity for heating.

Total level of employment in the sawlog industry is equivalent to about 17 FTE jobs, including sleeper cutting, compared with 12 in the Stage 1 study. Several small-scale sawmills, including operations at Talbot, Inglewood and Rushworth now produce small-dimension sawn timber products from tendered or residual sawlogs, or postlogs that would otherwise have been cut for fencing material.

Table 17.8 Value of production, employment, and volume for each product

	Firewood	Fence timber	Sleepers	Sawlogs	Total
Net economic contribution (\$/year)	295 071	74 579	22 500	67 125	459 275
product share	64%	16%	5%	15%	100%
Total volume (cubic metres)	42 150	4 390	500	895	47 935
product share	88%	9%	1%	2%	100%
Total jobs (FTE)	43	18	4	13	78
product share	55%	23%	5%	17%	100%
cubic metres/person	592	244	120	68	

Note: FTE jobs are not attributed to the 40% of firewood that is collected by domestic operators, but the net economic contribution of domestic firewood is included at the same value (\$7/ cubic metres) as commercial firewood.

Source: Midas Consulting (2001)

Employment implications

The Box-Ironbark timber industry is characterised by a large number of individuals with forest operators' licenses (FOLs), many of whom work part-time as post or firewood cutters. About 160 people with FOLs are active in the forest. Some also own farms, or have other seasonal or regular work; others have a small timber allocation, and may prefer to cut more. Several have relatively large allocations, and employ full-time or part-time staff to assist. Some cutters harvest both products, typically the posts first, then the heads for firewood in the following two years. A few cutters produce value-added products from their post timber allocations.

The ECC's economic consultants conducted an employment survey of full-time and part-time timber cutters to clarify what constitutes a 'full-time equivalent' (FTE) post cutter or firewood cutter in Bendigo FMA. It was aimed at producing a reliable estimate for a normal cutting year, taking into account the above variations. To determine FTEs in

terms of the annual average number of fence posts and volume of firewood cut respectively, a selection of cutters was interviewed. Of the 26 respondents, 13 had been interviewed by the consultants in the Stage 3 social and economic survey. Most cutters were contacted by mail and by telephone.

The 26 operators who responded work full-time or part-time with 16 partners/spouses, 18 casual employees and 2 permanent, a total of 62 people. For both posts and firewood, the consultants were satisfied that the sample of cutters was large enough and that the responses were consistent with each other, over a range, in size of operations. Several cutters do not cut all their allocated volume each year, and the FTE job estimates were adjusted accordingly. Post cutters on average cut 80% of their allocation; firewood cutters harvest 94%.

The Stages 1 and 2 surveys estimated that an FTE post cutter could cut 14 444 posts, and an FTE firewood cutter 1 100 cubic metres each year. The Stage 3 employment survey estimated 6 342 posts and 592 cubic metres firewood per FTE.

It was assumed in the analysis that a full-time job involves a 38 hour week for 48 weeks of the year, i.e. 1 824 hours per year. For firewood, at the local price of \$45/ cubic metres, the 592 cubic metres per FTE volume would provide a gross return of \$26,640—net income would be substantially less. Many firewood cutters only achieve a reasonable level of net income by working considerably more than the nominal 38 hours per week.

The substantial differences between the Stage 2 and Stage 3 surveys can be partly explained by the earlier estimates not allowing for the operators working more than a 38 hour week, or not using up all their allocations. In addition, the Stage 3 survey included all labour required to produce and market the product, including office work.

Actual versus potential levels of timber production

NRE modelling indicated that the effect of the ECC recommendations on timber volume is approximately proportional to the reduction in productive forest area. The consultants chose to focus on the ‘actual’ rather than the potential (modelled) harvest for purposes of the benefit cost analysis and estimates of job losses. It is more likely

that the ‘actual’ estimates will prevail in the short to medium term. It is also likely that there will be job losses over this period whereas the modelled results predicted job increases from existing levels.

Table 17.9 shows the results of the consultants’ analysis based on conservative assumptions about future timber availability. The conservative case—39% reduction in timber volume—is based on the reduction in available state forest area in Bendigo FMA following ECC recommendations.

Defined as in the employment survey, the consultants’ calculated that for the conservative case, approximately 30% of the present timber cutter jobs, measured as full-time equivalents, will be lost in the short to medium term as a result of the ECC’s recommendations.

The Box-Ironbark area was previously included in the West RFA region. On completion of the ECC’s Box-Ironbark investigation, FMA planning will commence in this area, and the JANIS criteria will be taken into account by NRE at that time. The consultants attempted to construct an analysis taking into account the likely effects of applying those criteria, but decided that the exercise was too hypothetical.

Table 17.9 Estimates of impacts on economic returns and employment

	Sawlogs¹	Posts	Firewood	Total
	Volume available (cubic metres per year)			
Recent actual cut from existing net productive area	1 395	4 390	42 150	47 935
Conservative case – actual harvest after ECC changes (39% reduction)	851	2 678	25 712	29 240
	Net economic contribution (\$m per year)		Employment (FTE jobs)²	
	reduction		reduction	
Recent actual cut from existing net productive area	0.46		77	
Conservative case – actual harvest after ECC changes (39% reduction)	0.28	0.18	47	30

Notes: ¹ Sawlogs include sleepers

² Jobs are not attributed to the 40% of firewood that is collected by domestic operators.

Source: Midas Consulting (2001)

Assistance measures

Of those directly employed in the Box-Ironbark forests, timber cutters are likely to be the most affected if the ECC’s recommendations are adopted. In the short to medium term at least, several of them may lose their livelihoods completely while others may face cut-backs in their timber allocations.

In contrast, the consultants consider that most of the benefits of the ECC’s recommendations would be likely to go to Victorians as a whole, in the form of environmental values obtained through the conservation of biodiversity. In other words, the benefits of the ECC recommendations would be widely dispersed while the costs would be localised. This helps to explain the vigorous opposition to the

recommendations in some localities in the study area. The existing income distributions of those expected to suffer losses would be likely to be below those expected to gain, even if adjusted for relative urban and rural living costs. The consultants viewed the ECC's recommendations as potentially regressive, providing a strong case for assistance.

If the ECC recommendations had gone through RFA processes, the majority of the timber cutters adversely affected would have been eligible for assistance under the Victorian Forest Industry Structural Adjustment Package (Vic FISAP). In particular, they could have been assisted under the Business Exit Assistance Guidelines or the Worker Assistance Guidelines.

FISAP funds however are unlikely to be available to the Box-Ironbark timber industry but principles of social justice present an undeniable case for financially assisting the timber workers from other sources if necessary.

There is agreement among many economists and sociologists that adjustment in rural industries can be more painful than that in urban industries, other things being equal. The lack of access to re-training facilities, the average age of those affected, the need to consider moving house and home, and the lack of other job opportunities are some of the reasons for this view.

It is the consultants' view that timber cutters adversely affected by the ECC's recommendations should be assisted at least to the levels that they would be eligible for under Vic FISAP. Some aspects of the package, in particular its emphasis on asset computations, may not be appropriate for the Box-Ironbark timber cutters who are generally small-scale operators. Those affected would need to produce evidence of the effects on their net cash income or net profit resulting from the ECC recommendations, and be considered for assistance on a sliding scale. The consultants' concluded by stating that assistance should be available whether or not those affected rely full-time on the forests for their income.

The ECC agrees with the consultants' views, and supports the provision of assistance to affected cutters (see Recommendation R1 in Chapter 3). This may necessitate an industry restructure in Bendigo FMA. Where specific cutters are affected by the recommendations—the remaining sleeper cutter, and post cutters in the Killawarra addition to

Warby Range State Park—the ECC is proposing a maximum six-year phase-out period, to enable transition to value-adding or other industries.

Recruitment of large trees

The modelling shows that, over time, the number of larger trees can be increased. Trees harvested for sawlogs or sleepers are in the 40 to 60 cm diameter class. There are on average 13.5 trees per hectare in this class, across the BITA area. Fencing timber and firewood are harvested mostly from trees less than 40 cm diameter in thinning operations. Trees in this diameter class are relatively abundant and generally considered to have comparatively lower habitat values.

To ensure that some of these trees are recruited into the 60+ cm cohort before the next harvesting cycle, the ECC is recommending that the existing prescriptions be amended so that, where they exist, the two trees currently required to be retained for habitat purposes in the 40 to 60 cm class be derived from the 50 to 60 cm size class. It is also recommended that two additional trees be retained in the 40 to 50 cm size class.

Of the BITA average of 2.1 trees per hectare over 60 cm diameter, notionally 0.1 trees per hectare (or one tree per 10 hectares) may be removed in keeping with the current prescription. However, because of the way the prescription is currently applied, removal of 60 to 80 cm diameter trees for sawlogs or other products is, in fact, rare. The ECC's recommendation that no trees over 60 cm be harvested is to ensure that there is a significant cohort of large trees in the future. This should be reviewed periodically.

Monitoring and review

The natural growth and development of Box Ironbark forests are slow due to the relatively harsh environment. Accordingly, it takes many years to conclusively demonstrate the effect of management practices. However, monitoring the results of the application of prescriptions as amended above is an important component in adaptive forest management, which will enable prescriptions to be refined through time to achieve the desired outcomes in the forest. Given the relatively long time frame over which the Box-Ironbark forests develop, it is recommended that reviews of the prescriptions be undertaken at ten year intervals to coincide with the forest management planning cycle. This would provide the opportunity for community input to the

review of prescriptions, and contribute to the longer-term vision for the management of these forests.

Decisions about the need to continue to retain these larger trees for habitat or to remove some for timber products would be made after future reviews. Prior to the next sawlog harvesting cycle, monitoring information could be used to make informed decisions about the way in which the expanded resource of larger and hollow-bearing trees would be managed in the future.

The combination of the expanded conservation reserve system in the Box-Ironbark forests and the improvement in habitat conditions in the remaining state forest, as outlined above, should result in a significant enhancement of habitat values across the region over the coming years.

Forest management

Forest management planning after finalisation of the ECC's recommendations would include the following aims:

- to address the development of a forest structure less dominated by small stems;
- to achieve a real increase in the numbers of large trees in state forest; and
- to establish an FMA zoning scheme that protects: known habitat for threatened species in state forest; occurrences of poorly protected EVCs (to meet JANIS criteria where possible); and sites with particular values.

NRE has established a State Forest Habitat Management Working Group to review the basis for forest management prescriptions across Victoria. In reviewing management prescriptions for the Box-Ironbark forests, NRE proposes to consider:

- measures to identify and protect existing large trees;
- management to ensure adequate recruitment into larger tree cohorts;
- the appropriate landscape scale for planning retention and recruitment of larger trees;
- ecological requirements of sensitive forest fauna, including the appropriate distribution of retained trees;
- identification of an ecologically desirable diameter distribution (forest structure) as a goal for stand management;

- management of habitat values in stands over multiple cycles of harvesting;
- forest stand dynamics and responses to thinning; and
- opportunities for modelling to guide decisions on forest stand management.

Other issues for consideration by forest managers include:

- the status of dead standing and fallen trees, and to what extent they should be retained; and
- the status and habitat value of sawlog trees classed as 'residual logs'.

Principles and guidelines for state forest management

Under the following recommendations, no trees presently over 60 cm would be harvested. This reinforces the effect of current prescriptions.

However substantially more than the present 2.1 large trees per hectare are required to improve the structure of the forests and habitat values. Measures to allow large trees to grow on, and to recruit more large trees, are outlined in the principles and guidelines below. Over future cutting cycles the number of these increased large trees to be retained and the number to be cut would be reviewed.

NRE has established the forest stand structure of working circle 1, as described in the BITA report, as an interim management goal for state forest in the remaining working circles. NRE should continue to implement, and periodically review, habitat management prescriptions which provide specific protection for large diameter trees and trees bearing hollows, and should protect sufficient numbers of smaller diameter trees to allow for recruitment to the larger size classes.

A multi-disciplinary, adaptive management approach should be taken to implementation and review of forest habitat prescriptions, taking into account newly available research outcomes, operational experience and changes in the structure of forest stands. Reviews of the prescriptions should coincide with reviews of forest management plans which occur every ten years; these should provide for community input to refinement of the prescriptions. NRE should keep records and conduct regular reviews of compliance with prescriptions, with the outcomes made publicly

available. To facilitate an adaptive approach to forest management, NRE should investigate options for monitoring changes in the structure of forest stands under various management regimes.

Effects of principles and guidelines

NRE recently provided advice on the effects of implementing the recommended principles, guidelines and recommendations for forest management. The proposed measures and the NRE responses are as follows:

Protecting all large old tree sites – approximately 1 487 ha of state forest are in large old tree sites. Protecting these areas (and the ‘excellent’ quality fauna refuges) would reduce the modelled available net sawlog volume by a further 1.3%, fencing by 1.7% and firewood by 1.6%, bringing the total modelled effect of ECC’s recommendations to a 39% reduction for sawlogs and fencing, and 38% for firewood.

Retaining all trees over 60 cm diameter – this approximates current practice, and NRE’s modelling has assumed that this measure is in place.

Retaining two trees in the 50 to 60 cm size class – for this and the other tree retention proposals, NRE has advised that the model cannot be used to quantify the effects of protecting specific numbers of trees in 10 cm size classes. However the numbers of trees can be determined from the BITA data, as shown in Table 17.10. NRE has cautioned that the data are averaged, and pointed to working circles (see Figure 17.1) where designated numbers of trees are not present, but has not drawn conclusions from the data. The ECC’s conclusions are that working circles 1, 2 and 3 have at least two non-merchantable trees per hectare on average in this size class, and these could be protected without affecting sawlog production. Working circles 4 and 6 have one merchantable and one non-merchantable tree per hectare.

Working circle 5 has the fewest medium-sized trees (see Figure 17.2 and Table 17.4 also) and will not support a sawlog industry for many years.

Retaining two trees in the 40 to 50 cm size class – Table 17.10 indicates that two trees per hectare can be retained from non-merchantable trees in all working circles.

Retaining all stems 40 cm diameter and above in fencing/firewood and firewood-only operations – NRE has advised that this approximates current practice, and

that some fencing and firewood material is also produced from heads (and upper trunks) in sawlog operations.

Retaining ten stems in the 30 to 40 cm diameter size class in all operations – Table 17.10 indicates that there are sufficient trees to retain ten stems in all working circles, recognising that these are for growing stock as well as habitat trees.

Retain all trees larger than 20 cm diameter with visible hollows – NRE has advised that this “could be adopted with negligible impact on current timber resource availability in the short term. In the longer term, increasing the relative density of hollow bearing trees...will have a negative impact on diameter increment.”

Protecting ‘excellent’ quality fauna refuges – approximately 377 ha of forest is within ‘excellent’ quality fauna refuges – see comments regarding large old tree sites above.

Retain buffer strips along drainage lines – NRE has advised that the modelled area statements included an allowance for buffers and filter strips.

Coupes are to have permanently fixed boundaries wherever practicable – this proposal is unlikely to have any significant bearing on resource availability. However NRE considers there are substantial operational and management benefits from maintaining flexibility in coupe boundaries, which may need to vary to reflect regional circumstances, structural characteristics and product requirements.

Guideline measures should apply across the whole coupe, rather than on every hectare – this is current practice.

Table 17.10 Number of stems per hectare (ha) of particular size classes by working circle

Number of stems per ha Stem diameter and merchantability	Working circle					
	1	2	3	4	5	6
50 to 60 cm stems						
Merchantable	3	1	2	1	1	1
Non-merchantable	3	2	2	1	0	1
Total	6	3	4	2	1	2
40 to 50 cm stems						
Merchantable	8	7	6	4	3	6
Non-merchantable	4	3	3	3	2	4
Total	12	10	9	7	5	10
30 to 40 cm stems						
Merchantable	23	23	16	15	11	21
Non-merchantable	6	6	7	5	7	8
Total	29	29	23	20	18	29

Source: NRE

PRINCIPLES AND GUIDELINES

The following principles and guidelines provide a broad framework for key aspects of state forest management.

Large old trees

Protect existing large old trees and recruit additional large trees for habitat across the Box-Ironbark forests

- All identified large old tree sites should be protected where possible.
- Sufficient trees should be retained in the lower size classes to provide future large trees.
- [See recommendations F (k) to F (o)]

Forest structure

Restore forest structure over time to more closely approximate the structure before settlement

- Harvesting and silvicultural regimes should be applied that will result in a real increase in the numbers of large trees across the forest.

Hollows

Protect existing hollow trees and implement programs to increase hollow numbers for habitat across the Box-Ironbark forests

- [See recommendations F (p) and F (q)]

Gullies

Protect gullies for biodiversity conservation

- All identified 'excellent' quality fauna refuges, including previously identified drought refuges, should be retained.
- Buffer/filter strips should be retained along defined drainage lines, as appropriate.

Firewood industry

In the long term, source firewood largely from plantations on private land, and the heads of harvested sawlog and fencing trees

- Establishment of plantations for firewood should be encouraged.
- [See recommendation F (j)]

Other forest management measures

Provide transparency and certainty in the application of prescriptions, that when areas or individual trees are identified for protection, they will be protected into the distant future

- Coupes should have fixed, permanent boundaries wherever practicable.
- Measures above should apply across the whole coupe, where relevant, rather than on every hectare.
- [See recommendation F (h)]

F State Forests

GENERAL RECOMMENDATIONS FOR STATE FORESTS

F The area of 120 950 ha shown as state forest on Map A be used in accordance with the principles and guidelines outlined above, to:

- (a) produce hardwood timber, subject to the following:
 - (i) logs should be directed as far as possible to the highest value-added products,
 - (ii) minor products should as far as possible be produced from waste from operations for major products and from thinning operations that remove small diameter stems, and
 - (iii) harvesting of timber should proceed in accordance with the *Code of Forest Practices for Timber Production* and relevant prescriptions;
 - (b) conserve native plants and animals;
 - (c) supply water and protect catchments and streams;
 - (d) provide opportunities for open-space recreation and education;
 - (e) protect historic sites and Aboriginal cultural sites and places;
 - (f) produce minerals, honey, gravel, sand, road-making materials, eucalyptus oil and other forest products;
- and:
- (g) (i) forest management prescriptions applying to Box-Ironbark forests be reviewed at ten year intervals, and
 - (ii) NRE keep records and conduct regular reviews of compliance with prescriptions, with the outcomes of these reviews made publicly available;

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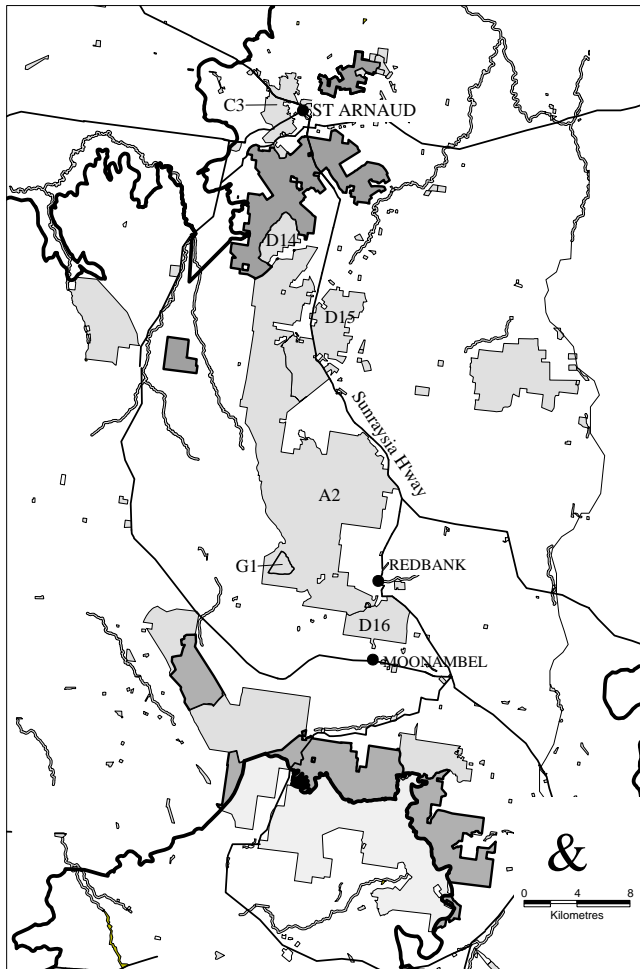
- (h) measures to:
 - (i) implement the principles and guidelines outlined above, and
 - (ii) make secure provision for the conservation of rare or threatened species, depleted EVCs and other characteristics of the forests that should be retained for biodiversity conservation purposes, be put into effect through zoning in forest management planning or prescriptions, as appropriate;
 - (i) within a maximum of six years from the date of Government approval of these recommendations
 - (i) cutting of fencing products cease in the Killawarra forest, or earlier if the cutting cycle is completed sooner;
 - (ii) cutting of sleepers cease in the Box-Ironbark study area;
 - (j) firewood-only coupes be reduced over time, in favour of harvesting of firewood in conjunction with higher-value products such as sawlogs and fencing material;
 - (k) forest stands be managed to increase the relative abundance of large diameter trees in Box Ironbark forests;
 - (l)
 - (i) no trees larger than 60 cm diameter be harvested in the current cutting cycle (until 2030), and
 - (ii) subject to the outcome of periodic reviews of progress with increasing the numbers of large trees for habitat, some harvesting of large trees may take place after 2030;
 - (m) where they exist (see Note 1), at least:
 - (i) two trees per hectare in the 50 to 60 cm diameter class, be retained as habitat trees in sawlog operations, and
 - (ii) two trees per hectare in the 40 to 50 cm diameter class, be retained as habitat trees in sawlog operations;
 - (n) all individual trees larger than 40 cm diameter be retained in fencing and firewood operations;
 - (o) at least ten trees per hectare be retained in the 30 to 40 cm diameter class in forest operations, for growing stock and future large trees;
 - (p) all trees larger than 20 cm diameter with visible hollows be retained as habitat trees, where practicable and consistent with public and operator safety and the attainment of other biodiversity objectives;
 - (q) research into hollow formation in Box-Ironbark forests be conducted and, if feasible, programs which will increase the density of hollow-bearing trees be implemented;
 - (r) Box-Ironbark forests be harvested using systems which seek to optimise growth rates on individual stems for both habitat management and wood production objectives, and which maintain stands in an uneven-aged condition;
 - (s) new information on wildlife ecology or forest structure be taken into account in future forest management strategies;
- and:
- (t) state forests be managed by the Department of Natural Resources and Environment; and
 - (u) the special features in state forest areas listed below be protected under Section 50 of the *Forests Act 1958* or Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions which accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Notes: 1. Trees to be retained under F(m) above should as far as possible be selected from non-merchantable stems.
 2. The list of features requiring protection in the following state forests is based on currently available information. Features may be added or removed over time; for example, as better information becomes available or as the status of particular species changes. These lists do indicate the complexities of managing forests to balance production needs while protecting significant features.

Information Sources

- | | |
|--|---|
| 1 NRE (1999). | 16 Stothers (1999). |
| 2 NRE (1998a). | 17 Soderquist and McNally (2000). |
| 3 Commonwealth of Australia (1992). | 18 Robinson and Rowley (1994). |
| 4 Government of Victoria (1997a). | 19 Robinson and Rowley (1996). |
| 5 JANIS (1997). | 20 Benson and Redpath (1997). |
| 6 Commonwealth of Australia and State of Victoria (2000) | 21 Newman (1961). |
| 7 NRE (1996b) [Midlands FMA Plan] | 22 Bannear (1993a to g; 1994a,b; 1995). |
| 8 NRE (2001b) [Mid-Murray Proposed FMA Plan] | 23 Bannear (1997). |
| 9 NRE (2001c) [North East FMA Plan] | 24 Evans (1999). |
| 10 NRE (2001d) [Bendigo WUP 2001/2002] | 25 Butler (1997). |
| 11 NRE(1996c). | 26 Context Pty Ltd (1999). |
| 12 NRE (1997). | 27 Ryan and Leech (2000). |
| 13 Soderquist (1999b). | 28 Midas Consulting (2001). |
| 14 Soderquist and Rowley (1995). | |
| 15 Holland and Cheers (1999). | |

F1 St Arnaud & Pyrenees State Forests



The St Arnaud & Pyrenees State Forests are the most steeply dissected Box-Ironbark forests. The St Arnaud Range forests are notable for their relatively balanced age structure. The comparative remoteness of these forests from large towns means they are less visited than other forests, and generally less disturbed except around localised mining locations. Pyrenees forests are at the limit of Box-Ironbark vegetation types. The southern fall of the Pyrenees Ranges, dominated by Herb-rich Foothill Forest EVC, has been excluded from the study area.

Benefits of the forest

Timber harvesting

The St Arnaud & Pyrenees State Forests will supply a range of Box-Ironbark timber products, from sawlogs to firewood, and eucalyptus oil.

Biodiversity conservation

Management of this area as state forest, with an increased emphasis on biodiversity conservation, would lead to improved habitat quality for Box-Ironbark flora and fauna. Contiguity of these forests with national parks and nature conservation reserves will maximise dispersal and ranging opportunities for a variety of species across the forests.

Future zoning as part of the forest management planning process will identify Special Protection Zones and Special Management Zones to protect rare or threatened species and communities.

Location

St Arnaud State Forest is in two parts—at the north end of the St Arnaud Range near St Arnaud township and an area with mallee EVCs north-east of the town. Pyrenees State Forest is between Avoca and Landsborough. St Arnaud Range north forests contain 5 390 ha, and Pyrenees forest 7 270 ha; along with Little Tottington Forest (480 ha), a combined total of 13 140 ha. The St Arnaud forests are contiguous with the recommended St Arnaud Range National Park (A2), St Arnaud Regional Park (C3), and Stoney Creek Nature Conservation Reserve (D14). In the Pyrenees, the forests abut the Landsborough Hill and Landsborough Nature Conservation Reserves (D12, D13), and Percydale Historic and Cultural Features Reserve (E1).

Environmental values

Biodiversity

Threatened species recorded within the St Arnaud & Pyrenees State Forests include cane spear-grass, broad-lip leek orchid, inland pomaderris, powerful owl, swift parrot, square-tailed kite and painted honeyeater.

Several occurrences of threatened EVCs are found in the area—Grassy Woodland EVC, Grassy Woodland/Alluvial Terraces Mosaic EVC (St Arnaud), Grassy Dry Forest/Heathy Dry Forest Complex EVC, and Valley Grassy Forest EVC (Pyrenees).

There are three large old tree sites.

Cultural heritage

Historic eucalyptus distilleries, woodcutters' carvings and numerous mining history sites are located in north St Arnaud Range State Forest.

Community views

There was some support in submissions and consultative meetings for maintaining timber production in the St Arnaud & Pyrenees State Forests, and local firewood production near St Arnaud township. Some submissions opposed, while others supported, incorporation of the St Arnaud Range State Forest into a national park. Several submissions wished to maintain access for prospecting. Other proposals were to incorporate the recommended Stoney Creek Nature Conservation Reserve and adjacent state forest into the proposed St Arnaud Range National Park because of their biodiversity values, and to combine the existing Pyrenees State Forest with the adjacent nature conservation reserves.

Current uses and implications

Timber harvesting

The net available productive area in the St Arnaud & Pyrenees State Forests (8 150 ha), is 6.4% of the productive forest in the study area currently available for timber harvesting, and 11.1% of the productive forest after these recommendations.

Timber production and eucalyptus oil production will continue in these forests, subject to the provisions in this chapter and Chapter 8. Compared with the Draft Report proposals, there is a larger area of state forest available near St Arnaud for local wood production, with the recommended Stoney Creek Nature Conservation Reserve (D14) to be reduced, and Little Tottington forest available.

Permits are issued for the collection of fallen timber for domestic firewood, with north St Arnaud Range the most important area. On average approximately 1 860 cubic metres of firewood per annum is collected through the St Arnaud and Avoca work centres. Some 446 ha are cut for eucalyptus oil production.

Apiculture

There are 13 temporary and 16 permanent bee sites distributed through the St Arnaud & Pyrenees State Forests (within the study area).

Recreation and tourism

St Arnaud Range north is used for bushwalking, nature observation, fossicking, camping, hunting and picnicking. Pyrenees Range is used for car touring, trail bike riding, nature observation, fossicking, camping, picnicking and horse riding.

Pyrenees Range has moderately rugged bushwalking opportunities and important opportunities for relatively remote recreation. There is some fossicking around old goldfields in both forests.

Mining

Current exploration licences cover about one third of these forest areas. One small mining licence is current in the Pyrenees. State Forest is 'unrestricted Crown Land'. Forests Service, as the land manager, can comment on, but not refuse, exploration and mining proposals.

Defence training

The Department of Defence uses parts of the St Arnaud State Forest for, generally, low-impact training exercises, such as camping and cross-terrain navigation on foot. This training will be allowed to continue, subject to the land manager's discretion.

RECOMMENDATIONS

F1 The St Arnaud–Pyrenees State Forests of 13 140 ha:

- (a) be used in accordance with the general recommendations for state forests on page 217–218;
- (b) continue to allow low-impact Department of Defence training, subject to the land manager’s discretion; and
- (c) the following special features be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions which accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Note: No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED**Pyrenees State Forest***Biodiversity conservation*

- Grassy Dry Forest/Heathy Dry Forest Complex EVC
- Valley Grassy Forest EVC
- powerful owl
- one entire large old tree site and part of another large old tree site

North St Arnaud Range State Forest*Biodiversity conservation*

- Grassy Woodland EVC
- Grassy Woodland/Alluvial Terraces Mosaic EVC
- cane spear-grass
- inland pomaderris
- powerful owl
- square-tailed kite
- painted honeyeater
- swift parrot
- one large old tree site

Heritage

- Woodcutters carvings
- Prince of Wales eucalyptus distillery
- Vernons old eucalyptus distillery.

Little Tottington State Forest*Biodiversity conservation*

- swift parrot
- Low Rises Grassy Woodland/ Alluvial Terraces Herb-rich Woodland Mosaic EVC
- Grassy Woodland EVC

Information Sources

Bannear (1994a,b).

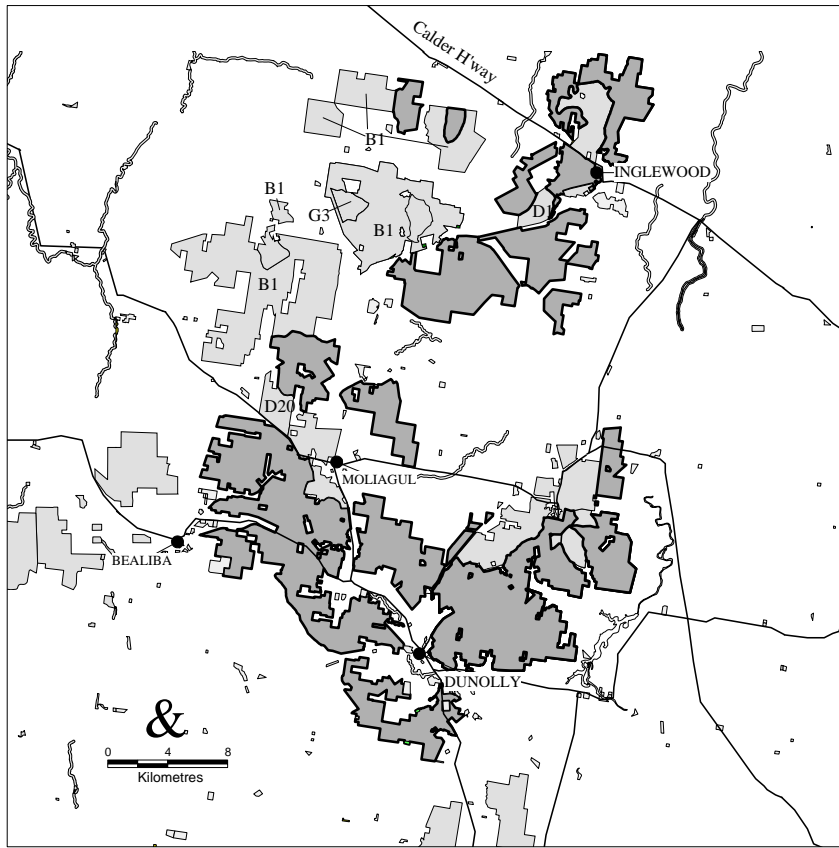
Bannear (1995).

Butler (1997).

Soderquist and Rowley (1995).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

F2 Dunolly–Inglewood State Forests



The Dunolly–Inglewood State Forests comprise a number of relatively large blocks with outlying fragments, together constituting a major Box-Ironbark forest in the heart of gold rush country. While some larger trees remain which are able to produce sawlogs, much of the timber output would be minor products utilising the durability of Box-Ironbark timbers.

Benefits of the forest

Timber harvesting

The Dunolly–Inglewood State Forests supply some sawlogs and post-logs for value-added uses, including a range of minor sawn products—stakes, pegs and droppers, along with fence posts, firewood and eucalyptus oil.

Biodiversity conservation

Management of this area as state forest, with an increased emphasis on biodiversity conservation, would lead to improved habitat quality for Box-Ironbark flora and fauna. Forest management planning will identify Special Protection Zones and Special Management Zones to protect rare and threatened species and communities.

Location

Dunolly–Inglewood State Forests lie in a crescent shape, from Tarnagulla to Dunolly, Moliagul, Kingower and Inglewood. Much is on metamorphic aureole hills around the Kangdaraar and Murphys Creeks granites. The total area is 32 400 ha including Longbush Potato Patch, adjoining small parcels, and forest adjoining parks and reserves. Many areas are contiguous with recommended parks and reserves—Kooyoora State Park (B1), Moliagul, Waanyarra and Inglewood Nature Conservation Reserves (D20, D28 and D1), and Moliagul Historic and Cultural Features Reserve (E1).

Environmental values

Biodiversity

Several threatened species have been recorded in this area, including silky glycine, streaked wattle, cane spear-grass, brush-tailed phascogale, bush stone curlew, powerful owl, barking owl, woodland blind snake and key sites for swift parrot.

A number of EVCs are represented, including Heathy Woodland EVC, Grassy Woodland EVC and Low Rises Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVC.

Ten large old tree sites and two important fauna refuge sites are present.

Heritage

Several significant mining heritage sites occur in the Dunolly–Inglewood State Forests (see list of special features in the recommendations below) as well as the old Felton Grimwade & Bickford eucalyptus distilling sites.

Community views

There was support in submissions and consultative meetings for maintaining timber production in the Dunolly–Inglewood forests for a range of products, and local firewood production, particularly near Dunolly and Tarnagulla townships. The forest around Wehla, recommended as an addition to Kooyoorra State Park, were seen as valuable for timber production. There was strong support for maintaining access to these ‘Golden Triangle’ forests for prospecting and mining, particularly the Waanyarra area for bush camping.

Many submissions supported the further extension of the Kooyoorra State Park through addition of adjoining forest, particularly the Kingower State Forest as this was seen to have high biodiversity values. Upgrading Waanyarra Nature Conservation Reserve to a state park was often put forward. Some submissions called for tighter controls on mining, prospecting, timber and firewood production in the state forests around Dunolly and Inglewood due to their impacts on flora and fauna. Other submissions argued for addition of the eucalyptus oil production areas, north of the existing Kooyoorra State Park, to the expanded park.

Current uses and implications

Timber harvesting

The net available productive area of 21 570 ha is 17% of the productive forest in the study area currently available for timber harvesting, and 29.5% of the productive forest after these recommendations. It provides a post and firewood resource. A major post cutter has diversified into small dimension sawn products such as stakes and droppers. Timber and eucalyptus oil production will continue in the Dunolly–Inglewood State Forests. Compared with the Draft Report proposals, there is a larger area of state forest between Dunolly and Tarnagulla available for wood production, with the reduction in the recommended Waanyarra Nature Conservation Reserve (D28).

Permits are issued for the collection of fallen timber for domestic firewood. At Kingower, wood is also felled by NRE for domestic collection. On average approximately 2 460 cubic metres of firewood per annum is collected through Inglewood and Dunolly work centres. Together with Wedderburn area, some 1 665 ha are harvested for eucalyptus oil production.

Apiculture

There are 32 temporary and 35 permanent bee sites distributed through the area of the Dunolly–Inglewood State Forests.

Recreation and tourism

These forests are very important locations for a number of recreational activities including prospecting (especially around Kingower, Moliagul, Goldsborough, Tarnagulla and Dunolly), bushwalking (Kingower and Inglewood), nature observation, picnicking (Inglewood and Dunolly), low-intensity firewood collection, orienteering, camping, car rallying, bike riding, horse riding and trail bike riding.

Mining

There are 17 small mining licence areas in these forests. Current exploration licences cover about two thirds of the area. A major tourist fossicking authority (see glossary) includes most of this forest. This permits tour promoters to take groups around former goldfields within the authority area, and search for minerals with metal detectors or by panning. Hand tools only are used for any digging, to avoid disturbance or removal of trees, shrubs, or archaeological objects.

State forest is ‘unrestricted Crown land’. Forests Service as the land manager can comment on but not refuse exploration and mining proposals.

Management issues

Prospecting

In intensively used areas, prospecting may require appropriate management to limit damage, particularly to vulnerable natural, historic or Aboriginal cultural features.

Rehabilitation

Some past mining sites may require rehabilitation to restore vegetation.

RECOMMENDATIONS

F2 Dunolly–Inglewood State Forests of 32 400 ha:

- (a) be used in accordance with the general recommendations for state forests on page 217–218; and that
- (b) the following special features be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions which accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Note: No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED

Inglewood State Forest

Biodiversity conservation

- Grassy Woodland and Gravelly-Sediment Broombush Mallee/ Heathy Woodland Mosaic EVC
- dainty phebalium
- cane spear-grass
- shrubby dampiera
- Williamson’s wattle
- western golden-tip
- woodland blind snake
- swift parrot

Heritage

- Eaglehawk Gully Mine puddlers
- old Felton Grimwade & Bickford eucalyptus distilling sites

Kingower State Forest

Biodiversity conservation

- streaked wattle
- inland pomaderris
- swift parrot
- powerful owl
- two large old tree sites

Dunolly State Forest

Biodiversity conservation

- Heathy Woodland EVC
- Grassy Woodland EVC
- Low Rises Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic EVC
- sweet quandong
- shrubby dampiera
- woodland blind snake
- bandy bandy
- swift parrot
- barking owl
- powerful owl
- one fauna refuge

Heritage

- Old Lead Reservoir
- Swipers Gully Diggings puddler
- Wild Duck Lead Diggings puddler
- Great Sandstone Co. Mine
- Halfway Diggings
- Linger & Die Lead
- Star Reef Co. Mine

Mt. Hooghly State Forest

Biodiversity conservation

- Grassy Woodland EVC
- silky glycine
- swift parrot

Heritage

- Bet Bet Reef Workings
- Bromley Cemetery
- Burnt Creek
- Clovers Gully Diggings puddlers
- Queens Birthday Reef distillery
- Kings Birthday Co. Mine
- Perseverance Co. Mine
- South Birthday Co. Mine

Longbush (Potato Patch) State Forest

Biodiversity conservation

- bush stone-curlew
- Grassy Woodland EVC
- three large old tree sites

Bealiba State Forest

Biodiversity conservation

- swift parrot
- bush stone-curlew
- powerful owl
- barking owl
- three large old tree sites and part of another site
- part of one fauna refuge

Heritage

- timber camp site

Information Sources

Bannear (1993c).

Bannear (1994a).

Butler (1997).

Soderquist and Rowley (1995).

Robinson and Rowley (1994).

Robinson and Rowley (1996).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

F3 Maryborough State Forests



Several moderate-sized and small forests clustered around Maryborough and Talbot carry mostly Box-Ironbark Forest EVC. They provide local wood supplies. Most are recovering after the major 1985 bushfire.

Benefits of the forest

Timber harvesting

The Maryborough State Forests supply firewood and some post-log products, and specialty products from the Majorca plantation.

Biodiversity conservation

Management of this area as state forest, with an increased emphasis on biodiversity conservation, would lead to improved habitat quality for Box-Ironbark flora and fauna. Contiguity of these forests with Paddys Ranges State Park and several nature conservation reserves will provide dispersal and ranging opportunities for a variety of species across the forests.

Forest management planning will identify Special Protection Zones and Special Management Zones to protect rare and threatened species and communities.

Location

The Maryborough State Forests (15 630 ha) comprise several distinct forest blocks surrounding the regional centre of Maryborough—Paddys Ranges (8 495 ha), Havelock-Timor (2 455 ha), Maryborough (2 570 ha), Majorca (200 ha), Eglington (1 510 ha) and Dunach (400 ha) State Forests. These areas are contiguous with several reserved areas set aside for nature conservation, including Paddys Ranges State Park (B5), Bung Bong, Talbot, Dunach, Timor and Havelock Nature Conservation Reserves (D22, D23, D25, D26 and D27).

Environmental values

Biodiversity

A number of threatened species have been recorded in this area, including swift parrot (key sites), brush-tailed phascogale, leafy templetonia, sharp midge-orchid, trailing hopbush and clover glycine.

Five large old tree sites are present.

Heritage

Numerous sites of heritage significance are located within the Maryborough State Forests, representative of the region's Aboriginal culture and rich gold mining heritage. Aboriginal water-wells hollowed in rock outcrops, are confirmed as having Aboriginal and social significance. Other areas identified are listed within the special features to be protected for each forest block.

Community views

There was strong support for the maintenance of local and regional timber production, including the continued supply of railway sleepers. Many of the recommended parks and reserves were nominated as important for timber production.

In other submissions there was support for the further addition of state forest to Paddys Ranges State Park, and Bung Bong, Dunach and Havelock Nature Conservation Reserves. Several other areas of state forest were identified as being particularly important for nature conservation, with associated proposals for increased protection.

Current uses and implications

Timber harvesting

The net available productive area of 8 343 ha is 6.6% of the productive forest in the study area currently available for timber harvesting, and 11.4% of the productive forest after these recommendations. It provides a firewood and post resource. On average approximately 1 730 cubic metres of domestic firewood per annum are collected through Maryborough Work Centre. Timber production will continue in the Maryborough State Forests.

Apiculture

There are 21 temporary and 25 permanent bee sites distributed through the area of the Maryborough State Forests.

Recreation and tourism

These forests are very important locations for a number of recreational activities including prospecting, bushwalking, nature observation, picnicking, gemstone seeking, orienteering, low-intensity firewood collection, camping, bike riding, horse riding and trail bike riding.

Mining

There are five small mining licence areas in these forests. Five exploration licences cover nearly all the area. Two tourist fossicking authorities include most of this forest. They permit tour promoters to take groups around former goldfields within the authority area and search for minerals with metal detectors or by panning. Hand tools only are to be used for any digging, to avoid disturbance or removal of trees, shrubs or archaeological objects. State forest is 'unrestricted Crown land'. Forests Service, as the land manager, can comment on, but not refuse, exploration and mining proposals.

Management issues

Prospecting

In intensively used areas, prospecting may require appropriate management to limit damage, particularly to vulnerable natural, historic, or Aboriginal cultural heritage features.

Rehabilitation

Some past mining sites may require rehabilitation to restore vegetation.

RECOMMENDATIONS

F3 Maryborough State Forests of 15 630 ha:

- (a) be used in accordance with the general recommendations for state forests on page 217–218; and that
- (b) the following special features be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions which accord with the *Flora and Fauna Guarantee Act 1988* as appropriate.

Note: No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED

Havelock State Forest

Biodiversity conservation

- Grassy Woodland EVC
- leafy templetonia
- swift parrot (key site)

Heritage

- Bluchers Reef whims/heaps
- Eaglehawk Gully Mine puddlers
- Eaglehawk Gully Reef Mine
- White Horse Gully Mine

Paddys Ranges State Forest

Biodiversity conservation

- Alluvial Terraces Herb-rich Woodland EVC
- Grassy Woodland EVC
- trailing hop-bush
- clover glycine
- swift parrot
- brush-tailed phascogale
- three large old tree sites

Heritage

- Blacksmiths Gully Mine
- Daisy Creek puddlers
- Workhouse Gully Cemetery puddlers
- stone outlines
- Bye-wash at Mosquito Gully Reservoir
- Hidden Graveyard
- Mud Brick Wall (eastern Paddys Ranges State Forest)
- Chinese Joss House site and baths

Dunach State Forest

Biodiversity conservation

- sharp midge-orchid
- brush-tailed phascogale

Eglington State Forest

Biodiversity conservation

- Grassy Woodland EVC
- buloke
- two large old tree sites

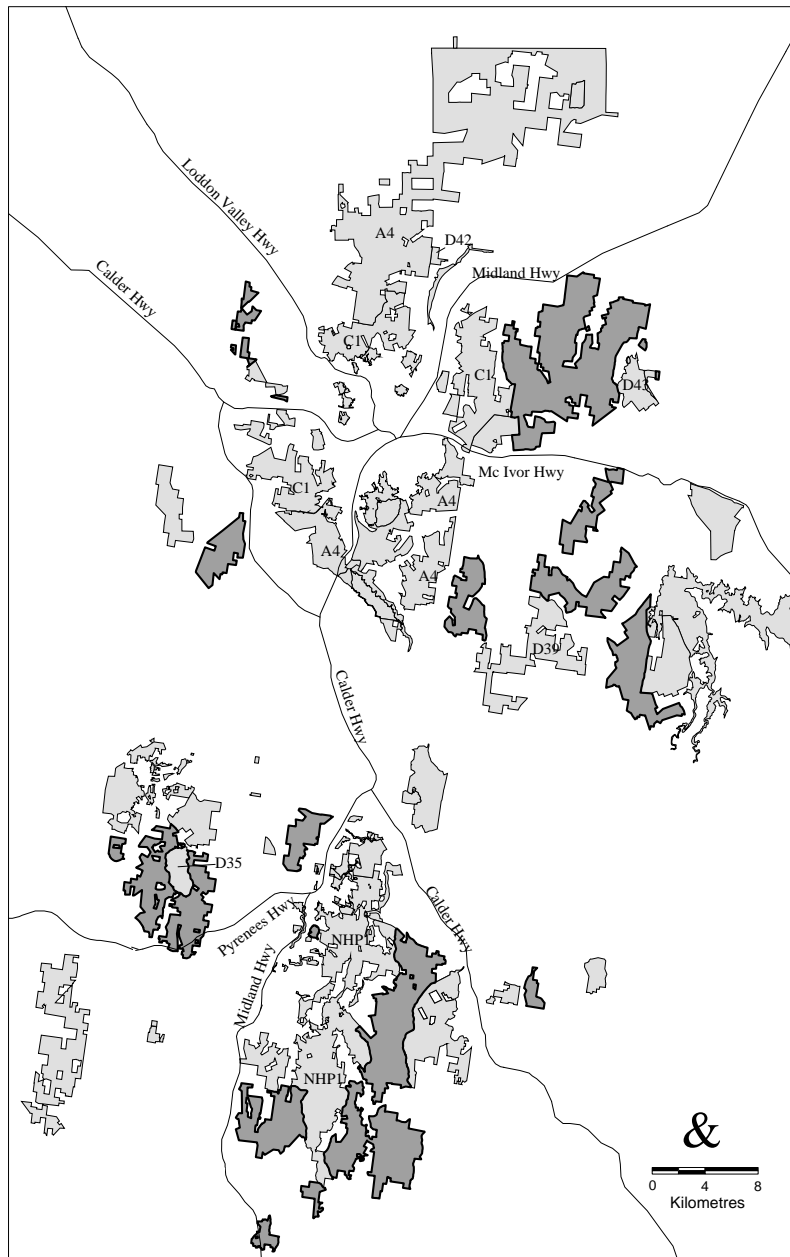
Information Sources

Bannear (1994b).

Soderquist and Rowley (1995).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

F4 Bendigo-Castlemaine-Maldon State Forests



These forests experienced the most intense utilisation of the Box-Ironbark area during the gold rushes, and accordingly have few large old trees. They range from mallee remnants west of Bendigo, through Box-Ironbark Forest on gently dissected slopes at Wellsford, to Heathy Dry Forests on intensely dissected hills south of Castlemaine.

Benefits of the forest

Timber harvesting

The Bendigo-Castlemaine-Maldon State Forests supply sawlogs, fencing, firewood and some minor sawn products.

Biodiversity conservation

Management of this area as state forest, with an increased emphasis on biodiversity conservation, would lead to improved habitat quality for Box-

Ironbark flora and fauna. Contiguity of these forests with the recommended Greater Bendigo National Park (A4), Castlemaine Diggings National Heritage Park (NHP1), Bendigo regional park (C1), and several nature conservation and other reserves will maximise dispersal and ranging opportunities for a variety of species across the forests.

Forest management planning will identify Special Protection Zones and Special Management Zones to protect rare and threatened species and communities.

Location

The Bendigo-Castlemaine-Maldon State Forests comprise numerous forest areas surrounding these towns. Major forest blocks include Wellsford, Fryers Ridge and Muckleford State Forests. Other blocks include Axedale, Mandurang South, Pilchers Bridge-Lyell, Kimbolton, Lockwood, Upper Loddon, and the small Woodvale West, Dry Diggings, and Metcalfe State Forests. The total area of these state forests is 27 000 ha. Many areas are contiguous with significant recommended parks and reserves—Greater Bendigo National Park (A4), Castlemaine Diggings National Heritage Park (NHP1), Bendigo Regional Park (C1), and Muckleford, Fryers Ridge, Pilchers Bridge and Mt Sugarloaf Nature Conservation Reserves (D35, D37, D39, D43).

Environmental values

Biodiversity

A number of threatened species have been recorded in this area, including swift parrot, regent honeyeater, grey-crowned babbler, bush stone-curlew, square-tailed kite, brush-tailed phascogale, Ausfeld's wattle, Williamson's wattle, dwarf geebung, Fryerstown grevillea and cane spear-grass.

Ten large old tree sites and two important fauna refuges are present.

Heritage

Many significant heritage mining sites exist in these state forests (see those identified in special features to be protected below), this area being known to have a particularly rich mining heritage.

Community views

There was some support at consultative meetings and in submissions for retention of forests around Bendigo, Castlemaine and Maldon for traditional timber harvesting and firewood collection. Numerous submissions supported continued access to forests for recreational activities including horse riding, orienteering and metal detecting.

Strong support was evident for upgrading the proposed Greater Bendigo Regional Park to national park status, and the addition of further state forests surrounding Bendigo, particularly Wellsford Forest and eucalyptus oil harvesting areas west of the proposed Whipstick-Kamarooka State Park. Eucalyptus oil producers submitted that they should continue to have access to current areas. Some submissions suggested that activities

detrimental to nature conservation, in particular timber harvesting and mining, should be excluded from Wellsford State Forest.

Two additional issues in Wellsford Forest were firstly, ensuring the regeneration and continuation of summer flowering red ironbarks, which occur in about half the forest, and secondly, treatment of the virulent dodder laurel creeper prevalent there. Dodder is apparently reducing the regeneration success of red ironbarks after harvesting.

There was also strong support for upgrading the status of the proposed Castlemaine Regional Park to a national park and adding Fryers Ridge, Muckleford, and Upper Loddon Forests. Exclusion of mining and timber harvesting from these forests was supported in many submissions.

Current uses and implications

Timber harvesting

The net available productive area of 13 990 ha is 11% of the productive forest in the study area currently available for timber harvesting, and 19.1% of the productive forest after these recommendations. It provides a post and firewood resource. On average approximately 5 250 cubic metres of domestic firewood per annum are collected through Bendigo and Castlemaine work centres. Timber production will continue in the Bendigo-Castlemaine-Maldon State Forests.

Apiculture

There are 29 temporary and 21 permanent bee sites distributed through the area of the Bendigo-Castlemaine-Maldon State Forests.

Recreation and tourism

Surrounding major regional centres, these forests provide very important opportunities for a number of recreational activities including prospecting, orienteering, bushwalking, walking dogs, nature observation, picnicking, low-intensity firewood collection, camping, hunting, bike riding, horse riding and trail bike riding. South of Castlemaine there are some opportunities for relatively remote recreation.

Mining

There are no mining licence areas in this forest. Nine exploration licences cover about three quarters of the area. State forest is 'unrestricted Crown land'. Forests Service, as the land manager, can comment on, but not refuse, exploration and mining proposals.

Management issues

Rehabilitation

Some past mining sites may require rehabilitation to restore vegetation.

Forest management

Renewed attention should be paid to treatment of dodder laurel in Wellsford State Forest, and ensuring continuation of the summer flowering red ironbarks.

RECOMMENDATIONS

F4 Bendigo-Castlemaine-Maldon State Forests of 27 000 ha:

- (a) be used in accordance with the general recommendations for state forests on page 217–218; and
- (b) the following special features be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions that accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Note: No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED

Muckleford State Forest

Biodiversity conservation

- swift parrot (key sites)
- turquoise parrot
- square-tailed kite
- brush-tailed phascogale
- one fauna refuge

Heritage

- Bacon Gully Mine sinkings
- Blow Reef/Dividend Co. Mine
- Boswarva Hill
- Golden Age Co. Mine
- Ironbark Gully sinkings/puddler
- Young Australian Co. Mine

Lockwood State Forest

Biodiversity conservation

- buloke
- swift parrot (key site)
- brush-tailed phascogale

Wellsford State Forest

Biodiversity conservation

- Williamson's wattle
- Ausfeld's wattle
- sand rush
- cane spear-grass
- swift parrot
- brush-tailed phascogale
- one large old tree site
- one fauna refuge

Axedale State Forest

Biodiversity conservation

- Ausfeld's wattle

Pilchers Bridge–Lyell State Forest

Biodiversity conservation

- Ausfeld's wattle
- swift parrot (key site)
- brush-tailed phascogale
- large tree research site (Lyell State Forest)

Kimbolton State Forest

Biodiversity conservation

- swift parrot
- regent honeyeater
- grey-crowned babbler
- brush-tailed phascogale
- one large old tree site

Heritage

- confirmed social and aesthetic values

Upper Loddon State Forest

Biodiversity conservation

- Valley Grassy Forest EVC
- Fryerstown grevillea
- dwarf geebung
- brush-tailed phascogale
- bush stone-curlew
- four large old tree sites
- habitat in Tarilta Gorge

Fryers Ridge State Forest

Biodiversity conservation

- Valley Grassy Forest EVC
- Fryerstown grevillea
- grey goshawk
- three large old tree sites

Heritage

- fire tower

Landscape

- Scenic corridor for the Melbourne–
Bendigo Railway

Metcalfe State Forest

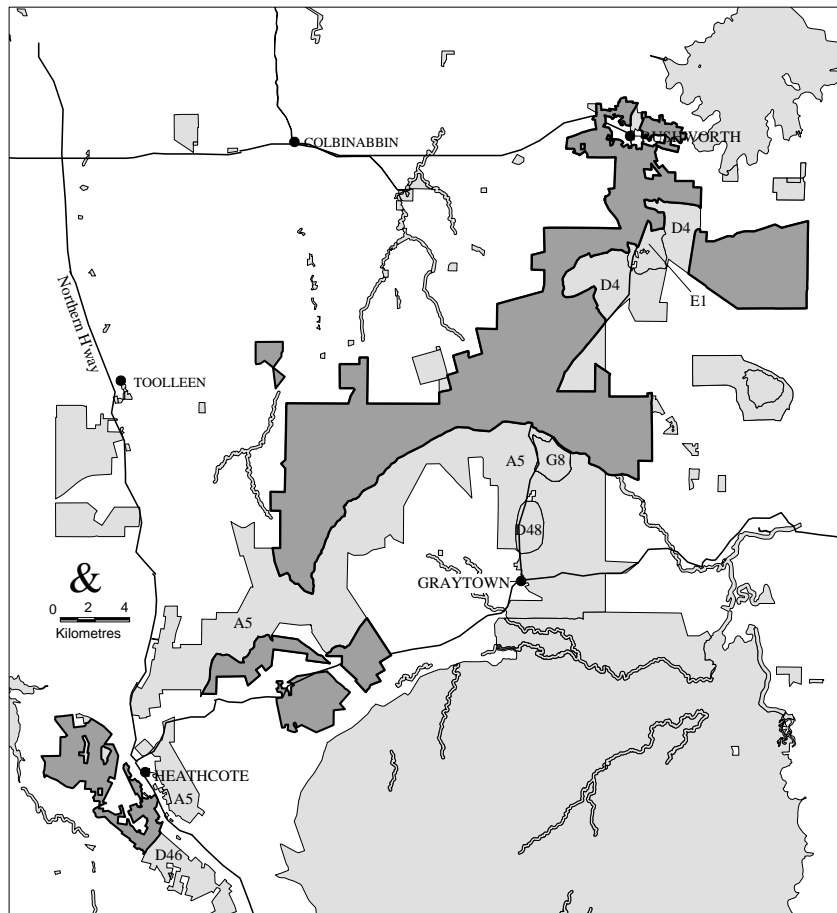
Biodiversity conservation

- Valley Grassy Forest EVC
- brush-tailed phascogale
- large old tree site

Information Sources

- Bannear (1993a).
Bannear (1993b).
Bannear (1993f).
Bannear (1997).
Butler (1997).
Context (1999)
Soderquist and Rowley (1995).
Robinson and Rowley (1994).
Robinson and Rowley (1996).
Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

F5 Rushworth–Heathcote State Forests



The Rushworth–Heathcote State Forests cover a major part of the largest Box-Ironbark forest in Victoria. Its timber output will underpin the production of increasingly specialised and value-added timber products which reflect the uniquely valuable characteristics of Box-Ironbark timbers. Forests around Heathcote supply local needs.

Benefits of the forest

Timber harvesting

The Rushworth–Heathcote State Forests will supply sawlogs and postlogs to local industry to provide a range of value-added products, maximising the economic value of the unique features of Box-Ironbark timbers, and fencing products, firewood and eucalyptus oil.

Biodiversity conservation

Management of these areas as state forest, with an increased emphasis on biodiversity conservation, would lead to improved habitat quality for Box-Ironbark flora and fauna. Future zoning as part of the forest management planning process will identify Special Protection Zones and Special

Management Zones to protect rare or threatened species and communities.

Location

Most is in the Rushworth–Heathcote State Forest, with substantial areas also around Heathcote. It has a total area of 23 650 ha, including isolated forests near Costerfield and Cornella, and forest around Rushworth. This forest is contiguous with Heathcote–Graytown National Park (A5), Whroo Historic and Cultural Features Reserve (E1), and Whroo, Spring Plains and Gobarup Nature Conservation Reserves (D4, D46 and D1).

Environmental values

Biodiversity

The area includes important sites for brush-tailed phascogale, squirrel glider, swift parrot, powerful owl, painted honeyeater and Williamson's wattle.

Two threatened EVCs are represented—Alluvial Terraces Herb-rich Woodland and Grassy Woodland. Seven large old tree sites (total 357 ha) and four important gully sites are present.

Heritage

There are numerous sites in these forests with recorded community heritage values (natural, Aboriginal, social, historic and aesthetic). There are two historic sites of state significance, Poverty Diggings and White Hills puddlers. Many other historic mining sites are of regional significance and the area also includes a cemetery, wartime internment camp site and other historic features (as listed in the recommendations below).

Community views

Many submissions opposed these forests as a whole being designated as national park. There was support for maintaining the local timber and eucalyptus oil industries, and some strong opposition to particular areas being reserved. Establishing the whole Rushworth–Heathcote State Forest as a national park would prevent the timber industry from harvesting wood and carrying out fire prevention works. There was some opposition to the proposed Mt Black State Park, but strong concern about loss of local wood resources close to Heathcote and Rushworth. Some submissions suggested only limited areas should be reserved. Current management practices were argued to be sustainable and alternative energy sources to firewood were thought too expensive for some locals. There was a suggestion that the parts of the forest currently set aside under prescription be made available for selective logging. Local community members wanted to retain access to the forests for a range of recreation activities.

In contrast, there was also support for the designation of the whole Rushworth–Heathcote State Forest as a national park. Particular areas, including Graytown/Mt Black and Mt Ida/Costerfield were also advocated as national parks. These forests were seen to have a high conservation value. There was a view that traditional approaches to forest management were insufficient to control future impacts from residents adjacent to these forests.

Production of high-value, kiln-dried timber for furniture and floorboards rather than lower-value products was supported as a way to maintain a viable industry.

Current uses and implications

Timber harvesting

The net available forest area covered by the recommended Rushworth–Heathcote State Forests is 16 340 ha. This is 12.9% of the productive forest in the study area currently available for timber harvesting, and 22.3% of the productive forest after these recommendations. It is one of the principal sources of timber for the largest operating sawmill in the Box-Ironbark region (located in Rushworth). Timber production will continue in the Rushworth–Heathcote State Forests. Compared with the Draft Report proposals, larger areas of state forest are available for local wood production close to Heathcote and Rushworth, as the proposed Heathcote Regional Park is no longer recommended, forest and park boundaries around Costerfield have been modified, and Whroo Nature Conservation Reserve has been reduced.

Permits are issued for the collection of fallen timber for domestic firewood. On average approximately 3 890 cubic metres of firewood per annum are collected through Heathcote and Rushworth work centres. Eucalyptus oil production will continue, from about 66 ha of mallee harvested.

Apiculture

There are 27 temporary and 15 permanent bee sites distributed through the area of the Rushworth–Heathcote State Forests.

Recreation and tourism

This area is used regularly for picnicking and barbecues, car touring, car rallies, orienteering, bushwalking, nature study, fossicking, trail bike riding, firewood collection, hunting, horse riding and camping.

Mining

Nearly all the Rushworth–Heathcote State Forest is included in six exploration licences. Ten mining licences are current. The Perseverance Corporation Mine at Bailieston is just outside the Rushworth–Heathcote State Forests. State forest is 'unrestricted Crown land'. Forests Service, as land manager, can comment on, but not refuse, exploration and mining proposals.

Defence training

The Department of Defence uses parts of the Rushworth–Heathcote State Forests for low-key training exercises, such as camping and cross-terrain navigation on foot, approximately thirty times a year on average. This training will be allowed to continue.

RECOMMENDATIONS

- F5** The Rushworth–Heathcote State Forests of 23 650 ha be used:
- in accordance with the general recommendations for state forests on page 217–218;
 - for continued low-key Department of Defence training, subject to the land manager’s discretion; and
 - the following special features be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions that accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Note: No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED

Rushworth—Heathcote State Forest

Biodiversity conservation

- brush-tailed phascogale
- squirrel glider
- swift parrot (key sites)
- powerful owl
- painted honeyeater
- Williamson’s wattle
- Alluvial Terraces Herb-rich Woodland and Grassy Woodland EVCs
- seven large old tree sites
- four fauna refuges

Heritage (state significance)

- Poverty Diggings
- White Hills puddlers (Whroo)

Heritage (regional significance)

- Curly Dog Dam puddler
- Welcome Reef Mine and puddlers
- Why Not Gully and New Why Not Company Mine (Redcastle)
- Fontainebleu dam and puddler (Whroo)
- Specimen Hill open cut

- Nuggetty Company
- Perseverance Company and Shellback Company Mines
- Old Ned’s Gully sinkings
- Robertson’s Brothers and Rushworth Gold Mines battery foundations
- Chinaman’s Hill surface workings
- Antonio Gully brickworks and puddler (Rushworth)
- Jones Eucalyptus Distillery (Rushworth)

Heritage sites of thematic interest

- Redcastle internment camp site, hut and ford (Moormbool West)
- Steam Traction Engine Whistle Stop
- Growlers Hill Lookout reserve and tower
- Specimen Hill cemetery (Rushworth).

Argyle State Forest

Biodiversity conservation

- Ausfeld’s wattle
- maroon leek-orchid
- swift parrot
- regent honeyeater

Information Sources

Bannear (1993e).
 Bannear (1993g).
 Bannear (1997).
 Butler (1997).
 Context (1999).

Soderquist and Rowley (1995).
 Robinson and Rowley (1994).
 Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

F6 Existing state forests

Other state forests outside those described in F1 to F5 above include: Illawarra west of Stawell; Glynwylln north of Stawell; Glenmona east of Avoca; Wedderburn; Sandon south-west of Newstead; Knowsley north of Lake Eppalock; and Barambogic south of Chiltern.

Together, they have a net available forest area of 4 740 ha, which is 6.5% of the productive forest after these recommendations.

Production of timber and other forest products will continue in these forests.

Community views

A range of submissions referred to these existing forests. Some supported their current use and management and continued resource extraction, in particular, firewood production from these small forests.

Other submissions called for the inclusion of some or all of these forests in the reserve system. Protection of Sandon Forest in a park or reserve, addition of the remainder of Illawarra to the adjoining reserve, and inclusion of Barambogic in the Chiltern—Pilot National Park were supported in submissions. Exclusion of mining and timber harvesting from public land, and a shift of hardwood, firewood and eucalyptus oil production to private plantations were called for in various submissions.

RECOMMENDATION

F6 The state forests of 9 130 ha shown on Map A and listed in Appendix 11, be used:

- (a) in accordance with the general recommendations on page 217–218 and
- (b) the special features in state forest areas forest listed below be protected under Section 50 of the *Forests Act 1958*, Section 4 of the *Crown Land (Reserves) Act 1978*, or through the implementation of management prescriptions that accord with the *Flora and Fauna Guarantee Act 1988*, as appropriate.

Note: 1. Small areas of state forest within Stawell and Maryborough townships should be managed primarily for amenity and fire protection.
2. No changes are proposed to current management provisions affecting apiculture, mining, prospecting and firewood collection.

SPECIAL FEATURES TO BE PROTECTED

Illawarra State Forest

Biodiversity conservation

- Plains Grassy Woodland EVC
- Heathy Woodland EVC
- Sedge-rich Woodland EVC
- corkscrew spear-grass
- bush stone-curlew
- large old tree site

Glynwylln State Forest

Biodiversity conservation

- buloke
- Grassy Woodland EVC

Heritage

- Glynwylln alien camp

Glenmona State Forest

Biodiversity conservation

- buloke
- swift parrot (key site)
- two large old tree sites

Wedderburn State Forest

Biodiversity conservation

- Kamarooka mallee

Heritage

- Felton, Grimwade & Bickford eucalyptus oil distilling site

Sandon State Forest

Biodiversity conservation

- Low Rises Grassy Woodland/ Alluvial Terraces Herb-rich Woodland Mosaic EVC
- sharp midge-orchid
- leafy templetonia
- brush-tailed phascogale
- swift parrot (key site)
- powerful owl

Heritage

- Harry Lauder Mine
- Stockyard Creek workings

Knowsley State Forest

Biodiversity conservation

- Ausfeld's wattle
- large old tree site

Barambogie State Forest

Biodiversity conservation

- powerful owl
- barking owl
- turquoise parrot

Information Sources

Bannear (1993f).

Bannear (1997).

Butler (1997).

Soderquist and Rowley (1995).

Holland and Cheers (1999).

Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.

18 Other public land use categories

G Reference areas

Reference areas are parcels of land set aside as representations of different ecosystems within an area. These areas are designed to maintain natural ecosystems into the future and for use as a reference for comparison with similar land under other uses. Reference areas have been identified in earlier Land Conservation Council investigations and most have been securely reserved. Eleven areas totalling 3 287 ha have been set aside in the Box-Ironbark study area. They were selected on the basis of their constituent land systems, forming parts of a representative network across Victoria.

The existing reference areas in the study area (and two recommended new reference areas), are listed from west to east in Table 18.1. These relatively small areas are protected from the influence of adjoining land uses by protective buffers.

Reference areas are proclaimed under the *Reference Areas Act 1978* and management arrangements are decided by the Minister for Environment and Conservation, on advice from the Reference Areas Advisory Committee established under that Act. Unlike most other public land use categories, reference areas are not available for recreation or resource extraction. Use of reference areas for scientific research requires the approval of the Reference Areas Advisory Committee.

The land systems used to classify the current reference areas were based on fundamental features of the landscape: rock type, topography, climate, soils and vegetation. They have repeating patterns of components, and for land systems included in reference areas, the aim is for all components to be adequately represented.

Not all land systems can be represented in reference areas. For many land systems, no suitable public land exists that can be practically managed for scientific reference and the extent of others is too small to justify a reference area. Many land systems, particularly those on plains and alluvial valley floors sought for agriculture, have no suitable land for reference areas available as these areas have been almost entirely modified from the natural condition.

Along with floristic vegetation data, land systems were used as a basis for the development of EVCs, and especially for the pre-1750 EVC mapping (see Appendix 2). To some extent the EVC concept supersedes land systems. The predominant EVC representation in the existing reference areas is listed in Table 18.1.

Plains Grassy Woodland/Gilgai Wetland Mosaic EVC occurs in Reef Hills State Park, Reedy Lake Natural Features Reserve, and on former farmland at Puckapunyal. Metamorphic Slopes Shrubby Woodland EVC occurs in Kooyoora State Park, the Waanyarra Nature Conservation Reserve and Dunolly State Forest. Suitable areas representing these EVCs are recommended as new reference areas.

Several major EVCs are not represented in reference areas. The former extent of Plains Grassy Woodland EVC is located very largely on cleared private land or as small areas around the margins of public land adjoining private land and, therefore, unsuitable as a reference area. Pre-1750 occurrences of Plains Grassy Woodland in Puckapunyal Military Area are mainly on cleared former farmland.

Creekline Grassy Woodland occurs in many small, narrow strips along streams often at the head of cleared privately-owned valleys. The poor representation of this EVC reflects the proximity of these occurrences to private land.

Several poorly represented EVCs occur in or around areas of current or recommended parks and reserves. A mosaic of Low Rises Grassy Woodland with Alluvial Terraces Herb-rich Woodland occurs around the margins of Bolangum, Big Tottington, Little Tottington and Dalyenong blocks. Heathy Woodland occurs in the Lonsdale, Illawarra, Dalyenong and Waanyarra Nature Conservation Reserves and Dunolly State Forest. Moderate areas of Alluvial Terraces Herb-rich Woodland occur in the recommended Dunneworthy addition to Ararat Regional Park. These EVC occurrences are in areas that are too small or inappropriately located for reference areas.

Table 18.1 Reference areas and EVC representation

Reference area	Area (ha) ¹	EVCs represented
G1 Mt Separation	188	135 ha Heathy Dry Forest, 44 ha Box-Ironbark Forest, 9 ha Grassy Dry Forest
G2 Korong Vale	460	377 ha Broombush Mallee, 78 ha Box-Ironbark Forest, 5 ha Metamorphic Slopes Shrubby Woodland
G3 Kooyoora	325	325 ha Granitic Hills Herb-rich Woodland
G4 Kingower ²	345	345 ha Metamorphic Slopes Shrubby Woodland
G5 Terrick Terrick	100	100 ha Grassy Woodland
G6 Sandhurst	425 ³	195 ha Heathy Dry Forest, 2 ha Box-Ironbark Forest, 10 ha Valley Grassy Forest, 145 ha Grassy Dry Forest, 73 ha Hillcrest Herb-rich Woodland
G7 Kamarooka	225	207 ha Grassy Woodland, 18 ha Broombush Mallee
G8 Mt Black	380	284 ha Box-Ironbark Forest, 96 ha Heathy Dry Forest
G9 Reef Hills ²	123	123 ha Plains Grassy Woodland/Gilgai Wetland Mosaic
G10 Warby Ranges	170	19 ha Valley Grassy Forest, 36 ha Heathy Dry Forest, 112 ha Granitic Hills Woodland, 3 ha Grassy Woodland
G11 Killawarra	141	134 ha Box-Ironbark Forest, 6 ha Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic, 0.3 ha Alluvial Terraces Herb-rich Woodland, 0.3 ha Creekline Grassy Woodland
G12 White Box	90	15 ha Heathy Dry Forest, 45 ha Grassy Dry Forest, 16 ha Box-Ironbark Forest, 14 ha Valley Grassy Forest
G13 Pilot Range	518	22 ha Rocky Outcrop Shrubland/Herbland Mosaic, 7 ha Heathy Dry Forest, 9 ha Granitic Hills Woodland, 480 ha Grassy Dry Forest

Notes: ¹ The areas in this table are GIS-based, and differ from the proclaimed areas for some reference areas.

² See recommendation G4, G9 below.

³ This is the reduced area of Sandhurst (see recommendation G6 below)

Community views

Most submissions referring to reference areas recognised their importance in providing representative examples of land systems important for scientific research. Several submissions proposed large areas of Box-Ironbark forests be included as reference areas. Greater protection was proposed for these areas, specifically increasing the buffer area around these to 20 km to exclude apiculture sites. Conversely, apiarists proposed the abolition of buffer areas for apiculture purposes and requested a 200 metre buffer area apply for apiculture, in line with buffer areas for other land uses.

Some recreational users proposing greater access to parks and reserves recognised the value of reference areas, requesting access to all public land except reference areas.

Achieving a balance

The purpose of reference areas is to preserve representative examples of different ecosystems and to use these for scientific reference for similar land under other uses. The ECC considers this a land use category of high importance. The ECC recommends that existing reference areas continue to be managed in accordance with previous recommendations, and management plans subject to the advice of the Reference Areas Advisory Committee.

The ECC is required to make recommendations on the balanced use of public lands in the study area. As such, the ECC has decided it is not appropriate to recommend further large areas of public land as reference areas.

Buffers around reference areas are necessary and as a general principle, buffer areas should be large enough to restrict outside uses affecting reference areas. The ECC supports the buffers set by the Reference Area Advisory Committee.

The ECC has recommended that the boundary of Sandhurst Reference Area be adjusted to exclude an existing access track to communications equipment; implementation of a proposed land swap, with Coliban Water, of a 50 metre buffer strip along the Coliban main channel, for a freehold block within the reference area; and accommodation of walking trail access to Mt Herbert. Land excised from this previously recommended (but not proclaimed) reference area will be included in the Greater Bendigo National Park (see G6 below).

Two new reference areas are recommended: one representing Metamorphic Slope Shrubby Woodland EVC in the Kooyoora State Park, and another representing Plains Grassy Woodland/Gilgai Wetland Mosaic EVC in the Reef Hills State Park (B4).

GENERAL RECOMMENDATIONS FOR REFERENCE AREAS

G1-G3, G5, G7-G8, and G10-G13 The reference areas listed in Table 18.1 above and shown on Map A continue to be used for scientific reference in accordance with previous recommendations and appropriate management plans.

G6 For Sandhurst Reference Area :

- (a) the boundaries be adjusted as indicated on Map A, and
- (b) this area be proclaimed under the *Reference Areas Act 1978* and managed by the Department of Natural Resources and Environment.

G4, G9 The areas shown on Map A at Kingower (G4) and Reef Hills (G9):

- (a) be used to maintain natural ecosystems as a reference to which those concerned with studying land for particular comparative purposes may be permitted to refer, especially when attempting to solve problems arising from the use of land;
- (b) be surrounded by a buffer of adjoining public land, and that delineation of the buffer be by joint arrangement between the Reference Areas Advisory Committee and the land manager;
- (c) consistent with existing reference areas, activities (such as grazing, exploration for minerals, mining, timber harvesting and apiculture) that conflict with the purposes of a reference area not be permitted, and any such activities in the proposed reference areas cease when these recommendations are adopted; and
- (d) they be proclaimed under the *Reference Areas Act 1978* and managed by the Department of Natural Resources and Environment.

H Natural features reserves

'Natural features reserve' is a general public land use grouping which includes several categories of land that have broadly similar land use objectives.

These are:

- wildlife areas (that are seasonally available for hunting);
- public land water frontages;
- streamside areas;
- bushland areas;
- natural and scenic features areas;
- geological and geomorphological features areas; and
- highway parks.

Small block information

Previous Land Conservation Council (LCC) investigations mainly considered larger parcels of public land and did not include Crown land in cities and towns. As a result, there are several thousand small land parcels without public land use recommendations. Some are now proposed as natural features reserves.

The recommendations for these areas are based on several recent studies and compilations of data which have contributed to the identification of additional areas warranting specific reservation.

The major sources of this information are:

- NRE assessments for small Crown land parcels, including many additional assessments since publication of the Draft Report;¹
- a specific consultancy (funded by the Commonwealth Government) that inspected and reported on 120 small blocks selected from aerial photos as having remnant tree cover but no LCC recommendations;²
- a study of Box-Ironbark remnants by NRE;³
- sites of botanical significance that were identified for large forest blocks and small parcels;⁴
- a study of sites of geological and geomorphological significance that identified 69 such sites.⁵ These were shown on Map C in the ECC's 1997 Resources and Issues Report;

- data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife⁶ showing recorded locations of threatened species that were reviewed for small block records;
- a NRE study of disused railway lines;⁷ and
- numerous submissions that refer specifically to small block features.

Wildlife areas

These reserves have been distinguished from game refuges (refer to Chapter 16) by being designated as seasonally available for duck hunting.⁸ The existing reserves are wetlands, located on the northern plains near Murchison, Nagambie, and north of Violet Town and Benalla. While the wetlands often carry Wetland Formation EVC (not a Box-Ironbark unit), the surrounds commonly have Box-Ironbark vegetation in Plains Grassy Woodland/Gilgai Wetland Mosaic or Plains Grassy Woodland EVCs.

Public land water frontages and stream beds and banks

Public land water frontage reserves are the linear Crown land abutting many streams. Most were originally set aside from selection in 1881. In the inland hills, selection and survey for farms followed along major streams and minor valleys, producing irregular public land boundaries. As a result, habitat along the streams and vegetation types such as Creekline Grassy Woodland EVC were usually cleared, except where a Crown land frontage was reserved. On the northern plains, these linear reserves, along with vegetated road reserves, provide most of the remaining habitat for numerous threatened species, and are of particular importance. Stream frontage reserves are also an important recreation resource.

The beds and banks of all watercourses are deemed to have remained Crown land under the *Water Act 1905* and subsequent Acts. Stream bed and bank recommendations apply to all watercourses outside major public land use categories, whether or not there is an adjoining public land water frontage.

Streamside areas

These are localised nodes along Crown stream frontages where the public land is wider. They are, in effect, a wider section of a public land water frontage reserve. Access is generally given by a road either crossing, or near, the stream. Existing streamside areas were set aside for picnics and informal recreation, and in some cases, for camping. Where they carry remnant vegetation these reserves are increasingly important for conservation.

Bushland areas

Last century many small reserves were set aside for overnight camping by drovers with their travelling stock. Others had a spring or dam and were reserved for stock water supply. Unused recreation reserves and gravel reserves that have revegetated often also have Box-Ironbark vegetation. Remaining reserves of these types are now distributed throughout largely cleared freehold farmland and many have been designated bushland areas. These scattered patches of remnant bush add scenic diversity to the landscape and are of increasing importance for nature conservation.

Natural and scenic features areas

Hilltops with ready access, some with developed lookouts, have been set aside as scenic reserves. Several have relatively intact remnant vegetation.

Geological and geomorphological features areas

Specific features showing significant geological exposures,⁵ for example, the Permian glacial pavements at Eppalock, or geomorphic elements such as the Victoria Hill plunging anticline at Bendigo, have been reserved for scientific and wider interest.

Highway parks and roadside stops

Reserves along some major roads have been set aside to provide rest and relaxation areas for travellers. These areas often have picnic facilities, including tables and fireplaces, and may incorporate areas of scenic value such as streams, or natural value such as remnant vegetation.

Community views

Submissions regarding the several sub-categories of natural features reserves mostly sought greater protection, more management input or removal of perceived detrimental uses, in particular, grazing and apiculture. There was particular focus on many

small blocks throughout the study area currently designated as bushland reserves.

Detailed information on values of numerous small blocks in the former LCC Murray Valley study area were received proposing that specific reserves be retained as natural feature reserves or upgraded to nature conservation reserves. Several specific reserves attracted considerable interest including H36 Kaweka Wildflower Reserve and H2 Hughes Creek water frontage. These submissions proposed removal of detrimental uses, and greater protection and management for these reserves.

Other proposals supported ECC recommendations for particular areas calling for their addition to other parks and reserves or upgrading to nature conservation reserves. Adding unused road reserves with Box-Ironbark vegetation to adjoining reserves was proposed. There was general support for better management of public land water frontages and some streamside areas, protecting old trees and other habitat features, retaining indigenous vegetation, and excluding grazing from public land water frontages and streamside reserves.

A few submissions opposed specific recommendations owing to the potential impact on individual grazing licensees. Several submissions proposed access be retained for recreational hunters to hunting grounds, including wildlife areas classed as game reserves.

Achieving a balance

The ECC recognises the diversity of land uses, quality, size and values of the many proposed natural features reserves in the study area and appreciates the comments and local knowledge received for these. The ECC has reviewed existing reserves, including consideration of issues raised in submissions.

In response to these, the ECC has included notes of values or special management considerations with individual reserve recommendations, as appropriate.

Where outstanding natural values have been brought to the attention of the ECC, specific blocks have been upgraded to nature conservation reserves, including at Baddaginnie, Earlston, Gownagardie and Kaweka. Existing reserves will be retained, unless specifically altered elsewhere in these recommendations. Recreational hunters retain access to numerous wildlife reserves (H1), including Black Swamp at Wunghnu, and Moodies Swamp.

Natural features reserve use and management

In other parts of Victoria natural features reserves are not primarily recommended for nature conservation but, in the Box-Ironbark study area particularly on the northern plains, these reserves may carry the only local remnants of indigenous vegetation and often have important conservation values.

Some of the blocks subject to recommendations below have been or are grazed or, are used for apiculture. Because of their small size, generally these blocks do not contribute substantially to local farm income. On the inland hills, there is generally little if any grazing value but there is the potential

for severe degradation of indigenous vegetation and subsequent erosion. On the northern plains, remnant native vegetation is important wherever it occurs, and it is at risk from grazing.

NRE generally manages natural features reserves, through Parks Victoria. NRE has had discussions with organisations and institutions with an interest in, and the capability for, managing some natural features reserves. The ECC supports such arrangements provided the land is managed in accordance with the recommendations and the effectiveness of such management is reviewed.

GENERAL RECOMMENDATIONS FOR NATURAL FEATURES RESERVES

H Natural features reserves, according to their specific characteristics, be used to:

- (a) protect natural features and values;
 - (b) provide opportunities for:
 - (i) education and passive recreation such as picnicking, walking and where relevant, fishing, and
 - (ii) more intensive recreation such as camping where specified;
 - (c) conserve indigenous flora and fauna;
 - (d) protect areas with remnant vegetation or habitat value;
 - (e) provide protection for historic and Aboriginal cultural values and sites;
 - (f) preserve features of geological or geomorphological interest;
 - (g) maintain scenic features and the character and quality of the local landscape;
- and:
- (h) commercial timber harvesting not be permitted;
 - (i) some firewood may be available from thinning for ecological management, subject to research and the approval of the land manager,
 - (j) exploration for minerals be permitted, and mining, subject to decisions on particular cases;
 - (k) prospecting and apiculture be generally permitted (see Notes 2 and 3 below);
 - (l) grazing generally not be permitted, unless required for short periods by the land manager;
 - (m) unused road reserves adjoining natural features reserves be added to those reserves where appropriate; and
 - (n) they be permanently reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment.

Notes:

1. Most are shown on Map A; some are too small to appear on the map; not all public land water frontages (H2) are shown; stream beds and banks (H3) are not shown.
2. Prospecting and apiculture would generally be permitted, subject to appropriate conditions; removal of these activities would require the land manager to demonstrate a particular need.
3. Apiculture sites should be located away from picnic areas, car parks, walking tracks and other focal points for recreation.
4. While the primary public land manager remains NRE, on-ground management can be delegated to organisations or institutions other than NRE, as committees of management, under licence or other arrangement, subject to review of management effectiveness.
5. Several of the natural features reserves have values worthy of protection other than their primary use. Notes on these other values are included in Appendix 11.

RECOMMENDATION FOR WILDLIFE AREAS

H1 The wildlife areas shown on Map A (numbered H1) and listed in Appendix 11 be used in accordance with the general recommendations for natural features reserves on page 243, and:

- (a) primarily to conserve the habitat of native fauna associated with wetlands; and
- (b) for public recreation (including hunting in season as specified by the managers) and education, where this does not conflict with the primary aim.

RECOMMENDATIONS FOR PUBLIC LAND WATER FRONTAGES

H2 Public land water frontages, where not recommended otherwise for a specific use, be used in accordance with the general recommendations for natural features reserves on page 243, and be used to:

- (a) conserve native flora and fauna as part of an integrated system of habitat networks across the State;
- (b) maintain or restore indigenous vegetation;
- (c) protect adjoining land from erosion, and provide for flood passage;
- (d) protect the character and scenic quality of the local landscape;
- (e) provide protection for cultural heritage features and values;
- (f) provide access for recreation (including hunting where appropriate) at levels of use consistent with (a) to (e) above;

and:

- (g) Catchment Management Authorities, in cooperation with adjoining landholders, implement programs to gradually restore frontages, where public land water frontages are currently licensed for grazing or other purposes, and where stream-bank or frontage vegetation is degraded, frontage vegetation is not regenerating, stream banks are eroding or salt-affected, or to protect natural, cultural, recreational and scenic values or water quality;
- (h) programs to restore frontages be implemented according to local priorities and a practical timetable, with particular emphasis on the Victorian Riverina bioregion (northern plains);
- (i) where frontages adjoin farmland, fencing and off-stream stock watering points be encouraged by appropriate support;
- (j) where stream frontage vegetation is to be restored, particularly in cleared or degraded areas, indigenous trees, shrubs and ground species be planted, where possible using seed of local provenance;
- (k) where appropriate, suitable areas for more intensive recreational use be identified and facilities established;
- (l) where land exchanges are proposed that involve frontage land that is no longer adjacent to rivers, efforts be made to prevent loss of any nature conservation or other values of this land from the public land estate;
- (m) where a licence has been issued for a public land water frontage, usually for grazing, recreation use by the public for activities such as walking, nature observation or fishing be permitted, while motorised forms of recreation not be permitted;
- (n) licensees be required to provide stiles in any fences erected across their licence area if requested to do so by the land manager;
- (o) no new cultivation of stream frontages for agriculture be permitted, and areas currently cultivated be reviewed by the land manager as part of a systematic assessment of river restoration priorities, with a view to phasing out inappropriate cultivation;
- (p) timber cutting not be permitted;
- (q) sand and gravel extraction may be permitted by the land managers where this is consistent with the above uses, and where necessary for bed and bank stability;

and:

- (r) public land water frontages be managed by the relevant Catchment Management Authority and NRE, as appropriate.

Note: Public land water frontage recommendations apply to sections of many watercourses outside major public land use categories. Some are shown diagrammatically on Map A; others are not shown. They are not individually listed. For details, refer to parish plans, or the Department of Natural Resources and Environment.

RECOMMENDATIONS FOR STREAM BEDS AND BANKS

H3 Stream beds and banks, subject to other relevant recommendations, guidelines and statutory requirements, be used in accordance with the general recommendations for natural features reserves on page 243, and be used to:

- (a) conserve or restore habitat for native flora and fauna;
- (b) provide for appropriate recreational activities and levels of use;
- (c) provide for flood passage and drainage requirements of adjacent land;
- (d) where necessary, provide for the passage of artificial flows of water stored within the catchment or transferred from other catchments;
- (e) maintain streams in a stable condition using environmentally sound techniques; and
- (f) where this does not conflict with the above, provide a source of sand and gravel.

Note: Stream beds and banks recommendations apply to all watercourses outside major public land use categories, whether or not there is an adjoining public land water frontage. They are not labelled on Map A.

RECOMMENDATIONS FOR STREAMSIDE AREAS

H4–H7 All existing streamside areas (H4), and new streamside areas (H5–H7) listed in Appendix 11 and shown on Map A, be used:

- (a) in accordance with the general recommendations for natural features reserves on page 243; and
- (b) to provide opportunities for more intensive recreation such as camping at the discretion of the land manager if this does not conflict with the maintenance of the water quality in the adjacent stream.

RECOMMENDATIONS FOR BUSHLAND AREAS

H8–H131 Existing bushland reserves (H8), except where recommended for other purposes, and new areas of bushland (H9–H131: listed in Appendix 11), as shown on Map A, be used in accordance with the general recommendations for natural features reserves on page 243.

RECOMMENDATIONS FOR NATURAL AND SCENIC FEATURES AREAS

H132 Existing natural and scenic features areas as shown on Map A be used in accordance with the general recommendations for natural features reserves on page 243.

Existing natural and scenic features areas (see Appendix 11 for locations and areas):

- Black Range;
Note: Several significant fauna species, including swift parrot, powerful owl and square tailed kite have been recorded here. Management should aim at protecting habitat for these and other fauna.
- Mt Gowar;
- Howell's Hill;
- Mt Buckra;
- Murchison North;
- Mt Ochertyre; and
- Barnawartha.

RECOMMENDATIONS FOR GEOLOGICAL AND GEOMORPHOLOGICAL FEATURES AREAS

H133–H136 The following existing (H133) and new (H134–H136) geological and geomorphological features areas shown on Map A:

- (a) be used in accordance with the general recommendations for natural features reserves on page 243; and
- (b) educational and scientific study, and recreation, be permitted where they are compatible with protecting the geological and geomorphological features.

H133 Existing geological and geomorphological features (see Appendix 11 for locations and areas):

- Yowang Hill;
- Amherst quartz reef;
- Coliban Falls;
- Permian glacials, Moorabbee shoreline, Lake Eppalock.

Note: This site has recorded historic, natural, aesthetic and social community heritage values.

Note: This area could be delegated for management by Goulburn Murray Water, with advice from NRE.

H134 White Hills sediments (15.4 ha); outcrops of Ordovician sediments and Tertiary gravels.

H135 Barfold Gorge (8 ha); a spectacular gorge in an old valley cut in Ordovician sediments, exposing several newer volcanic flows, with basalt columns, waterfalls, a cave, talus cones and tessellated pavements.

Note: Only a small part of this gorge is public land. Management could be delegated.

H136 Pink Cliffs (36 ha); Pink Cliffs displays a geological ‘contact’ between Cambrian greenstone rock and adjoining granite, exposed by 19th century gold sluicing. The reserve includes the Pink Cliffs scenic reserve.

RECOMMENDATIONS FOR HIGHWAY PARKS

H137 The following existing highway parks and roadside stops, as shown on Map A, be used in accordance with the general recommendations for natural features reserves on page 243, and to provide opportunities for relaxation for travellers (see Appendix 11 for locations and areas):

- adjacent CA 3 Parish of Runnymede;
- Sections 19 & 20, Township of Toolleen;
- Casey Weir, CA 19A and adjacent water reserve to the west, Parish of Goorambat; and
- CA 7A Sec 1 Parish of Barambogic.

Note: The highway park previously identified at Ravenswood is now recommended as natural features reserve—bushland area H81.

I Water production

The water production category includes actual water storage areas, areas used primarily for water supply protection around the margins of domestic water supply reservoirs, diversion weirs and pump intakes that obtain their supply from catchment flows.

Coliban Regional Water Authority (RWA) provides water to Bendigo and other towns from the Coliban River system via the Coliban Main Channel, Sandhurst and Spring Gully storages and distributary channels, and from Lake Eppalock. Water is also supplied to Heathcote, Castlemaine, Dunolly, Wedderburn and some smaller towns.

Goulburn Valley RWA supplies Shepparton, Euroa, Violet Town, Nagambie, Rushworth and other northern plains towns. Wangaratta, Benalla, Beechworth and Chiltern are supplied by the North East RWA. In the west, the Central Highlands RWA supplies Maryborough and Avoca, and the Grampians RWA supplies St Arnaud and Stawell.

Where reservoirs store town drinking water, protective measures are required to provide protection from various forms of pollution. In recent years piped supplies from higher quality sources have replaced several of the small domestic water supply systems with relatively poor water quality.

Under the *Catchment and Land Protection Act 1994*, water catchments can be declared as 'special water supply catchment areas' and subsequently a 'special area plan' (or a pre-existing 'land use determination') can be prepared to guide catchment land use. The areas listed below have been declared under this Act, unless otherwise noted.

Other water supply sites whose catchments have not been declared include offtakes from the Campaspe and Goulburn Rivers, Goulburn Weir, several offtakes on creeks, numerous supply systems sourced from channels, and the off-stream water storage areas at Waranga Basin and Lake Mokoan.

Community views

Proposals regarding water production areas were mostly from water supply agencies concerned with land use recommendations for areas incorporating the walls or shorelines of designated water production areas. State forest (uncategorised public land in the Draft Report) adjoining the wall of Waranga Basin was requested to be included as part

of the water production area. It was similarly requested that H133 Moorabee shoreline, Lake Eppalock, be categorised as part of the water production area, in line with contiguous surrounding perimeter land. There was also a request to clarify land management responsibilities for the operation of the wall of No.1 Teddington Reservoir, Stuart Mill.

Achieving a balance

The ECC acknowledges the need for water management authorities to have control of particular land areas adjoining water production areas. The ECC recommends that public land adjoining Waranga Basin be included and managed as part of the water production area. H133 Moorabee shoreline, Lake Eppalock, contains important examples of Permian glacials and therefore, as a geological feature, forms an important part of the reserve system. The recommendations would permit delegation to Goulburn Murray Water of management of this area to protect the geological features.

The wall of No.1 Teddington Reservoir is at the interface of several land management authorities with different roles. Responsibilities should be resolved between these authorities, to ensure maintenance and safety of the dam wall, prevent degradation of Stuart Mill's water supply, and to provide for limited recreation in the adjoining St Arnaud Range National Park.

The identified water production areas are the main water storages and offtakes providing domestic water supply in the study area. The water production area applies to the storage and any public land buffer strip around the storage (or around an offtake) as defined in water supply catchment planning. However the catchments to the listed storages and offtakes—except for the immediate catchment to Spring Gully at Bendigo—have a mixture of public and private land, with a range of uses. In addition there are numerous other small offstream storage basins, tanks, water towers, channels and other water supply infrastructure that are not listed or shown on Map A. The land managers, water authorities and catchment management authorities should coordinate action to protect water quality and quantity in all domestic water supply catchments, and as appropriate in

other catchments. In particular, land, water and catchment managers should together determine:

- agreed principles for catchment management where public land is a major component of water supply catchments (e.g. parts of the Bendigo system, Redbank and Teddington Reservoir catchments) and other places where runoff or sub-surface flows from public land enter channels or catch-drains; and

- provision for reserves or easements as appropriate for water supply channels, tanks and pipelines where these are located in parks, reserves and state forests.

Domestic water supply storages should generally remain unavailable for public access. The Coliban Water Main Channel has its own reserve. Various irrigation and stock and domestic water supply channels should continue to be managed by relevant water supply authorities.

GENERAL RECOMMENDATIONS FOR WATER PRODUCTION AREAS

I The water production areas shown on Map A (numbered I1 and I2 and listed below and in Appendix 11); the storage areas, diversion works and associated facilities; protective buffer zones around diversion works and storages where defined in a special area plan or land-use determination; and any other public land considered necessary

be used for:

- (a) water supply purposes;
- (b) other activities permitted by the water supply authority after consultation with NRE and the Environment Protection Authority, as appropriate;
- (c) the biodiversity and historic values outlined in the notes below be protected by the relevant managers; and:
- (d) unless otherwise securely reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978* for water supply purposes and be managed by the water supply authority.

Note: Several large water storages not primarily used for domestic water supply are also used for water-based recreation. This may continue except where it results in deteriorating water quality.

Biodiversity values

Spring Gully and Sandhurst catchments should be managed to protect biodiversity as far as practicable

Historical values

Coliban Water Supply System (national significance)

Caledonia Gully Reservoir and race (local significance)

Laancoorie weir and water supply pumping system (regional significance)

Loddon River weir (typical of type)

Spring Gully catchment, Bendigo, has significant historical values associated with mining

Tarnagulla Recreation Reserve Reservoir (state significance)

I1 Water production areas - (declared catchments)

Declared special water supply catchment areas in the study area with an existing land use determination (LUD) or land use notice (LUN) (towns supplied in brackets) are:

- Malakoff Creek and Landsborough Reservoir (Landsborough, Navarre) LUD
- Sugarloaf Reservoir and Lead Dam (Avoca) LUD
- Cairn Curran lake environs LUN
- Eppalock lake environs LUD

Other declared special water supply catchment areas:

- Wimmera Systems—part
 - Lake Lonsdale (various)
- Picnic Road (Ararat)
- Teddington Reservoir (Stuart Mill)
- Redbank Creek Reservoir (Redbank)
- Forest Creek Reservoir (Amphitheatre)
- Bealiba Water Reserve (Bealiba)
- Loddon River - Laanecoore Reservoir (Dunolly, Laanecoore, Tarnagulla)

- Doctors Creek Reservoir (Lexton)
- Talbot Reservoir (Talbot)
- Centenary Reservoir (Maryborough)
- Tullaroop Reservoir (Maryborough)
- Lake Cairn Curran
 - McCay Reservoir (Castlemaine, Campbells Creek, Chewton, Fryerstown, Guildford, Harcourt, Maldon and Newstead)
- Spring Gully Reservoir (Bendigo)
- Lake Eppalock (Bendigo)
 - Coliban Main Channel (Taradale, Elphinstone)
 - Caledonia Reservoir (Heathcote)
 - McIvor Creek (Tooborac)
- Fifteen Mile Creek (Glenrowan)
- Diddah Diddah Creek (Springhurst)
- Ovens River (Wangaratta – offtake is outside study area boundary)
- Barambogic Creek (Chiltern)

Note: Coliban Water's Crusoe, No.7, Big Hill and Golden Point storages are within declared catchments but are to be removed from the Bendigo and Castlemaine supply systems.

I2 Other storages and offtakes

The following towns are supplied from water production areas with either part or all of their catchment within the Box-Ironbark study area. Their catchments have not been declared. They are grouped according to their relevant regional water authority (source of supply in brackets.):

Grampians RWA

- Charlton (Wimmera Mallee Water Channel)
- St Arnaud (Wimmera Mallee Channel to St Arnaud Reservoir)

Coliban RWA

- Wychitella (Wimmera Mallee Channel)
- Wedderburn and Korong Vale areas (Wimmera Mallee Channel)
- Bridgewater/Inglewood (Loddon River)
- Serpentine (Serpentine Creek)
- Jarklin (Serpentine Creek)
- Raywood (Raywood Reservoir)

- Sebastian (Cockatoo Hill Reservoir)
- Bendigo (Sandhurst Reservoir)
- Bendigo (Specimen Hill Reservoir)
- Bendigo (Jackass Flat Reservoir)
- Bendigo (Ironstone Hill Reservoir)
- Huntly (Huntly Channel)
- Axedale (Campaspe River)
- Goornong (Campaspe River)
- Elmore (Bore)

Goulburn Valley RWA

- Colbinabbin (Waranga Western Main Channel)
- Rushworth (Waranga Western Main Channel)
- Stanhope (No.9 Channel)
- Girgarre (Goulburn Murray Channel)
- Kyabram (Wyuna Main Channel)
- Tongala (Goulburn Murray Channel)
- Merrigum (Goulburn Murray Channel)

- Tatura (Goulburn Murray Channel)
- Shepparton/Tallygaroopna/Congupna Mooroopna (Goulburn River)
- Katandra West (Katandra West Channel)
- Toolamba (Goulburn Murray Channel)
- Murchison (Goulburn River)
- Goulburn Weir
- Nagambie (Lake Nagambie)
- Avenel (Goulburn River)
- Seymour (Goulburn River)
- Barmah (Murray River)
- Picola (Goulburn Murray Channel)
- Nathalia (Broken Creek)
- Numurkah/Wunghnu (Broken Creek)
- Katunga (Bore)

- Strathmerton (Bores)
- Cobram (Murray River)
- Katamatite (Goulburn Murray Channel)
- Dookie (East Goulburn Main Channel)

North East Region RWA

- Yarrawonga (Murray River at Lake Mulwala)
- Tungamah (Boosey Creek)
- St James (St James Channel)
- Devenish (Back Creek)
- Goorambat (Broken Creek)
- Bundalong (Ovens River – offtake is outside study area boundary)
- Wahgunyah (Murray River)
- Rutherglen (Murray River)
- Barnawartha (Bore)

13 Other major storages

- 13** (a) The following offstream storages providing water supply for irrigation and/or stock and domestic use be used for water supply purposes;
- (b) the special features specified below be protected; and
- (c) they remain under their existing tenure and control.
- Waranga Basin
 - Lake Mokoan

Values

Waranga Basin reservoir, weir wall and borrow pits, tramway and picnic area (state significance);

Waranga Western Channel, regulator, pumping station and bridge (regional significance)

(Note: Waranga Basin also has recorded natural, social and historic community heritage values.);

Other water supply catchments

The following declared catchments are outside the Box-Ironbark study area but supply water to towns within it. These are not shown as water production areas:

- Wimmera Systems—part
 - Fyans Creek (Stawell)
 - Lake Fyans (Ararat, Great Western)
- McCallums Creek (Maryborough)
- Malmsbury, Lauriston, Upper Coliban Reservoirs (Coliban Main Channel)

- Nine Mile Creek (Longwood)
- Seven Creeks and Mountain Hut Creek (Euroa)
- Ryans Creek (Benalla)
- Nine Mile Creek, Lake Kerferd (Beechworth)

Note: Various tanks and basins holding domestic supplies and major and minor channels supplying irrigation, domestic and/or stock water are not shown or listed.

J Community use areas

Community use areas are primarily used for education, recreation or other specific community purposes.

Education areas

Education areas were previously recommended by the Land Conservation Council to be set aside for environmental education; some have permanent school camps established on-site or nearby. The recommendations permit use for environmental studies, which may involve some environmental manipulation that would not normally be possible in parks and conservation reserves.

Information from NRE suggests that many of the recommended education areas across Victoria have had little use for their intended purpose. Those in the Box-Ironbark study area are now mostly proposed for other uses as most public land is available for environmental education.

The Eppalock Education Area beside Lake Eppalock does receive frequent visits by school groups, primarily associated with school camps. It is therefore recommended that it continue to function as an education area (see Recommendation J1).

Specific recommendations for other previously recommended education areas are as follows:

- Deep Lead Education Area should be added to the Deep Lead Nature Conservation Reserve (see D2, Chapter 16);
- Mt Egbert Education Area should be added to the Wychitella Nature Conservation Reserve (see D3, Chapter 16);
- Faraday Education Area should be included in Castlemaine Diggings National Heritage Park (see NHP1, Chapter 16);
- Waranga Education Area should be a natural features reserve (see Recommendation H116 in this chapter);
- Killawarra Education Area should be added to Warby Range State Park (see B3, Chapter 15); and
- Barambogie Education Area should be included in Chiltern–Pilot National Park (see A1, Chapter 15).

Recreation areas

Recreation areas are usually reserves close to townships and available for organised sports (horse racing, golf, team sports), or for informal recreation (picnicking, camping). Many recreation areas have retained indigenous vegetation on at least part of their area. In some parts of the northern plains, recreation areas are virtually the only public land parcels aside from road reserves. Any such vegetation occurrences should be protected. Indigenous grasses and herbs present should only be grazed if that is required for management.

Other important recreation areas are the various walking, riding or driving trails around major centres, and following particular themes. These include: the O’Keefe Rail Trail at Bendigo; part of the Murray to the Mountains Rail Trail (Wangaratta to Everton, and Beechworth link); the Bendigo Bushland Trail; the Major Mitchell Trail; and the Castlemaine–Maldon Diggings Heritage Trails.

Established rifle and other ranges

Rifle ranges have until recently been supervised by the Department of Defence to ensure safe operation. The Commonwealth has ceased this inspection function and some active shooting clubs have taken over the responsibility. The Victorian Police also have an oversight role.

Rifle ranges generally have large safety buffer zones behind the target mounds, some of which retain Box-Ironbark vegetation. If ranges are closed, the land should be assessed for suitable future uses—the buffer areas if appropriate should be reserved as park, nature conservation reserve, natural features reserve or state forest, according to compatibility with adjoining public land.

The freehold Bendigo Rifle Range is to be extended into Wellsford Forest to accommodate Commonwealth Games events. A shotgun range and a bow-hunting range in the buffer area are to be relocated.

In the recommended Reef Hills State Park (B4), the ECC has recommended that the cleared and infrastructure sites of three established ranges in the existing regional park not be included in the state park.

Forested buffer zones at these ranges would be retained in the parks, but zoned to ensure public safety.

Parklands and gardens

Botanic gardens, municipal parks and playgrounds on public land are used, often intensively, by the community for informal recreation. Some areas carry native vegetation and may have historical features.

Buildings in public use

Communities use public buildings such as halls, schools, libraries, museums, and their associated facilities, for a wide variety of purposes including education, recreation, meetings and tourism. Many public buildings are in use for a primary purpose (such as schools) but also serve wider community purposes. Some public buildings may have historical value.

Public buildings, and other community use areas, may be held under committee of management status by shires or community organisations. Other arrangements for delegated management may also be suitable in particular circumstances.

Community views

Most submissions concerning community use areas proposed maintenance of existing access to and use of these sites, particularly where surrounding land use categories have changed. Examples of such

proposals include Yundool School Hall (Broken-Boosey State Park), Bendigo Pistol Club range (Bendigo Regional Park) and Victorian Practical Prisons Club range (Shelbourne Nature Conservation Reserve). There was also support for the continued use of Eppalock Education Area. Some submissions proposed upgrading recommended community use areas to provide better protection for certain values. For example, part of J5 Maryborough was proposed to be included in the adjoining regional park to protect significant threatened plants.

Achieving a balance

The ECC considers the J1 Eppalock Education Area to be important, facilitating access and providing a focal point for Box-Ironbark environmental education activities associated with school camps. It is recommended that this area remain an education area. Except where they are recommended for another purpose, the ECC recommends continuation of J2 recreation areas, J4 rifle and other ranges and access to J6 buildings in public use, including where these are surrounded by other land use categories. Where these become unviable in the future they should be considered for inclusion into the park and reserve system. Significant natural and cultural heritage values should be protected; some have been included as notes with individual community use area recommendations in Appendix 11.

GENERAL RECOMMENDATIONS FOR COMMUNITY USE AREAS

J The recommended areas J1-J6 below be used for recreation, education or other community purposes and:

- (a) appropriate facilities be provided;
- (b) where relevant, and where compatible with the above, features of cultural significance, natural surroundings and the local character and quality of the landscape be maintained or restored;
- (c) harvesting of forest products, hunting and 'stone' extraction, as defined in the *Extractive Industries Development Act 1995*, not be permitted;

and:

- (d) they be reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment (see Note 3 below); and
- (e) small areas continue to be used by communities for local recreation and managed by committees of management or NRE as appropriate.

Notes:

1. Some of these areas are shown on Map A; others are too small to be shown.
2. Several of the community use areas have values worthy of protection other than their primary use. Notes on these other values are included in Appendix 11.
3. While the primary public land manager remains NRE, on-ground management can be delegated to organisations or institutions other than NRE, as committee of management, under licence or other arrangement, subject to review of management effectiveness.

RECOMMENDATIONS FOR EDUCATION AREAS

- J1** The Eppalock Education Area be used in accordance with the general recommendations for community use areas on page 252, and to provide opportunities for students of all ages to:
- (a) study the nature and functioning of reasonably natural ecosystems in a manner such that the integrity of those ecosystems is maintained as far as is practicable;
 - (b) compare the ecosystems within the education area with other nearby natural and modified systems;
 - (c) observe and practise methods of environmental analysis, and the field techniques of the natural sciences; and
 - (d) conduct simple long-term experiments aimed at giving an understanding of the changes occurring in an area with time.

RECOMMENDATIONS FOR RECREATION AREAS

- J2** Recreation areas be used in accordance with the general recommendations for community use areas on page 252, and be used:
- (a) for organised sports (team sports, horse-racing, golf etc.) and informal recreation (picnicking, camping, prospecting etc.) as permitted by the land manager;
 - (b) to conserve indigenous vegetation where possible; and
 - (c) for grazing at the discretion of the land manager, in appropriate areas.

Note: Large reserves are shown on Map A; smaller reserves, particularly in townships, are generally too small to be mapped at the scale used, and are not shown.

RECOMMENDATIONS FOR RECREATION TRAILS

- J3** The recreation trails continue to be used in accordance with the general recommendations for community use areas on page 252, and that suitable new trails for recreation and tourist use be encouraged.

RECOMMENDATIONS FOR ESTABLISHED RIFLE AND OTHER SHOOTING RANGES

- J4**
- (a) Existing use of established ranges as a rifle, pistol or clay target range, or for other shooting sports, continue, provided the club remains viable and the operator can ensure safety on the range and in adjoining areas to satisfactory standards; and
 - (b) where ranges including buffers are closed and they retain remnant Box-Ironbark vegetation, those areas be reserved as parks, nature conservation reserves, natural features reserves or state forest as appropriate.

Note: The buffer zones at several ranges have been included in adjoining parks and are subject to access limits.

RECOMMENDATIONS FOR PARKLANDS AND GARDENS

- J5**
- (a) Gardens, community parklands or ornamental gardens on public land be used in accordance with the general recommendations for community use areas on page 252;
 - (b) the conservation, scientific, educational, and historical values of botanical gardens be protected; and
 - (c) they be available for public use for passive open space recreation, appreciation and education, as determined by the land manager.

Notes:

1. Where these areas retain indigenous vegetation, it should be protected.
2. These areas are generally too small to be mapped at the scale used, and are not shown on Map A.

RECOMMENDATIONS FOR BUILDINGS IN PUBLIC USE

- J6** Various buildings in public use be used in accordance with the general recommendations for community use areas on page 252, where appropriate, and for schools, public halls, kindergartens, libraries, museums, galleries, war memorials, tourist facilities or other public uses.

Notes:

1. See also Recommendation N2.
2. These areas are generally too small to be mapped at the scale used, and are not shown on Map A.

K Plantations

Softwood plantations

This section is about the former publicly owned softwood plantations on public land. The typical Box-Ironbark environment is too dry for productive pine plantations and only small areas in the Box-Ironbark study area—at Castlemaine, Harcourt (Mt Alexander) and Chiltern (Barambogic), totalling about 916 ha—were previously designated for softwood production.

The Mt Alexander and Barambogic plantation forests are now privately owned, although the land remains Crown land. In 2015, Mt Alexander plantation reverts to the Crown, and is to be restored to eucalypt forest, under the *Victorian Plantations Corporation Act 1993*. This should then be added to the Mt Alexander Regional Park (C5).

Hardwood plantations

Farm forestry programs support the establishment of plantations for hardwood and other species on private land. They are established for erosion control, reducing infiltration in salinity recharge areas, windbreaks for stock shelter, and to provide future wood or other products. Box-Ironbark tree species are commonly planted, although sugar gum is suited to many conditions and is also widely planted.

Products include sawlogs, pulpwood, firewood, and eucalyptus oil. A feasibility study⁹ outlines expected returns to landholders from sawlogs, pulpwood, and eucalyptus oil. A separate business plan¹⁰ focusses on

opportunities for firewood plantations, with a view to replacing production from public land.

Emerging products include fuelwood for charcoal and biomass production, and the potential market for carbon credits. Recommendation R7 in Chapter 3 encourages continued programs of these types.

Rather than establishing plantations, natural regeneration of overstorey trees, and some shrubs and grasses (depending on seed sources and the condition of adjoining vegetation) will occur at many inland hills sites, on removal of grazing. It is likely to be the most cost-effective means of returning previously cleared areas to Box-Ironbark vegetation.

Community views

While there was very strong support for the establishment of plantations on private land to cater for future timber requirements, there were few submissions specifically concerning existing plantations on public land.

Achieving a balance

The ECC recommends that there be no extension of softwood plantations occurring on public land in the study area. In addition, the ECC recommends that consideration be given to the establishment of hardwood plantations following the next harvest at these sites. The recommendations support, in principle, the establishment of hardwood plantations on cleared private land to meet future timber demands, particularly for firewood.

GENERAL RECOMMENDATIONS FOR PLANTATIONS

- K**
- (a) There be no extension of softwood plantations on public land in the study area;
 - (b) at the time of harvest, consideration be given to the economics of establishing hardwood plantations on these areas; and
 - (c) the plantation managers address the issue of eradication of pine seedlings in adjoining forested areas.

SPECIFIC RECOMMENDATIONS FOR PLANTATIONS

- K1** The existing plantations shown on Map A continue under present use and management.
- K2** The Mt Alexander plantation, when re-vegetated, be added to the Mt Alexander Regional Park (see C5, Chapter 16).

Note: The Mt Alexander plantation contains: the site of the former Victorian Ladies Sericultural (silkworm breeding) Association, of state historical significance and recorded community heritage values; and remnants of a historical plantation of *Valonia* oaks for tanning. These sites should be protected.

L Earth resources

Mining sites

A detailed account of all relevant aspects of Box-Ironbark exploration and mining is provided in Chapter 7, culminating in six recommendations (R25–R30) setting the recommended framework for future exploration and mining in any public land use category where it occurs within the study area. These recommendations include general principles to minimise the impact of exploration and mining on Box-Ironbark public land values.

While it is not possible to set aside sites for future mining, it is appropriate to recognise the primacy of this major use of public land at sites where currently it is virtually the exclusive use over appreciable areas.

Community views

Submissions included strong views opposed to mining activities in the study area, in specific locations or generally, while mining companies and individual miners argued for ready access to prospective locations. Numerous proposals referred to Stawell Gold Mines and Bendigo Mining operations, in particular.

Several submissions opposed the recommendation for Big Hill, Stawell to be uncategorised public land.

At the time of the Draft Report this area was the subject of an environment effects statement (EES) relating to a mining proposal from Stawell Gold Mines.

Achieving a balance

The ECC is aware that the Stawell Big Hill Development Project will not proceed. The Minister for Planning (6 November, 2000) announced that the proposal did not provide an acceptable balance of economic, social and environmental outcomes. Big Hill is now recommended as a J5 community use area.

Around Bendigo, sites of particular interest for mining operations and infrastructure were identified. An additional mine operations site, the New Moon at Eaglehawk, is to be set aside as an L1 mining site. Sites of potential interest in Bendigo for the establishment of ventilation shafts for underground mining operations have been annotated. Regarding such ventilation shaft sites at Bendigo, the ECC considers it would be preferable if these were located in uncategorised public land areas. The inclusion of a ventilation shaft in the recommended Salomon Gully Nature Conservation Reserve (D 40) would be subject to appropriate approval processes.

RECOMMENDATIONS FOR MINING SITES

- L1**
- (a) The mining sites shown on Map A (numbered L1) and listed in Appendix 11 be used for mineral extraction in accordance with the general principles and recommendations in Chapter 7; and
 - (b) when no longer required for mining, each site be considered uncategorised public land and assessed for public land values and uses, and where appropriate assigned to another public land use category or made surplus.

Note: Areas undergoing open pit mining, where public land values have been removed, could be sold or exchanged before completion of mining.

Stone reserves

Chapter 14 introduces extractive industries in the study area. Specific small areas of public land were previously recommended for stone production. Some areas recommended were commercial quarries, but most were small parcels set aside for municipal gravel resources.

Current operations and approval processes for applications should continue, subject to continued viability, the *Extractive Industries Development Act 1995* and appropriate conditions (see principles and guidelines below).

In the past, the cumulative effect of numerous small extraction sites has been the gradual removal or degradation of areas of Box-Ironbark vegetation. Standards and practices have undoubtedly improved, but the challenge now for extractive industries should be no net reduction in the area with Box-Ironbark vegetation—rather, a gradual increase.

This challenge should be met given that, out of the 126 work authorities in the study area, 92 are wholly and six partially located on private land largely cleared of Box-Ironbark vegetation.

Community views

Several submissions proposed that extraction of earth resources should be excluded or rapidly phased out from public land. Others called for continued access to operating extraction sites, particularly in the light of changes in surrounding land use. It was also proposed that all existing and former quarries be retained as potential sites for stone production in the future.

Several submissions supported inclusion of the L2 area at Junortoun in the Bendigo Regional Park. Predominantly this support was generated from surrounding residents opposed to the extraction of gravel in a residential area. Also this area is valued for the recreational opportunities and natural values provided.

Achieving a balance

The ECC recommends that operating stone extraction sites continue. However, industry is encouraged to continue improving standards and

operations. The ECC has recommended a set of guidelines and principles (see below) for stone extraction, including requirements similar to those for mining, to minimise the impacts on natural values within and surrounding these areas. Land managers should also take particular care when it is necessary to extract stone for management needs on public land. Numerous disused stone extraction sites have been included in the reserve system and are no longer available for further extraction. Opportunities for stone extraction operations exist on cleared private land and should be pursued.

The ECC has reviewed the existing L2 area at Junortoun. The substantially disturbed eastern part of this reserve is recommended to be retained as a stone reserve, while the western part will form an important buffer for the Greater Bendigo National Park, maintaining recreational opportunities for surrounding residents. When this stone reserve is no longer viable it should be added to the reserve system.

PRINCIPLES AND GUIDELINES

The standards of operation and rehabilitation for stone extraction should be similar to comparable scale mining operations. The following principles and guidelines for stone extraction are proposed.

- Box-Ironbark vegetation should preferably not be removed for extraction, particularly where the same extractive resource is available on already cleared land or where the resource is shallow and extraction will be short term.
- If vegetation is to be removed, it should be replaced in kind, by the purchase of freehold land with established Box-Ironbark vegetation.
- A preliminary assessment of new proposals for possible impacts on Aboriginal cultural heritage values should be carried out.
- Reclamation of extraction sites needs to be of a high standard, with collection of seed from as many species as is practical from the site before operations, stockpiling of the topsoil layer, and re-establishment of a substantial complement of the original species present.
- Since broad areas are suitable and potentially available for extraction of most materials, careful planning will ensure that extraction is excluded from places of greater value for other purposes, including aesthetic or nature conservation values.
- Extraction sites should be rationalised to the smallest practical number of sites.
- Sites in use should be progressively rehabilitated.
- Old extraction sites should be rehabilitated where possible, including removal of rubbish, measures taken to stabilise the surface and ensure public safety and revegetation as required.
- Location of sites and conditions imposed should aim at minimising adverse effects on adjoining public land from noise, dust, unsightliness, and erosion.
- Particular care is necessary to avoid affecting water quality in run-off from extraction sites.
- Extraction should avoid highly erodible sites. The potential for adverse impacts of extraction in streambeds and granitic sands is severe, and if no alternative source is available, specific protective measures should be applied.
- Stone should not be removed from mine mullock heaps assessed as historically significant.
- In large public land areas, the land managers may extract stone from appropriate sites as required for management needs.

M Services and utilities

Located on public land are numerous utilities, such as transport, electricity and gas, communications, cemeteries, water, sewerage, waste disposal and other services. Some involve Commonwealth controlled activities such as communications towers. Also in this category is land used for agricultural research. Areas specifically recommended for these purposes are generally small.

Roads and road reserves

Roads providing access to farmland and townships also provide a crucial network of remnant natural vegetation across much of the study area. This network is particularly important on the northern plains, in locations of Plains Grassy Woodland and other highly depleted plains EVCs, and in Grassy Woodland EVC occurrences abutting the inland hills. Roadside vegetation can provide a guide and a seed source for the restoration of natural vegetation. It may carry the only remnants of some vegetation types.

Large old trees are relatively abundant along roadsides, providing habitat, and scenic appeal for road users. These trees are irreplaceable, except in the very long term; Box-Ironbark trees 75 cm in diameter, not unusual on roadsides in the Inland Hills are on average, at least 200 years old (they would be younger on deeper soils and better-watered sites).

In key locations roadsides provide habitat for threatened grey-crowned babblers, brush-tailed phascogales and squirrel gliders. From recent surveys¹¹, roadsides support a larger number of reptile species per site than comparable small or large woodland fragments, attributable to the absence of grazing from many roadsides, leaving a less-disturbed ground layer. Note that all survey sites were 1 ha—thus, on a per site basis roadsides were rich, but overall a larger block may in total support more species and certainly more individuals than a narrow roadside.

Unused roads can have similar values to used roads, contributing to the network of retained vegetation and habitat. Benefits for these networks are reduced vehicular use and absence of road maintenance. Unused road reserves adjoining parks, reserves and forests should generally be added to those areas. Other unused road reserves are located within farmland and are sometimes unfenced and grazed, reducing biodiversity values; many are fenced, however.

In conjunction with vegetation along streams (and, to a lesser extent, beside constructed water channels), roadsides and unused road reserves contribute to an integrated system of habitats linking larger forest and woodland areas. In addition to directly providing habitat, such corridors facilitate the movement of biota across areas of otherwise unsuitable habitat. Such links are of vital importance for allowing the recolonisation of populations of flora and fauna species that have become locally extinct and for supplementing local populations that are declining.

Managers should ensure that road reserve values are retained, where possible. Road reserves identified as being of high conservation value (such as those listed in Appendix 16) should be afforded particular protection. Some broad guidelines for roadside management are outlined below. It is recognised that many of these are being implemented by road managers.

A national protocol for co-operative management of roads used by various road managers has been proposed.¹² This could assist in conserving biodiversity along roads.

RECOMMENDATIONS FOR STONE RESERVES

- L2**
- (a) Stone reserves shown on Map A (numbered L2) continue to be used for the extraction of stone in accordance with the above principles and guidelines;
 - (b) proposed new extraction sites be located and operated in accordance with the *Extractive Industries Development Act 1995* and the above principles and guidelines;
 - (c) extraction sites preferably be located on already cleared land; and
 - (d) when no longer required for extraction, each site be considered uncategorised public land and assessed for public land values and uses, and where appropriate assigned to another public land use category or made surplus.

Notes:

1. Existing and recommended stone reserves are listed in Appendix 11.
2. Existing operations for stone extraction under licence within recommended new parks and reserves may continue, subject to the above principles and guidelines, and relevant approvals.

ROAD RESERVE MANAGEMENT GUIDELINES

- When improvements to a road are being carried out, indigenous vegetation on the road reserve should be either not disturbed, or disturbed to the minimum extent consistent with the safe and efficient design and use of the road.
- Major highway works should continue to be the subject of EES procedures, where appropriate.
- Where the nature and volume of traffic justifies major works to roads carrying trees and shrubs, the managers of adjacent public land should be consulted.
- The purchase of cleared freehold land for road construction purposes should be used instead of clearing stands of indigenous vegetation in the road reserve.
- The principle of net gain of Box-Ironbark vegetation on public land, applied to other industries in these recommendations, requires the replacement of areas of Box-Ironbark vegetation proposed to be cleared, by purchase and transfer to the public estate of private land with remnant vegetation.
Note: This principle was applied recently when the Goulburn Valley Highway was being widened, where private land with indigenous vegetation was bought to replace public land lost from the Mangalore Nature Conservation Reserve.
- High quality revegetation using local provenance plants should be undertaken in the areas disturbed by roadworks.
- Unused roads with indigenous vegetation should be managed to protect that vegetation.
- Unused roads adjoining parks, reserves and state forest should be added to those areas where possible.
- Where re-alignment of a road results in a section of the old road being cut off, wherever possible that section should not be sold, but used as a recreation and rest area or incorporated into an adjacent appropriate reserve.
- Every effort should be made to locate utility easements on cleared private land alongside the road, rather than clearing roadside vegetation.
- Road-making materials should not be taken from road reserves.
- Plans for burning off, slashing, poisoning or clearing of roadside vegetation for fire protection should take into account the maintenance of biodiversity, and be kept to a minimum consistent with providing adequate protection. In many cases works on adjoining freehold land can achieve the desired outcome.
- Weeds and vermin on road reserves should be controlled by means that do not conflict with biodiversity conservation.
- Gravelled and unsurfaced roads can be key contributors to erosion and stream pollution. The managers of such roads should utilise best practice methods to minimise these effects.
- On soils of moderate to high erosion hazard, road managers should ensure that pre-planning, design, construction and funding of roads cater adequately for erosion prevention and control.

Other utilities

Railway alignments often also retain little-disturbed examples of indigenous vegetation (except for the overstorey, removed for safety). These are important, and management should ensure actions such as fire protection are carried out at times that suit the vegetation. Disused rail reserves have been assessed by NRE for their recreation and conservation values, and recommendations for several such lines are included in earlier sections and chapters.

Various other service and utility sites may also retain indigenous vegetation, or significant cultural heritage features, and where possible, these should be protected.

Community views

There was considerable interest in the appropriate management of service and utility areas, particularly roadsides, throughout the study area. Many submissions proposed the establishment of conservation reserves along roads, or more effective management of these areas for nature conservation.

Proposals included greater coverage by roadside conservation strategies, creation of a new public land use category that provided specific protection for roadsides, railway areas and other corridors with natural values, and the removal of perceived detrimental uses such as grazing. It was proposed that networks of roadside with particular conservation significance be upgraded to natural

features reserves or nature conservation reserves. One submission called for all new services, utility sites, easements or lines not to be sited across any public land containing vegetation unless a socio-economic need for doing so was demonstrated. Some submissions proposed greater protection be given to specific roadside areas.

Achieving a balance

The ECC's view is that roadside areas with remnant vegetation are of paramount importance to maintenance of biodiversity and nature conservation throughout the study area. Appendix 16 tabulates some significant high-quality roadsides

identified throughout the study area; the Council has recommended these areas be protected in roadside management plans, which should include the management of potentially threatening uses. Biodiversity conservation along roadsides may also be assisted by the proposed national protocol for co-operative management of roads. The ECC recommends that any new services and utility sites, easements or lines avoid reference areas, and where possible avoid national, state or regional parks and nature conservation reserves. Where practicable, the ECC supports the placement of services and utilities infrastructure on previously cleared private land.

GENERAL RECOMMENDATIONS FOR SERVICES AND UTILITIES

- M1**
- (a) Existing reserves and easements used for public services and utilities such as transport, electricity and gas, communications, cemeteries, water and sewerage, continue to be used for those purposes;
 - (b) new services, or utility sites and easements or lines not be sited in or across reference areas, and wherever possible not be sited in or across national, state, or regional parks or nature conservation reserves;
 - (c) railway lines and other service and utility sites be managed to protect remnant vegetation and habitat, as far as practical; and
 - (d) should a public land area or building and site used for service or utility purposes no longer be required for its primary designated use, it be assessed for its natural, recreational and cultural heritage values, and capability for other public uses, as outlined under Recommendation N2.

Notes:

1. Many of these areas are too small to be shown on Map A.
2. Several of the services and utilities areas have values worthy of protection other than their primary use. Notes on these other values are included in Appendix 11.

- M2**
- (a) Organisations responsible for road reserve management conserve and protect indigenous flora and fauna communities and habitat occurring on roadsides, in accordance with the guidelines above (see Note 1); and
 - (b) the significant environmental values of the high quality road reserves identified in Appendix 16 be conserved and protected as part of roadside management plans (see Note 2).

Notes:

1. While NRE, VicRoads and municipalities are commonly responsible for road reserve management, many unused roads are managed by adjoining landholders.
2. Road reserves included in Appendix 16 are those that have vegetation of high conservation value that extends for a distance of at least 3 km. Many other road reserves have vegetation of high conservation value that does not exceed 3 km in length; it would be impractical to include all such road reserves within Appendix 16. However, these smaller lengths of high conservation value roadsides should be afforded the same degree of protection as those listed in the appendix. Refer to the information sources cited for the location of such roadsides.
3. There are numerous cemeteries across the area, many with burials dating back to the gold and settlement eras. Cemeteries often have remnant natural vegetation. Some of these sites are noted in Appendix 11, but numerous others are not listed.

N Uncategorized public land

This category includes public land, often in small rural parcels or in townships, that was previously recommended by the LCC as *Other reserves and public land* or *township land*, or for which no primary use was recommended. In other cases, no previous LCC recommendations were made.

With new information from subsequent surveys, assessments and submissions, these areas can now be categorised for a particular public use, or where appropriate, disposed of.

Crown land assessment and classification

NRE (through Land Victoria) is carrying out a state-wide assessment of Crown land parcels, for their public land attributes. These are the resources, or natural, recreational, heritage or scenic values present on a block, that generally require its retention as Crown land. Surplus Crown land, that has minimal or no such values or resources, may be considered for disposal if it is surplus to government needs.

In the Box-Ironbark area, there are some 30 000 separate parcels of Crown land, many of which are small, located in old gold mining townships, and have few or no public land values. Others retain Box-Ironbark vegetation, or at least over-storey trees. Some have mature trees which provide habitat for native animals; they may also contribute to habitat corridors on private land between larger blocks of Box-Ironbark vegetation. Others provide recreation opportunities or public access, or have notable historical features. It is important that such values be protected, either by retention as public land, or under management by suitable organisations.

Following assessment, Crown land with public land attributes (termed public land) is generally assigned by Land Victoria to either NRE Forests Service or Parks Victoria as land manager. Some parcels of land have significant values but for various reasons may not be suited to management by either NRE Forests Service or Parks Victoria.

Land Victoria includes some such parcels in a 'land bank' pending allocation to one of the following alternatives:

- committee of management tenure, often through a municipal council;

- licence to other organisations, for example tertiary colleges, Landcare groups, historical societies, environmental groups etc;
- licence to private users with specified conditions;
- sale with a land management agreement under Section 69 of the *Conservation, Forests and Land Act 1987*; or
- retention by Land Victoria.

Where organisations such as municipalities, tertiary colleges, Landcare groups, historical societies or environmental groups have the capability and resources to manage small Crown land parcels, the primary land managers should encourage such arrangements.

In all cases the public land attributes would be protected; the land would remain as Crown land unless sold.

Changes to existing public land use

Where public land has an existing approved LCC recommendation for public land use, an Order in Council may be required to amend or revoke the recommendation, under Section 26(2) of the *Environment Conservation Council Act 1997*.

On 10 March 1999, the Governor in Council approved an order to establish a procedure for the investigation, disposal, land exchange or re-categorisation of Crown land parcels in certain public land use categories.

The procedure requires that for land included under approved recommendations for *Uncategorised Public Land, Services and Utilities*, or *Community Use Areas (Buildings in public use)*, that is apparently surplus to requirements:

- an assessment of public land values be undertaken;
- appropriate consultation be carried out; and
- the areas be considered for land exchange, disposal, or (where there are substantial issues) reference to a body responsible for public land management.

Community views

Submissions regarding N1 uncategorised public land predominantly focussed on specific parcels, and were concerned with the management and protection of values on these blocks. A number of submissions proposed specific uses or protection for values of former ‘township land’ at Bendigo, Maryborough, Stawell, Castlemaine and St Arnaud.

Several uncategorised public land parcels on the Northern Plains previously recommended for revegetation were proposed as nature conservation or natural features reserves where they have remnant vegetation (for example, at Kaarimba), or for Box-Ironbark plantations. N1 land adjoining Waranga Basin, currently under management of Goulburn Valley Water (GMW), was proposed to be included as part of the water production area, under GMW management.

Provision for future ventilation shafts in several parcels at Bendigo, for underground mining, was requested. A proposal was put forward for a Box-Ironbark firewood plantation on uncategorised public land at Ararat. There was support for the protection of uncategorised public land at Big Hill, Stawell, as either historic and cultural features reserve or nature conservation reserve. It was proposed that in general, uncategorised land with native vegetation should be permanently protected for nature conservation.

Achieving a balance

The ECC has attempted to assign public land previously uncategorised—primarily the larger parcels and/or those with significant resource, natural, heritage or recreational values—to appropriate land use categories. Many have been recommended as additions to adjoining parks or reserves, or as new stand-alone small reserves (see Chapter 16 and this chapter). These recommendations are based on new data since previous LCC recommendations, from field inspections, information and views in submissions, and Crown land assessments by NRE.

However there are several hundred moderate-sized parcels—between 10 and 100 ha—and many thousands of small and very small parcels—from around 0.02 ha to 10 ha—about which the ECC has little or no information. These contribute to the substantial total area of ‘other public land’ shown in the Summary of Area Recommendations table in the Executive Summary. Ongoing NRE Crown land assessments will compile data on uses and values and provide direction for future land use decisions on such parcels.

Specific issues raised in submissions have been reviewed by the ECC. Comprehensive new recommendations are made for much of the former ‘township land’ in Bendigo and the towns listed above. Several of the ‘revegetation areas’ are recommended as natural features reserves, or are noted for protection of remnant vegetation.

Uncategorised public land adjoining Waranga Basin, including part of the wall of the reservoir and borrow pits associated with its construction, is recommended for addition to the water production area.

The ECC supports the provision for uses such as the mine ventilation shafts at Bendigo, where appropriate, and encourages establishment of box-ironbark plantations on cleared public land as well as on private land.

Uncategorised public land at Big Hill, Stawell, is now recommended as J5 community use area, including a note regarding protection of significant features.

Protection of significant values on remaining uncategorised public land will be put into effect by the notes for particular parcels in Appendix 11, and the Crown land assessment process outlined above.

RECOMMENDATIONS FOR UNCATEGORISED PUBLIC LAND

- N1** (a) Public land other than that:
- (i) recommended for specific uses in this report, or
 - (ii) subject to previous approved specific land use recommendations, be uncategorised public land;
- (b) existing legal use and tenure continue for the time being; and
- (c) when Crown land assessments are completed, the land be either:
- (i) if 'public land', assigned to an NRE land manager, or included in a 'land bank' and treated as outlined above, or
 - (ii) if assessed as surplus, disposed of.

Notes:

1. While the primary public land manager remains NRE, on-ground management can be delegated to organisations or institutions other than NRE, as committee of management, under licence or other arrangement, subject to review of management effectiveness.
2. Several of the uncategorised public land areas have values worthy of protection. Notes on these values are included in Appendix 11.

- N2** For Crown land subject to existing approved but non-specific land use recommendations as either:

- uncategorised public land
- services and utilities, or
- community use areas (buildings in public use)

and which is apparently surplus to requirements;

an assessment of public land values be undertaken and, following appropriate consultation, these areas be considered for re-categorisation, land exchange or disposal.

O Land not required for public purposes

This includes public land recommended to be alienated either for agriculture or for private use in townships.

Under Section 69 of the *Conservation, Forests and Lands Act 1987*, a binding agreement can be made between the Secretary of the Department of Natural Resources and Environment and a landowner, including the purchaser of surplus Crown land. Such Section 69 agreements can include covenants for a range of land management matters, including the retention of existing trees and other vegetation, protection for drainage lines and so on. Agreements of this type have been applied to several Crown land sales in the study area.

Community views

There was support for the retention of all areas with native vegetation as public land. It was also proposed that all land, including that without tree cover, should be retained by the Crown, as these areas may be used to provide links between other areas, to

function as buffers or be suited to regeneration of Box-Ironbark vegetation communities. Some proposed that rehabilitation plans should be prepared for areas of cleared public land not required for other uses. A plan was put forward for Crown land deemed as surplus to be exchanged for valuable private land under threat, or sold and the proceeds retained in a revolving fund to purchase important private land with remnant vegetation.

Achieving a balance

The ECC supports, and has included in its recommendations, the use of surplus land in land exchange programs, including the addition of freehold land with significant values to the reserve system, as it becomes available. The ECC further recommends that any land sold that has some public land values, for example, established trees, be subject to agreements under section 69 of the *Conservation, Forests and Lands Act 1987* to protect such values.

RECOMMENDATIONS FOR LAND NOT REQUIRED FOR PUBLIC PURPOSES

- O1** (a) Land not required for public purposes, as listed in Appendix 11, be considered for alienation or for exchange for freehold land; and
- (b) land to be sold be subject to agreements under Section 69 of the *Conservation, Forests and Lands Act 1987*, where appropriate.

Note: To facilitate addition of remnant Box-Ironbark vegetation on private land to the Crown estate, land exchange or a revolving fund to permit proceeds of land sales to be used for land purchase, where appropriate, should be considered.

Information Sources

- ¹ NRE Land Victoria, Bendigo office assessments of small public land parcels.
- ² Davidson *et al.* (1997).
- ³ Davidson (1996).
- ⁴ Muir (1996).
- ⁵ Rosengren and Joyce (in prep.).
- ⁶ Data on threatened species from the Flora Information System and the Atlas of Victorian Wildlife.
- ⁷ CNR (1995).
- ⁸ Victoria Government Gazette (11 March 1999).
- ⁹ Virtual Consulting Group (1999).
- ¹⁰ Traill and Porter (2001).
- ¹¹ Stothers ed. (1999).
- ¹² Farmar-Bowers (1999).

19 ECC's response to major issues raised in submissions

The submissions received in relation to Box-Ironbark public land use reflect a wide diversity of priorities, not all of which are mutually compatible.

Many Victorians are strongly interested in the use of Box-Ironbark public land. The ECC received around 1 500 submissions and letters following the release of the Draft Report in May 2000. Many stakeholders attended consultative meetings, briefings, and public meetings to put forward their views. Conservationists, prospectors, timber workers and naturalists were among the many who made submissions. Responses from interested parties came from across Victoria and interstate; some from rural regions, others from urban centres.

The diversity of ways in which Box-Ironbark lands are used ensures that many different people, with widely different perspectives, are concerned for the future of this region. The Box-Ironbark study area is vital for many local industries, notably mining, tourism, bee-keeping, timber and eucalyptus oil production. Many areas support important services or utilities such as defence and water production facilities.

These forests and woodlands also host a great diversity of recreational activities for residents of the region e.g. bushwalking, prospecting, nature study, trail-bike and horse riding and car rallies. Increasingly, the natural and cultural values of the forests are being recognised (many of which contribute to the values of other activities and industries). Sites and places of indigenous significance require protection, as do remnants of post-contact history when these forests resonated with gold rush fever.

The forests and woodlands are also home to a large number of threatened species. Many of the vegetation types represented in the remaining Box-

Ironbark forests are but a small fraction of their original extent. Squirrel gliders, turquoise parrots and pink-tailed worm-lizards are among the many threatened species dependent upon and largely restricted to the Box-Ironbark areas.

Many submissions supported the retention or expansion of existing industries. Many others called for the blanket protection of all remaining Box-Ironbark forests and woodlands. Activities regarded as essential for the region by one group might also be regarded as detrimental to the preservation of biodiversity by another group.

All these divergent views and proposals put forward were considered by the ECC within the context of similar submissions and competing land uses. In many cases different land uses are complementary or can co-exist. In others, they must be prioritised. In all cases, however, public submissions and extensive consultation make major contributions to the way in which these recommendations are formed. The following sections attempt to summarise that process.

19.1 Aboriginal interests

Many submissions were received proposing greater recognition of Aboriginal culture and connection with the study area, and the role Aboriginal people have played, and continue to play, in managing the Box-Ironbark forests and woodlands. Most of these submissions paid particular attention to the need to protect Aboriginal cultural sites and places. Some proposed all such sites should be protected in national parks.

Response

The ECC recognises that Aboriginal peoples' connections with the Box-Ironbark study area are strong, and that Aboriginal communities continue to assert their connections with all of their ancestral areas. For Aboriginal peoples, their cultural heritage is enmeshed with their spiritual, ecological, and economic connections with the land and water. Their relationship is based on a long tradition of ownership, stewardship, utilisation and cultural significance, a tradition that continues to this day.

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Many Aboriginal cultural sites and places have been incorporated in the recommended parks and reserves system. In line with the views of the communities, these places have not been highlighted. These sites and places are important features of parks and reserves and, where appropriate, will be significant in the interpretation and appreciation of Box-Ironbark forests and woodlands, including the cultural heritage of different Aboriginal groups. The ECC recommendations complement the protection of such sites, places and relics already received under State and Commonwealth legislation (*Archaeological and Aboriginal Relics Preservation Act 1972* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*).

Consultation with Mirimbiak Nations Aboriginal Corporation, Aboriginal Affairs Victoria, traditional owners and local Aboriginal groups has helped to establish a process to address Aboriginal interests related to the implementation of ECC recommendations. These recommendations are addressed in detail in Chapter 5 of this report, and Aboriginal interests regarding specific area recommendations are also addressed in Chapters 15–18.

19.2 Apiculture

There was strong industry support for continued access to all Box-Ironbark forests and woodlands for bee-keeping. Some apiarists put the view that there is little evidence to support any detrimental impact of honey bees in forested landscapes. Industry concern was evident regarding draft recommendation R22, which related to the discretion of land managers regarding the placement of hives on public land. Apiarists asserted that, in the past, land managers have excluded apiculture without adequate consultation, and without an avenue to appeal decisions.

There was opposition within the industry to draft recommendation R25, regarding investigation of the placement of hives on cleared land adjacent to public land. From a conservation viewpoint there was strong support for the ECC to recommend the application of the 'precautionary principle' in

relation to apiculture in conservation reserves. Particularly, it was considered that managed honey bees should be removed from national and state parks and other areas of high conservation importance, such as key sites for threatened nectar-feeding species. This view was based on perceived threats associated with feral and managed honey bees competing with native species for hollows and nectar resources.

There was also significant support for the ECC's recommendations related to further research into the impacts of introduced bees on flora and fauna, and on feral honey bee population dynamics and methods of removal. Some proposed that such investigations should be sponsored or subsidised by the apiculture industry and, in particular, it was viewed that the eradication of feral honey bees should be a responsibility of the industry.

Response

Bee-keepers will continue to have access to all areas of public land, except reference areas and their associated buffers. Scientific evidence to date on any deleterious interaction, or impact of honey bee foraging or competition, on either native flora or fauna species is ambiguous. Consequently, there is currently little justification for greater restrictions on apiculture.

It is essential however for the land manager to maintain control over the location of bee sites, where these may conflict with management and protection of other significant values. Such values include recreation sites and key areas for threatened flower-visiting species including swift parrot and regent honeyeater. The land manager must have discretion to address issues where there is a demonstrable conflict with other values whether in a park, reserve or state forest. The land managers currently have this discretion and it would be inappropriate for ECC to recommend its removal. The discussion and recommendations regarding use of land manager's discretion, addressing the issues raised, have been expanded in this report (see Recommendation R9 in Chapter 3).

The ECC has recommended that NRE and the apiculture industry jointly undertake research on feral bee population dynamics (and possible methods for their removal), and interactions between introduced bees and native flora and fauna. The findings of such research should determine future management decisions.

The ECC has deleted draft recommendation R25, related to placement of hives on private property adjacent to public land.

19.3 Conservation (general)

There was a very high level of support for increased protection of Box-Ironbark forests and woodlands throughout the study area. Submissions supporting conservation priorities in the region ranged from protecting all public land in national and state parks and other reserves, to detailed proposals regarding the protection and management of particular sites, vegetation communities or habitats.

Many submissions argued that with only around 17% of these forests and woodlands remaining, and the high number of threatened species dependent on this ecosystem, a much greater proportion should be included in parks and reserves than the JANIS level applied to less depleted ecosystems.

Some considered that an adequate biodiversity outcome could only be met by protecting all Box-Ironbark vegetation communities on public land. While numerous submissions commended the ECC on the draft recommendations, some also suggested the ECC's recommendations fell short of ensuring the longer term conservation of Box-Ironbark forests and woodlands and their associated flora and fauna.

Many submissions recognised the fragmented nature of the remaining Box-Ironbark forests and woodlands and suggested conservation methods to address this including:

- conservation management networks, as described in detail in the ECC's recommendation for Broken-Boosey State Park; were suggested for a number of additional areas
- roadsides—enhanced conservation and protection for remnant roadside vegetation; and
- private land—while the ECC is restricted to making recommendations on public land use, several submissions stressed the importance of recognising the function that remnant vegetation on private land has in the conservation of biodiversity at a regional level.

Many submissions proposed further limitations on activities and uses that were considered to be detrimental to the conservation of Box-Ironbark forests and woodlands on public land. These included mineral exploration and mining, timber harvesting, eucalyptus oil harvesting, apiculture, trail bike riding and prospecting, which were all regarded as potentially damaging in these submissions.

Some proposed that mining and timber harvesting be immediately banned from Box-Ironbark forests, that timber harvesting be phased out as alternative sources are developed, or that areas available for these uses be reduced.

There was some criticism that because no recognised goldfields had been lost to mining, it appeared that maintenance of mining access had taken precedence over protection of natural values.

Increased education and conservation awareness about Box-Ironbark forests and woodlands was considered important in not only assisting biodiversity conservation, but also in generating community interest and encouraging tourism promotion.

There were also many submissions opposed to new conservation reserves, ranging from opposition to specific park proposals to total disagreement with any enlarged reserve system. These submissions tended to be general in focus, opposing reserves based on restrictions placed on uses, including timber and firewood harvesting, mining, prospecting, recreational shooting and other activities. A multiple-use approach to public land management tended to be supported by these submissions. Others opposed recommended parks and reserves based on perceived concerns for weed, pest and fire management.

Response

Under the terms of reference for the investigation, the ECC is required to make recommendations on the balanced use of public land in these areas. The recommendations are based on the view that protection of biodiversity is a critical issue and can best be achieved by the creation of a much-expanded system of reserves, coupled with appropriate management of all areas. In achieving a balance it has been necessary to make judgements as to how much area to include, and in what areas current activities should be restricted. It is neither necessary nor appropriate to exclude a large number of activities from all or most Box-Ironbark forests and woodlands.

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The reduced extent of Box-Ironbark forests and woodlands, their fragmented nature, and a well documented historic and continuing loss of species from this system, means that a comprehensive, adequate and representative system of fully protected parks and reserves must be put in place to promote the recovery of these forests and woodlands and their associated flora and fauna.

The ECC has recommended a system of new parks and reserves in key areas. This system would protect threatened species and ecological communities and enhance the conservation of biodiversity throughout the study area. The recommended parks and reserves would benefit the conservation of biodiversity through:

- the protection of a number of large contiguous areas including national parks at: St Arnaud Range, Heathcote-Graytown, Greater Bendigo and Chiltern-Pilot; and state parks at Kooyoora, along the Broken-Boosey Creeks, the Warby Ranges, at Reef Hills and Paddys Ranges;
- representation of EVCs;
- the protection of key sites for threatened species;
- protection of large old tree sites; and
- protection of fauna refuges.

Nature conservation measures extend beyond the reserve system, so that biodiversity conservation is a major use along with timber production in state forests, with the objective of improving forest habitat values over time. There are scattered high-value biodiversity sites outside the reserve system such as large old tree sites, high-value fauna refuges and key sites for threatened species. These areas would be protected in informal reserves and by prescriptions as part of future state forest management planning.

The ECC's recommendations would put in place a reserve system that meets the nationally agreed JANIS criteria for a comprehensive, adequate and representative reserve system, as far as is practical. Where JANIS targets for EVC representation have not been met, the areas outside the reserve system are either small patches within recommended state forests—most appropriately protected in subsequent forest management planning—or are in small parcels isolated by extensive clearing, and often in poor condition—for which reserve system status is unrealistic.

The conflicts between the protection of biodiversity values and other uses have been a major consideration of the ECC. The final recommendations balance conservation objectives with other land use requirements. Some activities that are incompatible with high level protection of biodiversity would be removed from new parks and reserves, while restrictions are recommended for these uses in other areas, and for less damaging uses in parks and reserves.

The recommended new or enlarged national and state parks generally do not include recognised goldfields. This is not because these areas were excluded from consideration for park status but because in most cases recognised goldfields do not have particularly high conservation values. This is at least partly attributable to heavy disturbance from mining and associated activities in the past. A notable exception is around Bendigo where some of the most prospective land in Victoria also has very high conservation values. In this case, the ECC has aimed at providing for both requirements by recommending a 100 metre depth limit for the new national park areas. This would enable access to a potentially highly valuable resource with negligible effect on other values present.

The issue of how best to protect and manage all remnant vegetation occurring on public land to ensure biodiversity conservation across the Box-Ironbark area must take into account the fragmented nature of remaining vegetation, and the occurrence of significant areas of remnant habitat on freehold land. The ECC has recommended that conservation management networks be established in appropriate areas to integrate freehold and public land management for biodiversity conservation. This concept could include the incorporation of significant roadside habitat, particularly where these link areas of significant remnant vegetation. While freehold land is outside the charter of the ECC's investigation, it is anticipated that this concept would provide assistance for the protection of significant habitat on private land.

The ECC considers roadside areas with remnant vegetation to be of high significance for nature conservation throughout the Box-Ironbark study area. Appendix 16 tabulates some of the more significant and high quality roadsides in the study area, and the ECC has recommended these be protected as part of roadside management plans.

Opposition to parks and reserves largely stemmed from individuals and organisations responding to limitations, real and perceived, placed on their chosen uses of these forests. These are addressed for the major user groups of Box-Ironbark forests and woodlands in the following sections.

19.4 Ecological management in parks and reserves

Many submissions supported ecological thinning in parks and reserves to promote large trees. Many of these stressed that any such practice must be driven by biodiversity outcomes.

Others recognised the need for continued research, and proposed that any management strategy be

applied on a trial basis. Opposition to ecological thinning was limited but was usually based on fear that this was 'harvesting by stealth' or that research was needed before thinning occurs on other than a trial basis.

Response

The ECC recommends that ecological thinning is undertaken as part of an ecological management strategy in parks and reserves, to assist the development of a forest structure ultimately dominated by large diameter trees. These operations would be driven by ecological goals, and would be controlled by park managers. Where an ecological thinning operation produces an excess of coarse woody debris beyond habitat requirements, the ECC recommends this should be made available for firewood.

19.5 Eucalyptus oil harvesting

Supporters of the eucalyptus oil industry were opposed to the reduction in access to currently available areas. They believed that these reductions would reduce the viability of the industry and some individual operators. Operators claimed that harvesting practices have very little negative impact on biodiversity, and are not a significant threat to those threatened species dependent on mallee vegetation in the study area. Some operators supported the potential of private land plantations in maintaining the viability of the industry, however they also stressed the importance of retained access to public land resources until such plantations are established.

Many submissions called for cessation of, or reduction in the area available for, eucalyptus oil harvesting. Some suggested access should immediately cease, while others proposed a delay to allow for plantation establishment on private land. Some also suggested that financial assistance should be available to assist with the move to plantations.

Justification for removal of the industry was usually based on perceived threats to biodiversity, especially threatened species such as pink-tailed worm-lizard, malleefowl and long-tail greenhood. Other submissions raised the issue of the relatively low returns from royalty for eucalyptus leaves.

Response

Some areas of Broombush Mallee, the principal species cut during eucalyptus oil harvesting, have been identified as important sites for a number of threatened species, and hence are key areas for biodiversity protection in the study area. The ECC has recommended that eucalyptus oil harvesting cease immediately in one key, though relatively small area but, in other areas where harvesting is recommended to cease, a six-year phase-out period apply. This timeframe allows for the suitable development of eucalyptus oil-producing plantations on previously cleared freehold sites. The ECC supports in principle the move of this industry to private land plantations.

19.6 Fire protection

A number of submissions expressed the view that the creation of new parks would result in the increased risk of wildfire. They suggested that this would be caused by either restriction on the harvesting of forest products which would increase the fire hazard; a reduction or cessation of fuel reduction burning; or

track closures that would increase the difficulties and dangers of combating fires.

Some submissions argued that the present dense forest of relatively small trees, created by the harvesting history, constitutes a fire hazard.

Response

The issue of fire in parks compared with state forest has been discussed in detail with NRE, as the agency responsible for fire protection on all public land. NRE has advised that there has been no increase in the number or extent of wildfires as a result of the transfer of land from state forest to parks or reserves.

Prescribed burning for fire prevention is undertaken on a strategic basis consistent with Regional Fire Protection Plans, which identify fire protection objectives and strategies across all public land. These plans are developed in consultation with local agencies such as the Country Fire Authority and local Municipal Fire Prevention Committees, as well as local landowners and stakeholders.

The plans take into account risk and fuel hazards, protection needs for natural and cultural assets, and increasingly consideration is given to use of fire for ecological purposes. Regular and frequent broadacre burning through large contiguous areas to reduce fuel levels within complex forest and park ecosystems is costly and can potentially degrade the environmental values for which the land is managed. A more effective way of managing fire prevention is to create a mosaic of areas burned in different years, with specific prevention measures directed at higher risk areas, such as those with public facilities, as well as property and road boundaries.

The very small branches (i.e. less than the thickness of a pencil) determine the hazardous nature of forest fuel levels. Harvesting of timber does not reduce this component at all and can, in the short-term, lead to more such fuel on the ground.

In accordance with NRE's *Code of Practice for Fire Management on Public Land*, the Department prepares strategic fire protection plans and fire operations plans (FOPs). The FOPs identify the program of burns and works operations planned for the following three years. Public comment is invited on FOPs, which are annually reviewed to allow for the effects of seasonal conditions on burns, and to reallocate priorities for the following years.

The extent of vehicular tracks maintained in both state forests and parks has been rationalised over the past 20 years in response to the need for land managers to target road maintenance effort more effectively. Both forest and park managers have inherited extensive road and track networks, many of which were established over 40 years ago in association with timber harvesting activities. Many of these tracks are replicated, merely providing alternative access to the same destination, and most have now passed their intended lifespan. Upgrading and maintaining these networks to meet current engineering and environmental standards is a significant cost. Parks and forests roading programs target key access roads and tracks necessary to provide for public and management access, including access for fire protection purposes. Within parks and reserves, tracks and roads will be maintained by Parks Victoria. It is intended that tracks which are surplus to these objectives, whether in parks or forests, would be closed and returned to their natural condition.

19.7 Forestry and timber (general)

Many submissions, from the timber industry and others, opposed the transfer of significant areas of productive forest to the reserve system largely on the basis that current forestry management is capable of achieving biodiversity protection. Other arguments put as justification for maintaining the *status quo* were the economic and social importance to surrounding towns; the particular values of Box-Ironbark timber; and the sustainability of current resource use. Access to forests for the collection of firewood for local communities was also often raised as an issue.

One group advocated a 'model forest' concept (a managed, sustainable multi-use forest, with management overseen by a committee of stakeholders, chaired by an independent person) as an alternative to establishment of permanent reserves, specifically for the Rushworth-Heathcote forest block. This concept involved sustainable use

of natural resources in the forest landscape, which would incorporate a balance between economic gain from the resources, with protection of the social and environmental values in the forest. Opportunities for tourism would be based on forest values and exploration of forest practices and forest products. Other industry members and some community members supported similar concepts.

Conversely, many submissions called for reductions in areas available for timber harvesting; increased restrictions on forestry operations and management; and the establishment of plantations to cater for future timber requirements. Many called for the complete protection of Box-Ironbark forests and woodlands, citing timber harvesting as a significant threat to conserving biodiversity. There was also wide support for the phase-out, or reduction, of harvesting lower-value products such as firewood.

There was considerable unease expressed in many submissions about the modelled timber availability estimates in the Draft Report, which indicated that close to current levels of harvesting could be sustained in the proposed reduced state forest area.

Many were concerned that if the current cut was maintained, this may result in increased pressure on flora and fauna in state forest and on the sustainability of the harvest from these areas, leading to degradation of habitats and over-cutting.

Response

Timber production is an important industry in Box-Ironbark forests generating products ranging from high quality sawn timbers, to fencing timber and firewood. Timber harvesting will continue in substantial areas of state forest, supplying sawlogs, fencing timber, firewood and other products. State forest in the ECC's recommendations occupies 28.3% of public land in the study area.

Following the Stage 3 social and economic study (see Appendix 5), the ECC has accepted the view that the recommended reduced area of state forest would support about 30 fewer full-time equivalent timber cutters (representing many more part-time cutters). At least the current volume of sawlogs should be able to be harvested, while less post timber and firewood would be available. The Stage 3 consultants carried out two detailed surveys of timber cutters as part of this study, one to characterise their operations and gain economic and social information, the other to determine what constituted full-time equivalent post and firewood cutters.

Within state forests, the ECC has recommended a series of principles to be applied in ongoing forest management, to further enhance the conservation of habitats and flora and fauna in the timber production areas.

Applying the 'model forest' concept to the large Heathcote-Rushworth forest block is not feasible, both in terms of establishing a comprehensive, adequate and representative reserve system, and in providing for the protection and conservation of biodiversity across the Box-Ironbark study area. This large area has high conservation significance incorporating valuable large old tree sites; several fauna refuges; key sites for threatened species, including swift parrot, powerful and squirrel glider; and threatened EVCs. Such a concept could however be applied to the management and use of state forest areas, such as Rushworth-Heathcote State Forests. The concept as proposed appears to have some similarity to the Regional Forest Reference Group established following the West Regional Forest Agreement Process (and in train for East Gippsland and the Midlands areas). If there is ongoing community support, this could be pursued following Government consideration of the ECC's recommendations.

NRE has carried out further detailed timber modelling that incorporates changes associated with the ECC's revised recommendations, and that has also given more weight to harvesting prescriptions as currently practised. The new modelling indicates that the current level of cut could be maintained for sawlogs and fencing material. This is not unexpected as current harvested volumes of these materials are relatively low and stand improvement works over recent years have been designed to improve the available volumes of these higher-value products.

The ECC believes that future demands for firewood can be met by a combination of a reduced volume of wood from state forest, supply of wood from private land plantations and the use of alternative wood sources such as currently under-utilised mixed species. Firewood collection should continue in state forests but should over time move away from firewood-only coupes to concentrate on harvesting in conjunction with higher value products such as sawlogs and fencing material. Some firewood is also likely to be available from thinning for ecological management in parks and reserves. Under the ECC's recommendations, rural towns should retain reasonable access to sources of firewood for domestic purposes.

19.8 Harvesting prescriptions and the protection of large trees

Submissions from the timber industry, domestic firewood collectors and community supporters argued that current forest management practices could achieve sustainable timber production and maintain biodiversity. In particular, it was felt that the *Code of Forest Practices for Timber Production* and current harvesting prescriptions were effective in balancing these aims.

Conversely, there was strong support from a conservation viewpoint regarding more stringent timber prescriptions applying to Box-Ironbark forests in the study area and the conservation of large trees throughout the Box-Ironbark forests and woodlands. Many submissions were dissatisfied with the current criteria for retained habitat trees, and the application of these criteria in harvesting coupes and between successive operations.

It was commonly stated that prescriptions for retained habitat trees were inadequate in protecting existing large trees, and there was particular concern that the current prescriptions did not guarantee the development of any new large trees.

Many called for the permanent protection of at least the six, ten or twelve largest trees in each hectare of forest. There was also support for the protection of all trees larger than 60 cm dbh (diameter at breast

height) and hollow-bearing trees; permanent marking of retained trees; and protection of gullies and associated fauna refuges.

Those supporting the protection of large trees commonly stressed the importance of these in providing hollows for wildlife, in particular the dependence on these of a number of threatened species, including powerful owl, barking owl, brush-tailed phascogale and squirrel glider.

Response

The ECC's recommendations for state forests and their management are premised on both continuing production of higher-value timber products and the conservation of native plants and animals. To achieve this, the ECC has established a set of recommendations and forest management principles that aim to improve integration of wildlife conservation with timber production requirements. It needs to be stressed that current management already places considerable emphasis on protection of biodiversity. In essence the recommendations are an enhancement of current management practice, which is justified by the much-reduced areas of Box-Ironbark remaining, the fragmented and altered state of much of this vegetation, and the number of rare and threatened species in this environment.

The ECC's principles and guidelines for forest management (see Chapter 17) provide a broad framework for the development of management prescriptions that are tailored to these depleted and fragmented forests and woodlands, prescribing more comprehensive conservation measures to reduce the risk of further local and regional wildlife extinctions.

While prescriptions need to be flexible, adapting to the development of new information, the ECC is confident the recommendations provide a durable framework for future prescriptions, which would ensure the conservation of biodiversity, and protection of significant values, in a sustainable timber production landscape. It is, however, recommended that there be a review period for prescriptions, in line with the usual forest management review period of 10 years. This will enable prescriptions to be reviewed and modified in light of new information.

The ECC has also recommended that timber harvesting should be excluded from identified excellent quality fauna refuges. Any drainage lines with a defined channel should have, at least, a filter strip of retained vegetation. This prescriptive measure is in recognition of the value of such sites to biodiversity conservation in Box-Ironbark forests and woodlands, and complements measures already included in forest management prescriptions.

The ECC is aware of the inherent significance of large trees in Box-Ironbark forests and woodlands. The recommendations aim to give much greater protection to existing large trees and to ensure an increase in the number of large trees.

The number of large trees remaining throughout the Box-Ironbark forests and woodlands has substantially decreased from an estimated 30 large trees per hectare in many areas before European settlement, to current figures averaging of 2.1 large trees (over 60 cm dbh) per hectare. The ECC has recognised the importance of forest managers not only protecting existing large trees over the coming decades, but also addressing and promoting the recruitment of more large trees across the forest.

An objective of the recommendations is to enable the forest to develop a substantially greater density of large diameter trees. Under the ECC's recommendations no tree over 60 cm would be harvested during the current cutting cycle (effectively the current practice) and there would be protection for a specific number of trees per hectare (where they exist) in the smaller size classes. By protecting trees in the 50 to 60 cms diameter size class (for example) it can be expected that in most cases, these trees would be well over 60 cms by the time the next cutting takes place in about 50 years.

The ECC has also recommended that all identified large old tree sites be protected where possible. These measures would, over time, result in a real and significant increase in the numbers of large trees across the forest area. The majority of large old tree sites have been included in the reserve system and sites outside the reserve system would in many cases be protected in the forest management planning process.

19.9 Land management

Issues relating to general public land management were raised in many submissions. Such issues included fire protection, maintenance of tracks, and the provision of adequate resources for management.

The 'discretionary' power of land managers was an issue raised in a number of submissions. Many people asserted that, in the past, land managers have made arbitrary decisions without consultation or any

mechanism for appeal. They were concerned that land managers should not have the power to control and/or restrict activities in areas where such activities are permitted in principle. This issue was of particular importance to prospectors. There were several calls for any decisions to restrict activities within public land to be more transparent, proposing a review by an independent body and the implementation of an appeals process.

Response

The ECC has strengthened its recommendations in relation to public land management (see Chapter 3), particularly regarding the availability of adequate resources. However, the ECC is a strategic planning organisation, and the responsibility for on-ground management clearly rests with the land managers, NRE or Parks Victoria. It would not be possible nor would it be appropriate for the ECC to attempt to specify details of management for all areas. Clearly local managers need the ability to address local issues and to respond to changed circumstances. There is a new recommendation (Recommendation R9 in Chapter 3) related to the ongoing discretionary power of land managers which addresses the issues raised in submissions.

19.10 Mining

There was strong industry support for continued access to public land in the study area for exploration and mining, particularly to areas of known goldfields. Several mining companies and associated bodies called for access to highly prospective areas of recommended national and state parks, and also Deep Lead Nature Conservation Reserve (where mining is currently not permitted).

Several industry submissions proposed a more flexible approach to mineral exploration and mining, such that mining with appropriate controls would be permitted in national and state parks. Specifically these considered that by avoiding areas of particular environmental or cultural significance, application of current industry standards would result in no damage to sensitive values and no net loss of environmental or cultural values. There was also support for access to mineral resources via underground mining in otherwise unavailable areas.

There was some criticism from industry that approval was rarely given for mining in some areas that are theoretically available, such as restricted Crown land.

Some submissions considered that the scale of a mining operation should be considered in the recommendations. In particular, restrictions applying to small-scale mining operations were thought by some to be inappropriate. Several proposed that mining be considered on a case-by-case basis for all

public land areas and that current controls provide adequate environmental protection.

There was also substantial support for the removal of exploration and mining activities from all or part of the Box-Ironbark public land areas, particularly from those areas recommended for inclusion in the reserve system. Some called for greater restrictions and regulation of the mining industry, including increased rehabilitation standards, and that all infrastructure be located on adjacent cleared private land to reduce impacts.

There was some criticism that, because no recognised gold fields had been lost to mining, it appeared that maintenance of mining access had taken precedence over protection of natural values. Several submissions proposed that declaration of any new state or national parks should terminate any existing exploration or mining licences. Other submissions criticised the ECC's proposals for nature conservation reserves arguing that these areas should be added to adjoining national or state parks or otherwise made exempt from exploration and mining. Submissions proposing greater protection from exploration and mining highlighted potential conflicts between mining interests and nature conservation in Box-Ironbark forests and woodlands, including vegetation disturbance; understorey disturbance; disturbance of alluvial areas; and as a threatening process to several significant flora and fauna species.

Response

The ECC has recommended that mining and exploration access be retained in most areas, excluding reference areas and national and state parks (with existing licences able to continue). These recommendations are in accordance with existing provisions in the *National Parks Act 1975* relating to mining. The ECC recommends that this Act, the *Native Title Act 1993*, and the existing public land use categories and their classification under the *Mineral Resources Development Act 1990* be retained as the appropriate policy and legislative framework for the administration of mining on Box-Ironbark public land. No recognised goldfield would be exempt from mining under the ECC's recommendations.

Nature conservation reserves are restricted Crown land under the *Mineral Resources Development Act 1990*, requiring the consent of the Minister for Environment and Conservation for any mining or exploration to proceed. This brings a high level of scrutiny to any mining or exploration proposal, such that thorough assessments of reserve values are required prior to any commencement of work. The acceptance of a mining proposal is conditional upon the protection and conservation of identified values. This determines if mining is an acceptable use and, if so, the conditions applying to the operation that minimise impacts on reserve values. This process can effectively protect natural values, while maintaining access to the most prospective areas for gold.

Regarding obtaining approval to mine in restricted Crown land it is clear that there is an intentional additional barrier in these areas to ensure that the features that were intended to be protected by the land status are adequately considered in the approval process.

Difficulties were probably exacerbated in the past by the lack of a satisfactory reserve system over this highly prospective part of Victoria. With the reserve system and other measures recommended in this Report providing a higher level of protection for natural values, it could reasonably be expected that mining approvals would be more easily facilitated in the future.

The recommended new or enlarged national and state parks generally do not contain areas of recognised goldfields. This is not because these areas have not been considered for park status but because in most cases recognised gold fields do not have particularly high conservation values. This is at least partly attributable to heavy mining and associated activities in the past. A notable exception is around Bendigo where some of the most prospective land in Victoria also has documented very high conservation values. In this case the compromise has been taken of recommending that the new national park areas not currently reserved under the National Parks Act, be reserved to a depth of 100 metres only below the surface. This would enable access to a potentially highly valuable resource with negligible effect on other values present.

The ECC has developed a set of principles that should be applied consistently to all mining operations. These principles should expand, rather than replace, existing environmental protection measures, such as controls for the retention of native vegetation under the *Planning and Environment Act 1987*. Application of these principles would ensure impacts on Box-Ironbark forests and woodlands will be minimised for all mining and exploration operations, including small-scale mining.

The ECC does not believe that different standards of environmental management for large and small miners are warranted. Both should be required to meet appropriately high standards.

19.11 Non-indigenous cultural heritage

The protection of significant historic and cultural heritage features representative of non-indigenous settlement received considerable attention. Examples of such features included in submissions were mines and mining relics, structures such as bridges and buildings and relics of past timber harvesting operations.

There was significant support for greater emphasis on the management and protection of historic and cultural features on all public land.

Many submissions supported the establishment of a national park in the Castlemaine area to recognise the highly significant historic and cultural features of this area. Many considered national park status would contribute to the case for World Heritage listing of the area as a significant cultural heritage landscape.

Response

Protection of significant historic and cultural heritage features in the study area would be enhanced through measures such as inclusion of these sites in parks or reserves and through Special Protection Zones established in state forest. These measures would augment the protection archaeological relics and objects attract under the *Heritage Act 1995*.

The recommendations in this report contribute significantly towards establishing a system of high level parks and reserves that would protect these areas. In addition to the features included in other parks and reserves, the important Maldon, Moliagul, Percydale and Whroo goldfields and 32 existing reserves are retained as historic and cultural features reserves. Some 15 new historic and cultural features reserves are also recommended. In addition, the ECC has identified and listed 14 significant features in state forest which should be taken into account during the forest management planning process.

Aware of the significant community support and the significance of the area's cultural heritage features, the ECC has recommended the establishment of the Castlemaine Diggings National Heritage Park (see Chapter 15). Not only would this park recognise and protect the significant cultural heritage landscape and natural values, but also provides a unique opportunity for the development of tourism based on interpretation of these features.

Following the release of the Draft Report it was brought to the attention of the ECC that its references to fossicking may have been misleading in terms of the protection offered to all archaeological relics or objects. Under the *Heritage Act 1995*, it is an offence to damage or disturb archaeological relics without the consent of the Executive Director of Heritage Victoria, and that any person who picks up or collects an archaeological relic in Victoria must immediately notify the Executive Director. These relics do not have to be registered or otherwise identified in inventories. The ECC has adjusted its text and recommendations to ensure these are consistent with the requirements of this Act.

19.12 Pest plant and animal control

Several submissions made specific mention of problems associated with pest plants and animals within the Box-Ironbark study area. Pest plants and animals were identified as a major threat to nature conservation on both private and public land. In particular, there were calls for public land managers to control pest plants and animals more effectively in order to improve the biodiversity values of public land, and also to reduce the problem of pest species moving from public land to adjoining private land.

Pest plant and animal control was also used as an argument for opposing the proposed reserve system. Various submissions stated that many existing parks and reserves within the study area are over-run by pest species, with public land managers having inadequate resources to control such species effectively. It was claimed that creating additional parks and reserves, without significantly increasing resources available for their management, would only exacerbate this problem.

Response

The ECC acknowledges the serious threat to biodiversity conservation posed by pest plant and animal species. It also recognises the need for pest plant and animal control to be improved on public land. Therefore, recommendations relating to pest plant and animal control have been strengthened in this report (see Chapter 3). The ECC strongly believes that pest plant and animal management should be a high priority for all land managers. While a number of submissions claimed that there are problems with pest plants and animals in parks there was no evidence to suggest that the problem is any greater in parks than in state forest.

19.13 Plantations

There was strong support for the establishment of native hardwood plantations on private land to replace production from public land or to reduce the impact of lower rates of harvest. Greatest support was for the general shift of firewood collection to private land plantations established on previously cleared land. Predominantly these submissions

believed that the ECC's recommendations for continued access to public land for firewood collection discouraged the establishment of woodlots on private land to meet firewood demand. A number of submissions also suggested that the royalty rate for firewood was set at too low a rate and hence discouraged private investment.

The Victorian National Parks Association has produced a detailed plan for the establishment of woodlots on private land to meet future demands for firewood, and this received wide support in submissions.

Many also proposed that plantations on private land should be established to also satisfy the long-term needs of the timber industry for larger products such as logs and posts.

There was strong support for the establishment of mallee species plantations on private land to replace the existing eucalyptus oil harvesting operations on public land.

Several submissions suggested the provision of incentives and financial assistance to landholders to encourage and assist the development of plantations. Others proposed using cleared public land or purchasing marginal land specifically for plantations.

Response

The ECC encourages the development of private land plantations to meet the demands of the firewood industry. While private land use is outside the charter of the ECC, its recommendations support in principle the establishment of freehold plantations, and the use of waste wood from forests other than Box-Ironbark for firewood. Alternatives to Box-Ironbark are already available for many forest products and their availability is likely to increase over the medium to long term with the continued development of agroforestry enterprises.

Ultimately it would be desirable for a gradual shift of the timber industry to purpose-grown woodlots, particularly for products such as eucalyptus oil and firewood where the lead-time is shorter compared to products such as sawlogs. The establishment of such woodlots would have associated benefits including addressing land degradation issues such as erosion and salinity, stock protection and aiding land productivity. They would also create an alternative source of income for landholders and opportunities for investors in regional economies.

The ECC views the shift of eucalyptus oil production to freehold plantations as the most plausible long-term future for the industry, having potential to be considerably larger, more productive and profitable than the existing industry.

19.14 Prospecting

There was a large body of support for continued access to Box-Ironbark forests and woodlands on public land for prospecting activities. Support for this activity reinforced that this is one of the major recreational uses of public land in the study area. Prospectors were particularly opposed to any loss of access to currently available areas. In general prospectors and supporters considered their activity to be a low impact, environmentally benign and legitimate use of public land.

Several submissions supporting continued access for prospectors considered current land management and access conditions to be satisfactory and that the

ECC's recommendations posed too many restrictions. Some of these believed that recommendations regarding land managers' discretion were unnecessary and would lead to the exclusion of prospectors from areas in the future.

Several submissions opposed the extent of area still available for prospecting. These submissions generally proposed prospecting be excluded from parks and reserves as it may compromise park values and particularly sensitive values such as rare orchids that are vulnerable to habitat disturbance, and cultural heritage sites.

Response

Prospectors would largely retain access to public land Box-Ironbark areas but would be excluded from reference areas and national parks. Most of the major areas of interest to prospectors are not included in the ECC's recommended areas. In other parks there will be exclusion zones to protect particular values. These zones would be located to protect park values such as areas of threatened vegetation, key sites for threatened ground-dwelling species and historic and cultural values. The zones would be developed as part of the management planning process, including consultation with prospecting representatives.

Where it is necessary to temporarily, or permanently, exclude areas from prospecting, the ECC recommends that the land manager manage the issue in accordance with Recommendation R9, pertaining to land managers discretion, which includes consultation and a grievance process (see Chapter 3). The ECC considers this an essential mechanism in achieving protection of significant values in this ecosystem.

19.15 Recreation

Many submissions detailed the importance of Box-Ironbark forests and woodlands on public land for the pursuit of a range of recreational activities. These included such diverse interests as bushwalking, nature study, camping, horse riding, hunting, cycling, mountain biking, car rallying, prospecting, orienteering and trail bike riding.

Substantial support was evident for continued access to these forest areas for organised car rallies. Many of these submissions proposed car rallies be permitted in parks and reserves, particularly in the proposed Chiltern-Pilot National Park, Warby Ranges State Park, Reef Hills State Park and the Rushworth-Heathcote forest in general.

Some submissions were received proposing greater access to parks and reserves for recreational shooters.

Predominantly these proposed that organised fox hunting be permitted in proposed parks, particularly those in the Bendigo area and Broken-Boosey State Park. Others sought greater access for other recreational hunting such as duck hunting in key areas.

Other submissions requested that orienteering be included as a listed activity in various parks and reserves. There were also calls for retaining public access in general to parks and reserves, including for activities such as camping, walking dogs and horse riding.

Some opposition to particular recreational activities was displayed. In particular, it was proposed that trail bike riding should be banned from all conservation reserves. Similarly a few submissions suggested that horse riding should also be banned.

Response

The ECC has attempted to cater for access to a range of areas throughout the region for the majority of current user groups, where this is compatible with park and reserve recommendations. The land use categories represent management units that are used to control land use, including recreational activities. State forests cater for the greatest diversity of recreational uses in the study area. Regional parks also have a distinct recreational focus.

National parks, state parks, nature conservation reserves and historic and cultural features reserves are primarily set aside for the protection of significant natural and cultural values, however provision for recreational pursuits which do not conflict with protection of these values is encouraged.

The ECC has endeavoured to limit impacts on current users, while recognising that some activities conflict with nature conservation and cultural heritage protection in parks and reserves. To balance impacts, and where a limited, special recreation resource exists, specific concessions for the use of parks and reserves for some activities have been made, where these do not overly compromise natural or cultural values. These include specific exceptions to general rules for car rallying, prospecting and gemstone seeking.

19.16 Socio-economic study

The socio-economic study conducted for the Draft Report came under much scrutiny in submissions. Some opposed to the proposed reserve system believed the study to be inaccurate; claiming that various figures (particularly those relating to visitation rates and tourism) contained fundamental errors. Scepticism was expressed in relation to projected tourism estimates, with several submitters believing that the creation of parks would not lead to increased tourism levels as predicted.

Some also believed that the impact of the draft proposals on industry and employment had not been accurately assessed. They predicted that the reduction in rural employment due to restrictions placed on forest-based industries would be greater than that portrayed in the socio-economic study and that the recommendations would impact negatively on local economies.

Response

There were some arithmetical errors in the socio-economic study in the Draft Report. The consultant who carried out the work, as well as the ECC, has acknowledged the errors and the ECC moved to establish a further independent study – the Stage 3 study. A summary of the study is included in this report (see Appendix 5). The new study provides information on the predicted impacts of the ECC's recommendations in this report. It also includes a review of earlier work plus more information on actual employment in forest industries. *continued next page*

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Considerable extra work was carried out to ensure that this data was reliable and included additional detailed interviews with a number of forest operators.

The new work provides reliable base data for current full-time equivalent employment in forest industries (this makes allowance for the large number of part-time and casual workers in the industry) and also gives reliable information for the social and economic effects of implementation of the ECC's recommendations.

19.17 Tourism

There was considerable support for the development of initiatives and land use recommendations that would promote tourism in the Box-Ironbark region. In particular, it was proposed that opportunities for nature-based tourism and ecotourism should be promoted as well as that associated with historic features and cultural sites of interest, especially relating to gold mining practices and Aboriginal culture. Tourism associated with prospecting was also strongly supported as a current major source of visitation and associated expenditure in the study area.

To facilitate increases in tourism there were two main areas of interest, tourism associated with appreciation of natural and cultural values, and that generated by multiple-use forests providing for a diversity of recreational uses.

Several submissions proposed that tourism be given greater emphasis as a viable industry in the ECC's recommendations. It was also suggested that promotion of visitation to parks and reserves should be more clearly supported in the recommendations.

There was some scepticism associated with the predictions of increased tourism in the study area allied with changes in land use recommendations by the ECC. Some contrasted this area with the very high values and hence visitor numbers at parks such as the Grampians and Wilson's Promontory, believing that the Box-Ironbark forests and woodlands lacked the significant features or values that are capable of attracting high visitation.

Response

The recommendations put forward by the ECC provide a focus for the development of tourism opportunities and associated increases in visitors to the under-rated Box-Ironbark forests and woodlands. These areas are easily accessible from Melbourne and other major regional centres in Victoria, and south-eastern Australia in general. In time, this would have the potential to lead to increases in regional employment in tourism and related services, alongside the continuing use of these forests by existing industries.

The recommended park and reserve system would provide enhanced opportunities for ecotourism and nature-based tourism, with a diverse range of recreational activities permitted and should form the basis for the development of more extensive tourism enterprises.

It is acknowledged that a change of land status from forest to park will not of itself lead to increased tourism. There is no doubt however that park status (particularly national or state park) does act as a marketing tool in attracting visitors. This however needs to be driven by publicity and assisted by the appropriate development of infrastructure and interpretation within parks and also in areas of state forest.

Support for tourism development should be provided through partnerships between Tourism Victoria, Parks Victoria, NRE, local Aboriginal groups, local government and regional tourism boards developing coordinated programs to increase promotion of tourism opportunities based on the parks and reserves system.

Concerns for attracting visitors and accessing tourism expenditure should be addressed through appropriate marketing and promotion of the key values of interest in Box-Ironbark forests and woodlands—gold, flora and fauna and heritage. Promotion of tourism should aim to attract overnight visitors and extended stays to increase regional expenditure and benefits.

The value of prospecting to the tourism industry based on the Box-Ironbark study area has been recognised with access maintained to most areas including key locations.

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Glossary

Acronyms

AAV	Aboriginal Affairs Victoria	IUCN	International Union for the Conservation of Nature and Natural Resources now generally referred to as the World Conservation Union.
ANZECC	Australian and New Zealand Environment and Conservation Council	JANIS	Joint ANZECC / MCFFA National Forest Policy Statement Implementation Subcommittee
BITA	Box-Ironbark Timber Assessment Project	LCC	Land Conservation Council
CAR	Comprehensive, Adequate and Representative	MCFFA	Ministerial Council on Forestry, Fisheries and Aquaculture
dbh	Diameter at breast height (1.3m)	NRE	Department of Natural Resources and Environment
dbhob	Diameter at breast height over bark	NRSP	National Reserve System Program
ECC	Environment Conservation Council	RFA	Regional Forest Agreement
EVC	Ecological Vegetation Class	WUP	Wood Utilisation Plan
FISAP	Forest Industry Structural Adjustment Package		
FMA	Forest Management Area		
GIS	Geographic Information System		

Aureole A zone of metamorphosed rock surrounding an igneous (granitic) intrusion, often resistant to weathering so higher than adjoining land.

Avifauna Bird life.

Basal area The sum of the cross sectional areas measured at breast height (1.3 m from the ground) of trees in a given stand. Usually expressed in square metres per hectare (m²/ha).

Biodiversity The variety of all life: the different plants, animals and micro-organisms; the genes they contain; and the ecosystems they form. Biodiversity is usually considered at three levels: genetic diversity; species diversity; and ecosystem diversity.

Biodiversity Strategy Victoria's *Biodiversity Strategy* fulfils commitments in the national *Strategy for the Conservation of Biodiversity* and requirements under the Victorian *Flora and Fauna Guarantee Act 1988*. It details strategic frameworks to prevent further loss of habitat, and a focus for better management of existing habitats and the continuation of natural ecological processes.

Box-Ironbark Timber Assessment (report) The Box-Ironbark Timber Assessment (BITA) examined all Box-Ironbark state forests within the Bendigo Forest Management Area (FMA) and adjacent Pyrenees Range in the Midlands FMA. The primary objective of this project was to provide accurate and reliable timber resource information for the purposes of determining a sustainable yield rate for the Bendigo FMA.

Carbon in pulp A process to extract gold from quartz.

Catchment management authority (CMA) One of ten regional bodies responsible for strategic planning and coordination of Victoria's land and water resources. Four CMA regions overlap the Box-Ironbark study area: Wimmera, North Central, Goulburn Broken, and North East.

Code of Forest Practices for Timber Production The set of principles and, in some cases, minimum standards for the conduct of timber harvesting and associated works on public land in Victoria. The code aims to ensure that impacts on environment and heritage values are minimised.

Complex (EVC complex) A vegetation unit where two or more EVCs are unable to be distinguished in an area but are known to exist discretely elsewhere.

Comprehensive regional assessment A joint Commonwealth/State assessment of all forest values—environmental, heritage, economic and social—leading to the establishment of a comprehensive, adequate and representative reserve system and the signing of a Regional Forest Agreement.

Comprehensive, adequate and representative (CAR) reserve system A reserve system with the following attributes:

comprehensive: the degree to which the full range of ecological communities and their biological diversity is incorporated in the reserve system;

adequate: the reserve system's ability to maintain the ecological viability and integrity of populations, species and communities; and

representative: the extent to which areas selected for inclusion in the reserve system are capable of reflecting the known biological diversity and ecological patterns and processes of the ecological community or ecosystem concerned.

Conservation status An assessment of the susceptibility of a biological entity (usually a species or ecological unit such as an ecosystem or vegetation type) to changes in abundance and extinction. For example, in Victoria, the World Conservation Union (IUCN 1994b) classification is used to describe the conservation status of vertebrates. In order to qualify for a threat category, a taxon must meet one or more assessment criteria, based on features such as numbers of individuals and populations, previous or projected declines in numbers or habitat, extent of occurrence, area of occupancy and extreme fluctuations in numbers or habitat. The categories in descending level of threat are critically endangered, endangered and vulnerable. Other categories are extinct, near-threatened and data deficient (see Appendix 1).

Contact era or cultural contact era The period from about 1790 to 1840 when Aboriginal people first had contact with European explorers, settlers and others.

Coupe An area of forest of variable size, shape and orientation from which logs for sawmilling or other processing are harvested.

Cultural heritage value Historic, scientific, social or aesthetic value for past, present or future generations.

Dedicated reserve A reserve equivalent to the IUCN Protected Area Management Categories I, II, III or IV as defined by the international Commission for National Parks and Protected Areas (IUCN 1994a). The status of dedicated reserves is secure, requiring action by Parliament or in accordance with legislation for reservation or revocation. Dedicated reserves include, but are not limited to, parks under the *National Parks Act 1975* and flora, fauna and nature conservation reserves under the *Crown Land (Reserves) Act 1978*.

Diameter at breast height over bark (dbhob) Diameter of a tree at 1.3 metres above the ground, measured to include the bark. Because the bark of red and mugga ironbarks in particular can be several centimetres thick, the diameter of a standing ironbark (over bark) can be considerably greater than that of the log (stripped of bark) cut from the trunk of the same tree. Diameter at breast height is useful in calculating timber volumes and tree age. For clarity in this report, dbhob is often abbreviated to dbh (diameter at breast height), without meaning to imply that the measurement does not include the bark. Following Soderquist and Rowley (1995), trees of 60 cm dbh or greater are considered 'large old trees'.

Disjunct populations Disjunct populations are physically separated from one another; that is, there is no gene flow between the populations. They are formed over time due to the appearance of a barrier in a (usually) formerly continuous distribution. Disjunct populations often have distinctive features in an evolutionary sense from the 'parent' population, and in time may become separate species.

Ecological vegetation classes (EVCs) Components of a vegetation classification system derived from groupings of vegetation communities based on floristic, structural and ecological features.

Ecosystem A set of naturally co-occurring and interacting species associated with a particular setting in the physical environment. The aggregate of plants, animals and other organisms, the non-living parts of the environment with which these organisms interact, and their interactions. A dynamic complex of plant, animal, fungal and micro-organism communities and the associated non-living environment interacting as an ecological unit.

Endemic species Species confined to a particular region or locality.

Exploration licence A licence under the *Mineral Resources Development Act 1990*, issued by the Minister for Energy and Resources, entitling the holder to carry out exploration on the land covered by the licence, subject to satisfying the criteria for commencement of work.

Exempt Crown Land Land owned by the Crown upon which, under the *Mineral Resources Development Act 1990*, exploration or mining is not permitted, except under a licence current at the time of declaration of the land in one of the public land use categories which are exempt, and subject to Section 40 of the *National Parks Act 1975*; includes national, state and wilderness parks, and reference areas.

Fauna refuge Moist gullies within Box-Ironbark forests and woodlands offering refuge to fauna during fire and drought. These areas tend to have a higher diversity of species than the surrounding forest.

Forest Industry Structural Adjustment Package (FISAP) A joint Commonwealth and Victorian Government agreement on implementing a program to assist the native forest hardwood timber industry in Victoria. Its purposes are to provide funding for industry development, necessary restructuring of industry, and assistance to those businesses directly affected by the outcomes of Regional Forest Agreements.

Forest management area (FMA) plan A plan developed to address the full range of values and uses in state forest, including nature conservation and timber production. There are 14 forest management areas in Victoria, and a plan is produced for each FMA.

Forest structure Refers to the main features of the physical form of the forest—such as the density and height of vegetation layers (e.g. canopy, shrub layer, ground layer), the amount of fallen timber, and size and density of trees—as opposed to the topography, or species of plants present, for instance.

Fossicking The use of metal detectors, hand tools, pans or simple sluices to search for relics or gemstones.

Fossicking authority A (tourist) fossicking authority entitles the holder and any person accompanied by the holder to search for minerals on private land with the consent of the owner and on Crown land (other than land exempted under Sections 6 or 7 of the *Mineral Resources Development Act 1990*). Where land is covered by a mining licence the holder must obtain permission to fossick from the licensee.

Geographic information system (GIS) A system which holds spatially referenced data which can be classified, overlaid, analysed and presented in map, tabular or graphic form.

Habitat The place or environment in which an organism naturally occurs.

Heritage All those things which we have inherited from previous generations and which we value. Heritage includes places (including National Estate places), things (movable objects) and folklore (customs, songs and sayings).

Indigenous vegetation Vegetation native to a particular location.

Inland hills One of the two principal physiographic divisions of the Box-Ironbark study area. The inland hills account for around half of the study area, mostly west of the Goulburn River but also in scattered hills adjacent to the Hume Highway. They are generally low, gentle hills—steeper in the south—mostly on Palaeozoic sediments, granites, and associated metamorphics. The other principal division is the northern plains.

Interim Biogeographic Regionalisation of Australia (IBRA) A regional framework delineating natural regions based on biophysical, environmental and vegetation considerations—for example, climate, soils, landform, vegetation, flora and fauna, and land use—that allow cross-border regionalisation.

JANIS criteria Criteria for the establishment of a comprehensive, adequate and representative (CAR) system of forest reserves (refer to Appendix 8).

Land use determination (specifically for water catchments) Some water supply catchments have prescribed land uses as described in the transition arrangements of the *Catchment and Land Protection Act 1994*.

Large old tree A tree of 60 cm dbh or greater (Soderquist and Rowley 1995).

Large old tree site A site with at least six large old trees per hectare.

Low impact exploration Mining exploration that aims to leave a site in the same condition it was in prior to exploration, with minimal disturbance to the associated biota and habitat (see Chapter 7).

Metal detecting The use of an electronic metal detector to prospect for gold or other minerals, or to fossick for metal relics.

Mining licence A licence under the *Mineral Resources Development Act 1990*, issued by the Minister for Energy and Resources, entitling the holder to carry out exploration and mining on the land covered by the licence, subject to receiving an authority to commence work

Mosaic (EVC mosaic) A vegetation unit consisting of discrete EVCs which were unable to be distinguished in the mapping due to the scale used.

National estate Those places being components of the natural or cultural environment of Australia that have aesthetic, historic, scientific or social significance or other special value for future generations and for the present community. National estate places are listed on the Register of the National Estate, maintained by the Commonwealth Government.

Northern plains One of the two principal physiographic divisions of the Box-Ironbark study area—the other is the inland hills. The northern plains account for around half of the study area, mostly east of the Goulburn River and north of about Serpentine or Rushworth. The northern plains have been formed by alluvium deposited on the former floodplains of ancient watercourses over the last 2 million years. They are almost flat, broken only by occasional sand ridges or low Palaeozoic rises.

Plantation An area planted with commercial tree species; for uses such as, timber or eucalypt oil production.

Post-contact era The period after initial cultural contact between Aboriginal people and European settlers (see contact era).

Pre-1750 EVC The extent of an ecological vegetation class prior to the year 1750 and pre-European settlement.

Prescriptions (for timber harvesting) The standards specified within the *Code of Forest Practices for Timber Production* which describe acceptable management practices related especially to timber harvesting. They have regulatory status.

Prospecting The use of metal detectors, hand tools, pans or simple sluices to search for gold or other minerals, requiring a miner's right or mining licence under the *Mineral Resources Development Act 1990*.

Public Land Use Categories Refer to the table below.

Puddler A structure for separating gold from dug soil and rock using a water-filled trough, often circular and agitated by a horse-drawn paddle.

Recognised goldfield A goldfield discovered and mined in the first phase of mining (1850s-1950s), and which had appreciable historical production. Nearly all the recent major mines and developments are in recognised goldfields.

Recovery plan A management plan intended to ensure the long-term conservation of a species, prepared under the Commonwealth *Endangered Species Protection Act 1992* for species listed on Schedules of that Act.

Regional Forest Agreement (RFA) An agreement, between the Commonwealth and a State or Territory Government, for the long-term management and use of forests in a particular region. The purpose is to reduce uncertainty, duplication and fragmentation in government decision-making by establishing a durable agreement on the management and use of forests.

Regional water authority Statutory authorities, such as Coliban Water, responsible for supplying water primarily to urban consumers and the disposal of waste water from towns.

Restricted Crown land Land owned by the Crown upon which, under the *Mineral Resources Development Act 1990*, any exploration or mining requires the consent of the Minister for Environment and Conservation; includes nature conservation reserves, regional parks and natural features reserves.

Richness (of plant or animal species) Number of species in a given area.

Riparian Associated with watercourse banks.

Rogaining A sport of long distance cross-country navigation (similar to orienteering) in which teams of two to five members visit as many checkpoints as possible in 24 hours. Teams travel entirely on foot, navigating by map and compass between checkpoints in terrain that varies from open farmland to hilly forest.

Section 40 Section 40 of the *National Parks Act 1975* specifies an approval process requiring the consent of the Minister for Environment and Conservation and tabling in both houses of Parliament for 14 days. This process allows full consideration of implications of mining on land with the highest conservation rating.

Silviculture The theory and practice of managing forest establishment, composition and growth, to achieve specified objectives.

Small blocks Small parcels of Crown land that are not contiguous with larger public land blocks.

Special area plan A plan developed for special water supply catchment areas as defined under the *Catchment and Land Protection Act 1994*.

Special Management Zone (in FMA plans) Delineates an area that is managed to maintain specified values, such as flora and fauna habitat or catchment values, while catering for timber production under certain conditions.

Special Protection Zone (in FMA plans) Delineates an area that is managed for the conservation of natural or cultural values and where timber harvesting is excluded. It forms part of a network designed to link and complement conservation reserves.

Special water supply catchment areas Under the *Catchment and Land Protection Act 1994*, water catchments can be declared as 'special water supply catchment areas', and subsequently a 'special area plan' (or a pre-existing 'land use determination') can be prepared to guide catchment land use.

Species A group of organisms capable of interbreeding with each other.

Taxon (pl: taxa) The named classification unit to which individuals or sets of species are assigned, such as subspecies, species, genus or family.

Thinning The removal of coppice regrowth or regenerated trees. This can be used to reduce the number of trees per hectare as a silvicultural tool and also to more closely replicate pre-European densities and forest structure.

Tourist fossicking authority A mining title under the *Mineral Resources Development Act 1990*. This permits tour promoters to take groups around former goldfields within the tourist fossicking authority area, and search for minerals with metal detectors or by panning. Hand tools only are used for any digging; no tree or shrub, or Aboriginal archaeological object is to be disturbed or removed.

Unrestricted Crown land Land owned by the Crown that, under the *Mineral Resources Development Act 1990*, can generally be prospected, explored or mined, but over which conditions may apply.

Value-adding The further processing of commodities into higher quality, high value goods.

Visitor days Accumulated number of visits to a site including overnight stays.

Whim Historical mining feature used for deep lead mining with deep shafts. A whim consisted of a large drum with a few turns of cable wound on it. Both ends of the cable were left free to run over pulleys down the shaft. A bucket (kibble) was attached to each end of the cable. As the horse walked around, the drum revolved and one bucket would be lowered down the shaft as the other was raised. A special harness was used which enabled the horse to turn around and walk in the opposite direction in order to reverse the movement of the buckets.

Wood utilisation plan Details an area to be harvested, and the type and quantity of wood to be produced from an FMA in any one year and provisionally for the succeeding two years; together with the allocation of timber to licensees. It provides detailed maps and sawlog quantities by grade for the next year's harvesting and estimates for the following two.

Work authority The holder of a mining licence must meet a number of criteria to obtain a work authority for extractive industry (*Extractive Industries Development Act 1995*); such as, the submission of a rehabilitation plan and payment of a bond, before commencing work.

Working circle A geographical subdivision for forest management purposes; for example, Bendigo FMA is divided into six working circles (see Figure 17.1).

World Conservation Union (IUCN) The World Conservation Union was created in 1948. It is the world's largest conservation-related organisation and brings together 76 states, 111 government agencies as well as a large number of non-government organisations, and some 10 000 scientists and experts, from 181 countries. Through various programs it supports the conservation of natural heritage – for instance the work of the IUCN World Commission on Protected Areas aims to promote the establishment and effective management of a worldwide, representative network of terrestrial and marine protected areas.

Public land use categories—Revised and former classification systems

Revised category	Revised sub-categories	Equivalent former category	Relevant chapter
Reference Area		Reference Area	18
National Park		National Park	15
State Park		State Park	15
Regional Park		Regional Park	16
		Multi-purpose Park	N/A
Nature Conservation Reserve		Flora Reserve	16
		Flora and Fauna Reserve	16
Natural Features Reserve	Natural and Scenic Features Area	Scenic Reserve	18
	Geological & Geomorphological Features Area	Geological Reserve or Monument	18
	Wildlife Area	Wildlife Reserve	18
	River Murray Reserve	River Murray Reserve	N/A
	Streamside Area	Streamside Reserve	18
	Stream Frontages, Beds and Banks	Public Land Water Frontage Reserve, Stream Beds and Banks	18
	Bushland Area	Bushland Reserve	18
	Highway Park	Highway Park	18
Water Production		Water Production	18
Historic and Cultural Features Reserve		Historic Area	16
		Historic Reserve	16
Community Use Area	Education Area	Education Area	18
	Recreation Area	Recreation Reserve	18
	Parklands and Gardens	–	18
	Buildings in Public Use	Utilities and Survey, Other Reserves and Public Land (containing schools, public halls, other buildings in public use etc)	18
State Forest		State Forest	17
		Hardwood Production	17
		Uncommitted Land	17
		Eucalyptus Oil Production	17
Plantation	Softwood plantation	Softwood Production	18
	Hardwood plantation	–	18
Earth Resources	Mining Site	–	18
	Stone Reserve	Mineral and Stone Production - 'Stone' Area	18
Services and Utilities	Transport	Roadside Conservation, Utilities and Survey	18
	Electricity and Gas	Utilities and Survey	18
	Hospitals, public offices and justice	Utilities and Survey	18
	Water and sewerage services	Water Regulation and Drainage; Utilities and Survey (some)	18
	Cemeteries	Cemeteries	18
	Other utility uses	Agricultural research; Utilities and Survey, Township Land, Other Reserves and Public Land (some in each)	18
Uncategorised Public Land		Township Land (for future township requirements)	18
		Other Reserves and Public Land (some)	18
		Revegetation Area	18
Land not required for public purposes		Township Land (some) Agriculture	18

Note: Wildlife reserves classified by NRE as not available for hunting are included as Nature Conservation Reserves. Those wildlife reserves where hunting may be permitted are Natural Features Reserves.

Key information sources

General Box-Ironbark information

The ECC's Box-Ironbark *Resources and Issues Report (1997)* summarised information on the resources, uses, environmental, cultural and recreational values, and relevant issues in the Box-Ironbark study area.

Social and economic studies

The following studies were commissioned by ECC for the Box-Ironbark investigation:

- Essential Economics and Read Sturgess Associates (1998)—Stage 1 Social and economic profile of the Box-Ironbark Forests and Woodlands Area.
- Essential Economics (1998)—Stage 1A Survey of Licence Holders.
- Read Sturgess Associates and Essential Economics (2000)—Stage 2 Assessment of the Effects of Proposals in the Draft Report.
- Midas Consulting (2001)—Stage 3: Potential Social and Economic Effects of the Environment Conservation Council's Final Recommendations for Victoria's Box-Ironbark Forests and Woodlands Area.

Aboriginal interests

- The ECC commissioned Mirimbiak Nations Aboriginal Corporation to consult with peak Aboriginal groups, traditional owners and local communities in the Box-Ironbark study area. Their report, *Outcomes of Consultation with Victorian Aboriginal Communities on the ECC Box-Ironbark Forests and Woodlands Investigation Draft Report (2000)*, is a key information source and is summarised at Appendix 4 of this report.

Recreation and tourism (including prospecting)

- A report, Brookes (1997), was substantially funded by the Department of Primary Industries and Energy to assess fossicking and other recreation in the Box-Ironbark area. This project collated available information and included a draft chapter for the ECC's *Resources and Issues Report (1997)*.
- Read Sturgess Associates (1999) and Read Sturgess Associates and Henshall Hansen Pollock Associates (1995) provided information on, respectively, recreation in parks and state forests at the statewide level.
- The annotated prospecting map series, Stone (1979–1999), provide local information on sites of interest to prospectors.

- Mapping from Minerals and Petroleum, Victoria, indicating location of auriferous areas and mineshafts, also assisted with locating areas of interest to prospectors.

Historic features

- The series of mining archaeological studies by Bannear for the North Central Goldfields Project (Bannear 1993a–g; 1994a,b; 1995) are well-researched and have field notes and location maps for most mining sites.
- A study for the Commonwealth Government and NRE of historical forest activity sites—charcoal, eucalyptus oil and tanbark production, forest camps, silviculture sites, and forest infra-structure by Bannear (1997), provided historical accounts and current site descriptions of places in the Box-Ironbark and Midlands areas.
- Butler (1997) reviewed 1 100 sites from historical themes other than mining and forest activities, and provided detailed assessments of 120 of these sites, for Environment Australia and ECC.
- Context (1999) assessed community heritage values and identified community heritage places in the Box-Ironbark area as part of a study for the West RFA region.

Public land management

- The Department of Natural Resources and Environment and its predecessors, and Parks Victoria, have produced a number of management plans for existing parks and reserves, for example CFL (1988); Parks Victoria (1998a,b). Forest Management Plans have been prepared for the Midlands and North East Forest Management Areas, the latter in conjunction with the *North East Regional Forest Agreement* (Commonwealth of Australia and Government of Victoria 1999).
- Prior to ECC, the public land use framework was provided by the series of Land Conservation Council investigations which resulted in final recommendations to government, for example LCC (1981–1997).

Considerable assistance was received from various public land managers, both office and field staff, particularly Forestry Victoria foresters and forest officers, Parks Victoria rangers and officers of Land Victoria.

Flora and fauna

Information on threatened flora and fauna distribution and abundance was obtained from the Flora Information System and the Atlas of Victorian Wildlife—NRE databases that contain several million records. Combined outputs from these databases were printed as 1:100 000 Biomaps for much of the study area.

Two studies were of particular assistance, providing descriptions and maps of high value locations:

- Sites of botanical significance in the Box-Ironbark study area, by Muir (1996); and
- Sites of high conservation value for fauna in the Box-Ironbark area, by Lumsden *et al.* (1997)

Studies to identify sites with large old trees and fauna refuges were important sources:

- Soderquist and Rowley (1995) identified large old tree sites in State forests in Bendigo FMA;
- Holland and Cheers (1999) identified large old tree sites in existing parks and reserves in Bendigo FMA, and on public land outside this FMA;
- Holland and Cheers (1999) also identified fauna refuges in public land areas not studied in the two following projects;
- Robinson and Rowley (1994, 1996) identified fauna refuges across most of Bendigo FMA
- NRE Forests Service provided digital mapping of the large old tree sites and fauna refuges.

Other key sources were:

- Flora and Fauna Guarantee information for listed threatened species was valuable, for example: Scientific Advisory Committee (1991, 1996); Benschmesh (1994); and Hills and Boekel (1996).
- The study of natural values and threats along the Broken, Boosey and Nine Mile Creeks by Robinson and Mann (1996a, b) contains detailed information on these areas.
- The series of Box-Ironbark fauna research and management projects carried out by Deakin University, Monash University and Arthur Rylah Institute were valuable, including the published fact sheets, Stothers (1999).

Staff of NRE Parks Flora and Fauna Division were particularly helpful in providing data and information in response to a large number of varied enquiries.

Timber production and forest management

- NRE Forests Service's Box-Ironbark Timber Assessment (BITA) project report was a key data source for timber information (NRE 1998a).
- The forest management model prepared by Forests Service, NRE (1999), used the BITA data to model wood product volumes before and after the ECC's proposals.
- Forests Service provided spreadsheets with production levels for each forest product in each work centre in Bendigo FMA, from 1986/87 to 1998/99.

- Timber productivity classes were provided by Forests Service in map and spreadsheet form, for each forest block.
- Forest Management Area plans for parts of the study area—Midlands, Central Highlands, North East, Mid-Murray (draft)—contained information for those areas.
- The North East Victoria and West Victoria Regional Forest Agreements were relevant to areas within the Box-Ironbark study area included in those regions.
- Forests Service conducted additional analyses of the Box-Ironbark timber resource in May and December 2000 and April 2001, which addressed the implications of the ECC's proposed changes to land availability in the Draft Report.
- After the release of the ECC's Draft Report, and due to concerns raised about resource availability and assumptions used in the modelling referred to above, NRE commissioned an independent review (Ryan and Leech, 2000) of issues relating to the forest inventory and timber resource analysis for the Box-Ironbark study area.

Over the course of many discussions, field and office staff of NRE were of great assistance in providing and interpreting information as required.

Eucalyptus oil production

Detailed digital mapping of areas harvested for eucalyptus oil, and associated data tables and production figures, were provided by Forests Service.

Mining

- Data on mineral and stone resources, prospectivity, exploration and mining was prepared for ECC block descriptions by NRE Minerals and Petroleum Victoria, McHaffie (1999; unpublished).
- A report on mining disturbance on public land, NRE (1998b), assisted with quantified information.
- Minerals and Petroleum Victoria provided maps and other data on mining licences and leases, exploration licences, mineral occurrences and quarries in the study area (1999—2001).

Minerals and Petroleum Victoria staff were extremely helpful in providing and interpreting information relating to mining, exploration and extractive industries.

Geological heritage

Rosengren and Joyce (in prep.) provided data on sites of geological and geomorphological sites of significance.

Apiculture

- Gibbs and Muirhead (1998) and Paton (1996) provided important information on apiculture.
- Locations of licensed bee sites were provided by Forestry Victoria, Land Victoria, and Parks Victoria.

Small blocks

- A project funded by the Commonwealth Government, Davidson *et al.* (1997; unpublished) collected detailed information on 120 selected small public land parcels with remnant vegetation across the study area.
- NRE Land Victoria, Bendigo office enabled access to recent on-ground information on several thousand Crown land assessments for small public land parcels prepared or overseen by Land Victoria staff.

Land Victoria staff assisted in providing information required on a large number of particular parcels.

Submissions and public consultation

Over the course of the investigation the ECC has received around 3 500 submissions and letters from stakeholders and interested members of the public, and has held numerous consultative meetings. The information gathered through submissions and consultation, with peak groups and local communities in particular, was invaluable in:

- identifying and clarifying many issues about specific areas;
- identifying areas requiring further consideration; and
- ultimately in assisting the ECC finalise its recommendations.

The ECC is extremely grateful for the cooperation and assistance provided by peak groups, local communities and interested individuals who contributed to this key source of information.

Appendix 1

Common names, scientific names and conservation status of flora and fauna species

Note: The legend is at the end of this Appendix.

		Aust	EPBC	Vic	FFG
Extinct fauna					
eastern hare wallaby ¹	<i>Lagorchestes leporides</i>	x	X	x	13
white-footed rabbit-rat ¹	<i>Conilurus albipes</i>	x	X	x	13
Threatened fauna					
spot-tailed quoll	<i>Dasyurus maculatus</i>		V	e	15
eastern quoll ¹	<i>Dasyurus viverrinus</i>			x	14
brush-tailed phascogale	<i>Phascogale tapoatafa</i>			v	79
squirrel glider	<i>Petaurus norfolkensis</i>			e	L
rufous bettong ¹	<i>Aepyprymnus rufescens</i>			x	14
bridled nailtail wallaby ¹	<i>Onychogalea fraenata</i>	e	E	x	14
grey-headed flying-fox	<i>Pteropus poliocephalus</i>			v	R
greater long-eared bat	<i>Nyctophilus timoriensis</i>			v	L
malleefowl ²	<i>Leipoa ocellata</i>	v	V	e	59
square-tailed kite ²	<i>Lophoictinia isura</i>			e	L
grey falcon ²	<i>Falco hypoleucos</i>			ce	83
black falcon	<i>Falco subniger</i>			e	
Australian bustard ¹	<i>Ardeotis australis</i>			ce	L
red-chested button-quail	<i>Turnix pyrrhothorax</i>			v	
bush stone-curlew ²	<i>Burbinus grallarius</i>			e	78
diamond dove	<i>Geopelia cuneata</i>			v	
glossy black-cockatoo ²	<i>Calyptorhynchus lathami</i>			v	L
swift parrot ²	<i>Lathamus discolor</i>	v	E	e	L
superb parrot ²	<i>Polytelis swainsonii</i>	v	V	e	33
turquoise parrot ²	<i>Neophema pulchella</i>			lr	L
powerful owl ²	<i>Ninox strenua</i>			e	92
barking owl ²	<i>Ninox connivens</i>			e	L
masked owl ²	<i>Tyto novaehollandiae</i>			e	L
red-backed kingfisher	<i>Todiramphus pyrrhopygia</i>			v	
speckled warbler ²	<i>Chthonicola sagittata</i>			v	L
regent honeyeater ²	<i>Xanthomyza phrygia</i>	e	E	ce	41
painted honeyeater ²	<i>Grantiella picta</i>			v	L
hooded robin ²	<i>Melanodryas cucullata</i>				L
grey-crowned babbler ²	<i>Pomatostomus temporalis</i>			e	34
crested bellbird ²	<i>Oreoica gutturalis</i>				L
ground cuckoo-shrike ²	<i>Coracina maxima</i>			e	
apostlebird ²	<i>Struthidea cinerea</i>			v	L
diamond firetail ²	<i>Stagonopleura guttata</i>				L
rugose toadlet	<i>Uperoleia rugosa</i>			e	
pink-tailed worm-lizard	<i>Aprasia parapulchella</i>	e	V	e	L

		Aust	EPBC	Vic	FFG
Threatened fauna					
hooded scaly-foot	<i>Pygopus nigriceps</i>			ce	108
woodland blind snake	<i>Ramphotyphlops proximus</i>			v	
carpet python	<i>Morelia spilota variegata</i>			e	L
bandy bandy	<i>Vermicella annulata</i>			lr	L
large ant-blue butterfly	<i>Acrodipsas brisbanensis</i>			E	70
bull-ant	<i>Myrmecia</i> sp. 17				L
ant spp.	<i>Peronomyrmex 'bartoni'</i>				L
Near threatened fauna					
common dunnart	<i>Sminthopsis murina</i>			dd	
large-footed myotis	<i>Myotis adversus</i>			lr	
dingo ¹	<i>Canis lupus dingo</i>			dd	
brown quail	<i>Coturnix ypsilophora</i>			dd	
grey goshawk	<i>Accipiter novaehollandiae</i>			lr	
little button-quail	<i>Turnix velox</i>			dd	
chestnut-rumped heathwren	<i>Hylacola pyrrhopygia</i>			dd	
tree goanna	<i>Varanus varius</i>			dd	
genoveva azure butterfly	<i>Ogyris genoveva genoveva</i>			R	

Other fauna			
platypus	<i>Ornithorhynchus anatinus</i>	jacky winter ²	<i>Microeca fascinans</i>
emu ²	<i>Dromaius novaehollandiae</i>	red-capped robin ²	<i>Petroica goodenovii</i>
painted button-quail ²	<i>Turnix varia</i>	eastern yellow robin ²	<i>Eopsaltria australis</i>
little lorikeet ²	<i>Glossopsitta pusilla</i>	white-browed babbler ²	<i>Pomatostomus superciliosus</i>
brown treecreeper ²	<i>Climacteris picumnus victoriae</i>	varied sittella ²	<i>Daphoenositta chrysoptera</i>
western gerygone ²	<i>Gerygone fusca</i>	crested shrike ²	<i>Falcunculus frontatus</i>
chestnut-rumped thornbill ²	<i>Acanthiza uropygialis</i>	Gilbert's whistler ²	<i>Pachycephala inornata</i>
southern whiteface ²	<i>Apeloecephala leucopsis</i>	rufous whistler ²	<i>Pachycephala rufiventris</i>
yellow-tufted honeyeater ²	<i>Lichenostomus melanops meltoni</i>	restless flycatcher ²	<i>Myiagra inquieta</i>
fuscous honeyeater ²	<i>Lichenostomus fuscus</i>	white-browed woodswallow ²	<i>Artamus superciliosus</i>
black-chinned honeyeater ²	<i>Melithreptus gularis</i>	dusky woodswallow ²	<i>Artamus cyanopterus</i>
brown-headed honeyeater ²	<i>Melithreptus brevirostris pallidiceps</i>	tree martin	<i>Hirundo nigricans</i>

		Aust	EPBC	Vic	FFG
Extinct flora					
robust greenhood ¹	<i>Pterostylis valida</i>	X	X	X	L
spiny rice-flower ¹	<i>Pimelea spinescens pubiflora</i>	X	X	X	
Threatened flora					
annual bitter-cress	<i>Cardamine paucijuga</i> (s.s.)			V	
annual buttons	<i>Leptorhynchus scaber</i>			E	L
Ausfeld's wattle	<i>Acacia ausfeldii</i>	R		V	X
Australian broomrape	<i>Orobanche cernua</i> var. <i>australiana</i>			V	
bald-tip beard-orchid	<i>Calochilus richiae</i>	E	E	E	5
Beechworth rustyhood	<i>Pterostylis</i> sp. aff. <i>boormanii</i>			E	
Beechworth silver stringybark	<i>Eucalyptus</i> aff. <i>cinerea</i> (Beechworth)			V	
bent-grass	<i>Deyeuxia imbricata</i>			V	

		Aust	EPBC	Vic	FFG
Threatened flora					
bow-lip spider-orchid	<i>Caladenia toxochila</i>			V	
brilliant sun-orchid	<i>Thebelymitra mackibbinii</i>	V	V	E	
brittle greenhood	<i>Pterostylis truncata</i>			E	L
buloke	<i>Allocasuarina luebmannii</i>				L
buloke mistletoe	<i>Amryema linophylla orientale</i>			V	
button immortelle	<i>Leptorhynchus waitzia</i>			V	
button rush	<i>Lipocarpus microcephala</i>			V	
button wrinklewort	<i>Rutidosia leptorhynchoides</i>	E	E	E	L
candy spider-orchid	<i>Caladenia versicolor</i>	V	V	V	103
chariot wheels	<i>Maireana cheelii</i>	V	V	V	
clover glycine	<i>Glycine latrobeana</i>	V	V	V	L
common fringe-sedge	<i>Fimbristylis dichotoma</i>			V	
coolibah grass	<i>Panicum queenslandicum</i> var. <i>queenslandicum</i>			E	
crimson spider-orchid	<i>Caladenia concolor</i>	V	V	E	L
crimson sun-orchid	<i>Thebelymitra X macmillanii</i>			V	
dainty phebalium	<i>Phebalium festivum</i>	R		V	L
Deane's wattle	<i>Acacia deanei deanei</i>			E	L
delicate cranesbill	<i>Geranium</i> sp. 6			V	
delicate leek-orchid	<i>Prasophyllum</i> aff. <i>petilum</i> (Wangaratta)	E		E	
delicate love-grass	<i>Eragrostis exitua</i>			E	
Dookie daisy	<i>Brachyscome gracilis</i>			V	L
downy Swainson-pea	<i>Swainsona swainsonioides</i>			E	L
dwarf swainson-pea	<i>Swainsona pbacoides</i>			E	
early golden moths	<i>Diuris</i> aff. <i>chryseopsis</i>	E	E	E	
eastern bitter-cress	<i>Cardamine microthrix</i>			V	
erect pepper-cress	<i>Lepidium pseudopapillosum</i>	V	V	E	L
Euroa guinea-flower	<i>Hibbertia humifusa erigena</i>	V	V	V	L
Fitzgerald's leek-orchid	<i>Prasophyllum fitzgeraldii</i>			E	L
flat spike-sedge	<i>Eleocharis plana</i>			V	
forest bitter-cress	<i>Cardamine papillata</i>			V	
fragrant leek-orchid	<i>Prasophyllum suaveolens</i>	E	E	E	L
glaucous flax-lily	<i>Dianella longifolia</i> var. <i>grandis</i>			V	
globe-hood sun-orchid	<i>Thebelymitra X chasmogama</i>			V	
golden cowslips	<i>Diuris bebrui</i>			V	
Grampians bitter-pea	<i>Daviesia laevis</i>	V	V	V	
green leek-orchid	<i>Prasophyllum lindleyanum</i>			V	X
grey billy-buttons	<i>Craspedia canens</i>			E	
hairy anchor plant	<i>Discaria pubescens</i>	R		R	L
hairy tails	<i>Ptilotus erubescens</i>				L
hoary sunray	<i>Leucochrysum albicans albicans</i> var. <i>tricolor</i>	E	E	E	
hooked needlewood	<i>Hakea tephrosperma</i>			V	
Hunter leek-orchid	<i>Prasophyllum</i> aff. <i>suaveolens</i> (Hunter)			E	
inland leek-orchid	<i>Prasophyllum</i> sp. aff. <i>pyrifforme</i> (goldfields)			E	
inland pixie-caps	<i>Acianthus collinus</i>			R	L
inland pomaderris	<i>Pomaderris paniculosa paniculosa</i>			V	

		Aust	EPBC	Vic	FFG
Threatened flora					
Jericho wire-grass	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>			E	
Kamarooka mallee	<i>Eucalyptus froggattii</i>	R		R	27
lanky buttons	<i>Leptorhynchus elongatus</i>			E	
large rustyhood	<i>Pterostylis maxima</i>			V	
large-fruit fireweed	<i>Senecio macrocarpus</i>	V	V	E	68
late-flower flax-lily	<i>Dianella tarda</i>			V	
leafless bluebush	<i>Maireana aphylla</i>			V	
lilac bitter-cress	<i>Cardamine lilacina</i> (s.s.)			V	
little pink spider-orchid	<i>Caladenia rosella</i>	E	E	E	L
long eryngium	<i>Eryngium paludosum</i>			V	
long-awn spear-grass	<i>Austrostipa tenuifolia</i>			V	
long-tail greenhood	<i>Pterostylis woollsi</i>	R		E	L
lowly greenhood	<i>Pterostylis despectans</i>	E	E	E	L
magnificent spider-orchid	<i>Caladenia magnifica</i>	K		X	L
mallee golden wattle	<i>Acacia notabilis</i>			V	
maroon leek-orchid	<i>Prasophyllum frenchii</i>	E	E	E	L
McIvor spider-orchid	<i>Caladenia audasii</i>	E	E	E	24
Mentone greenhood	<i>Pterostylis X toveyana</i>			V	
metallic sun-orchid	<i>Thelymitra epipactoides</i>	E	E	E	L
Mount Pilot spider orchid	<i>Caladenia pilotensis</i>				L
mountain swainson-pea ¹	<i>Swainsona recta</i>	E	E	X	L
Mueller daisy	<i>Brachyscome muelleroides</i>	V	V	E	L
myall	<i>Acacia melvillei</i>			V	
narrow goodenia	<i>Goodenia macharronii</i>	V	V	V	72
nealie	<i>Acacia loderi</i>			V	
northern sandalwood	<i>Santalum lanceolatum</i>			E	75
ornate pink fingers	<i>Caladenia carnea</i> var. <i>ornata</i>	V	V	V	
pale spike-sedge	<i>Eleocharis pallens</i>			V	
pepper grass	<i>Panicum laevinode</i>			V	
plains spurge	<i>Euphorbia planiticola</i>			E	L
plump windmill grass	<i>Chloris ventricosa</i>			V	
Pomonal leek-orchid	<i>Prasophyllum subbisectum</i>	E	E	E	L
proud diuris	<i>Diuris X fastidiosa</i>			E	
purple diuris	<i>Diuris punctata</i> var. <i>punctata</i>			V	L
purple eyebright	<i>Euphrasia collina muelleri</i>	E	E	E	L
purple eyebright ¹	<i>Euphrasia collina speciosa</i>			X	
purple wire-grass	<i>Aristida personata</i>			E	
red swainson-pea	<i>Swainsona plagiotropis</i>	V	V	E	L
riverina bitter-cress	<i>Cardamine moirensis</i>			V	
rosella spider-orchid	<i>Caladenia rosella</i>	E	E	E	103
rough eyebright	<i>Euphrasia scabra</i>	K		E	L
rough-seed wire-grass	<i>Aristida obscura</i>			E	
scented bush-pea	<i>Pultenaea graveolens</i>			V	L
Seymour cinnamon wattle	<i>Acacia leprosa</i> (Seymour variant)			V	

		Aust	EPBC	Vic	FFG
Threatened flora					
silky glycine	<i>Glycine canescens</i>			E	L
silky swainson-pea	<i>Swainsona sericea</i>			V	
silky umbrella grass	<i>Digitaria ammophila</i>			V	
silver needlewood	<i>Hakea leucoptera leucoptera</i>			V	
silver tea-tree	<i>Leptospermum multicaule</i>			V	
slender club-sedge	<i>Isolepis congrua</i>			V	L
slender darling-pea	<i>Swainsona murrayana</i>	V	V	E	L
slender love-grass	<i>Eragrostis exigua</i>			E	
slender water-milfoil	<i>Myriophyllum gracile</i> var. <i>lineare</i>			E	
small milkwort	<i>Comesperma polygaloides</i>			V	96
small scurf-pea	<i>Cullen parvum</i>	E	E	E	
small-leaf bluebush	<i>Maireana microphylla</i>			E	
small-leaf wax-flower	<i>Philotheca difformis difformis</i>			V	
smooth darling-pea	<i>Swainsona galegifolia</i>			E	76
soft sunray	<i>Leucochrysum molle</i>			V	
southern shepherd's purse	<i>Ballantinia antipoda</i>	E	E	E	102
spike grass ¹	<i>Elytrophorus spicatus</i>			X	
spiny rice-flower	<i>Pimelea spinescens spinescens</i>	V	V	E	
spiny-fruit saltbush	<i>Atriplex spinibractea</i>			E	
spiral sun-orchid	<i>Thelymitra matthewsii</i>	V	V	V	L
spotted gum ³	<i>Corymbia maculata</i>			V	
spotted-throat cowslip	<i>Diuris tricolor</i>			E	L
stiff groundsel	<i>Senecio bebriannus</i>	E	E	E	L
straw wallaby-grass	<i>Austrodanthonia richardsonii</i>			V	
striped water-milfoil	<i>Myriophyllum striatum</i>			V	
swamp billy-buttons	<i>Craspedia paludicola</i>			V	
swamp diuris	<i>Diuris palustris</i>			V	L
swamp leek-orchid	<i>Prasophyllum</i> sp. (Nagambie)			E	
swamp star	<i>Hypoxis exilis</i>			V	
tawny spider-orchid	<i>Caladenia fulva</i>	E	E	E	L
tick indigo	<i>Indigofera adesmiifolia</i>			V	
tough scurf-pea	<i>Cullen tenax</i>			E	
trailing hop-bush	<i>Dodonaea procumbens</i>	V	V	V	
trim flat-sedge	<i>Cyperus concinnus</i>			V	
twiggy sida	<i>Sida intricata</i>			V	
umbrella grass	<i>Digitaria divaricatissima</i>			V	
umbrella wattle	<i>Acacia oswaldii</i>			V	
veined spider-orchid	<i>Caladenia reticulata</i>			V	
velvet daisy-bush	<i>Olearia pamosa cardiophylla</i>	R		V	L
Warby Range swamp gum	<i>Eucalyptus cadens</i>	V	V	V	21
weak daisy	<i>Brachyscome debilis</i>			V	
wedge diuris	<i>Diuris dendroboides</i>			E	L
weeping myall	<i>Acacia pendula</i>			E	L
western golden-tip	<i>Goodia medicaginea</i>			R	
western silver wattle	<i>Acacia decora</i>			V	

		Aust	EPBC	Vic	FFG
Threatened flora					
whipstick crowea	<i>Crovea exalata revoluta</i>			V	
Whipstick westringia	<i>Westringia crassifolia</i>	E	E	E	40
whorled zieria	<i>Zieria aspalathoides</i>			V	L
wine-lipped spider-orchid	<i>Caladenia oenochila</i>	K		V	
winged pepper-cress	<i>Lepidium monolocoides</i>	E	E	E	L
woodland leek-orchid	<i>Prasophyllum</i> aff. <i>validum</i>	V	V	K	
woolly cloak-fern	<i>Cheilanthes lasiophylla</i>			E	
woolly ragwort	<i>Senecio garlandii</i>	V	V	E	
yarran wattle	<i>Acacia omalophylla</i>			E	L
yellow hyacinth-orchid	<i>Dipodium hamiltonianum</i>			E	82
yellow-lip spider-orchid	<i>Caladenia xanthochila</i>	E	E	E	103
yellow-tongue daisy	<i>Brachyscome chrysoglossa</i>			V	L
Near threatened flora					
annual buttercup	<i>Ranunculus sessiliflorus</i> var. <i>pilulifer</i>			K	
austral trefoil	<i>Lotus australis</i>			K	
Australian millet	<i>Panicum decompositum</i>			K	
bear's-ears	<i>Cymbonotus lawsonianus</i>			R	
bent-leaf wattle	<i>Acacia flexifolia</i>			R	
black roly-poly	<i>Sclerolaena muricata</i> var. <i>muricata</i>			K	
black-tip greenhood	<i>Pterostylis bicolor</i>			K	
blue caladenia wax-lip hybrid	X <i>Calassodia</i> sp. nov. (<i>Caladenia caerulea</i> hybrid)			R	
bluish raspwort	<i>Haloragis glauca glauca</i>			K	
blunt-leaf pomaderris	<i>Pomaderris belianthemifolia minor</i>			R	
branching groundsel	<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>			K	
branching raspwort	<i>Gonocarpus micranthus ramosissimus</i>			K	
bristly greenhood	<i>Pterostylis setifera</i>			R	
broad-lip leek-orchid	<i>Prasophyllum patens</i>			R	
broad-tip diuris	<i>Diuris</i> X <i>palachila</i>			R	
Brooker's gum	<i>Eucalyptus brookeriana</i>			R	
broom bitter-pea	<i>Daviesia genistifolia</i>			R	
brown beetle-grass	<i>Leptochloa fusca fusca</i>			R	
cane spear-grass	<i>Austrostipa breviglumis</i>	R		R	
clasping goodenia	<i>Goodenia benthamiana</i>			R	
club-hair New Holland daisy	<i>Vittadinia condyloides</i>			R	
coast stork's-bill	<i>Pelargonium littorale</i>			K	
coccid emu-bush	<i>Eremophila gibbifolia</i>			R	
common sour-bush	<i>Choretrum glomeratum</i> var. <i>glomeratum</i>			R	
corkscrew spear-grass	<i>Austrostipa setacea</i>			R	
cotton panic-grass	<i>Digitaria brownii</i>			K	
cream spider-orchid	<i>Caladenia patersonii</i>			K	
creeping grevillea	<i>Grevillea repens</i>	R		R	
cupped bush-pea	<i>Pultenaea vrolandii</i>			R	
currawang	<i>Acacia doratoxylon</i>			R	
dark roly-poly	<i>Sclerolaena muricata</i> var. <i>semiglabra</i>			K	

		Aust	EPBC	Vic	FFG
Near threatened flora					
dark wire-grass	<i>Aristida calycina</i> var. <i>calycina</i>			R	
Deane's wattle	<i>Acacia deanei paucijuga</i>			R	
dense mint-bush	<i>Prostanthera decussata</i>			R	
diosma rice-flower	<i>Pimelea flava dichotoma</i>			R	
dusky bush-pea	<i>Pultenaea polifolia</i>			R	
dwarf brooklime	<i>Gratiola pumilo</i>	K		R	
emerald-lip greenhood	<i>Pterostylis smaragdina</i>	R		R	
ferny small-flower buttercup	<i>Ranunculus pumilio</i> var. <i>politus</i>			K	
flame grevillea	<i>Grevillea dimorpha</i>			R	
flat-leaf bush-pea	<i>Pultenaea platyphylla</i>			R	
flat-sedge	<i>Cyperus victoriensis</i>			K	
forde poa	<i>Poa fordeana</i>			K	
fringed midge-orchid	<i>Genoplesium ciliatum</i>			K	
fringed sun-orchid	<i>Thelymitra luteociliatum</i>			R	
frosted goosefoot	<i>Chenopodium desertorum virosum</i>			K	
Fryerstown grevillea	<i>Grevillea obtecta</i>	R		R	
fuzzy new holland daisy	<i>Vittadinia cuneata</i> var. <i>morrisii</i>			K	
galvanised burr	<i>Sclerolaena birchii</i>			K	
Gariwerd grevillea	<i>Grevillea garinverdensis</i>			K	
golden dodder	<i>Cuscuta tasmanica</i>			K	
golden sour-bush	<i>Choretrum glomeratum</i> var. <i>chrysanthum</i>			R	
goldfield boronia	<i>Boronia anemonifolia aurofodina</i>			R	
goldfields grevillea	<i>Grevillea dryophylla</i>			R	
Grampians correa	<i>Correa reflexa</i> var. <i>angustifolia</i>			R	
Grampians peppermint	<i>Eucalyptus willisii falciformis</i>			R	
granite love-grass	<i>Eragrostis alveiformis</i>			K	
greenish-flower vanilly-lily	<i>Arthropodium</i> sp. 2 (greenish flowers)			K	
grey podolepis	<i>Podolepis canescens</i>			R	
grey spike-sedge	<i>Eleocharis macbarronii</i>			K	
hairy hop-bush	<i>Dodonaea boronifolia</i>			R	
half-bearded spear-grass	<i>Austrostipa bempogon</i>			R	
hickory wattle	<i>Acacia penninervis</i> var. <i>penninervis</i>			R	
leafy templetonia	<i>Templetonia stenophylla</i>			R	
leafy wallaby-grass	<i>Austrodanthonia bipartita</i>			K	
lizard orchid	<i>Burnettia cuneata</i>	R		R	
matted water-starwort	<i>Callitriche sonderi</i>			K	
mealy saltbush	<i>Atriplex pseudocampanulata</i>			R	
moss	<i>Archidium clavatum</i>			K	
moss	<i>Campylopus flindersii</i>			K	
moss	<i>Encalypta vulgaris</i>			R	
mossy woodruff	<i>Asperula minima</i>			R	
mugga	<i>Eucalyptus sideroxylon</i>			R	
naked beard-orchid	<i>Calochilus imberbis</i>			R	
narrow-leaf sida	<i>Sida trichopoda</i>			R	
narrow-leaf star-hair	<i>Astrotricha linearis</i> ssp. 1			R	

		Aust	EPBC	Vic	FFG
Near threatened flora					
narrow-leaf star-hair	<i>Astrotricha linearis</i> ssp. 2			R	
narrow-lip spider-orchid	<i>Caladenia leptochila</i>			K	
narrow-wing daisy	<i>Brachyscome</i> aff. <i>formosa</i> entity 2			K	
native couch	<i>Cynodon dactylon</i> var. <i>pulchellus</i>			K	
native orache	<i>Atriplex australasica</i>			K	
native peppercress	<i>Lepidium pseudohyssopifolium</i>			K	
oval-leaf pseudanthus	<i>Pseudanthus ovalifolius</i>			R	
pale-flower cranesbill	<i>Geranium</i> sp. 3			R	
plain quillwort	<i>Isoetes drummondii anomala</i>			K	
plains joyweed	<i>Alternanthera</i> sp. 1 (plains)			K	
Pyrenees gum	<i>Eucalyptus</i> aff. <i>cypellocarpa</i> (Pyrenees Range)			R	
quinetia	<i>Quinetia urvillei</i>			R	
rayless daisy-bush	<i>Olearia tubuliflora</i>			R	
Reader's daisy	<i>Brachyscome readeri</i>			R	
rising star guinea-flower	<i>Hibbertia humifusa humifusa</i>	R		R	
rye beetle-grass	<i>Tripogon loliformis</i>			R	
sand rush	<i>Juncus psammophilus</i>			R	
scaly greenhood	<i>Pterostylis hamata</i>			R	
sharp greenhood	<i>Pterostylis X ingens</i>			R	
shiny wallaby-grass	<i>Austrodanthonia induta</i>			K	
short-awned wheat-grass	<i>Elymus multiflorus</i>			K	
short-bristle wallaby-grass	<i>Austrodanthonia setacea</i> var. <i>breviseta</i>			R	
short-tail leopard-orchid	<i>Diuris brevissima</i>			K	
shrubby dampiera	<i>Dampiera dysantha</i>			R	
sikh's whiskers	<i>Pterostylis boormanii</i>			R	
silky browntop	<i>Eulalia aurea</i>			R	
slender bitter-cress	<i>Cardamine tenuifolia</i>			K	
slender ruddyhood	<i>Pterostylis aciculiformis</i>			K	
slender starwort	<i>Stellaria</i> sp. 1			K	
slender stylewort	<i>Levenhookia sonderi</i>			R	
slender tick-trefoil	<i>Desmodium varians</i>			K	
slender violet-bush	<i>Hybanthus monopetalus</i>			R	
slender water-ribbons	<i>Triglochin dubium</i>			R	
small burr-grass	<i>Tragus australianus</i>			R	
small chocolate-lily	<i>Arthropodium</i> sp. 3 (aff. <i>strictum</i>)			K	
small quillwort	<i>Isoetes pusilla</i>			K	
small-flower wallaby-grass	<i>Austrodanthonia monticola</i>			R	
small-leaf bush-pea	<i>Pultenaea foliolosa</i>			R	
smooth minuria	<i>Minuria integerrima</i>			R	
southern swainson-pea	<i>Swainsona bebriana</i>			R	
southern varnish wattle	<i>Acacia verniciflua</i> (southern variant)			K	
spoon mud-mat	<i>Glossostigma cleistanthum</i>			R	
spotted emu-bush	<i>Eremophila maculata</i> var. <i>maculata</i>			R	
spotted hyacinth-orchid	<i>Dipodium pardalinum</i>			R	
spurred spear-grass	<i>Austrostipa gibbosa</i>			R	

		Aust	EPBC	Vic	FFG
Near threatened flora					
spur-wing wattle	<i>Acacia triptera</i>			R	
squat picris	<i>Picris squarrosa</i>			R	
streaked wattle	<i>Acacia lineata</i>			R	
thyme beard-heath	<i>Leucopogon thymifolius</i>			R	
tiny bog-sedge	<i>Schoenus nanus</i>			K	
tufted club-sedge	<i>Isolepis wakefieldiana</i>			R	
twin-leaf bedstraw	<i>Asperula gemella</i>			R	
upright panic	<i>Entolasia stricta</i>			K	
velvet apple-berry	<i>Billardiera scandens</i> var. <i>brachyantha</i>			R	
Victorian club-sedge	<i>Isolepis victoriensis</i>			K	
water blinks	<i>Montia fontana amporitana</i>			K	
waterbush	<i>Myoporum montanum</i>			R	
wedge-leaf daisy	<i>Brachyscome cuneifolia</i>			K	
western emerald-lip greenhood	<i>Pterostylis</i> sp. aff. <i>longifolia</i> (Stawell)			K	
western pellitory	<i>Parietaria australis</i>			R	
wetland blown-grass	<i>Agrostis avenacea</i> var. <i>perennis</i>			K	
Williamson's wattle	<i>Acacia williamsonii</i>	R		R	X
wiry bossiaea	<i>Bossiaea cordigera</i>			R	
woolly buttons	<i>Leiocarpa panaetioides</i>			R	
woolly wattle	<i>Acacia lanigera</i> var. <i>lanigera</i>			R	
yellow star	<i>Hypoxis vaginata</i> var. <i>brevistigmata</i>			K	

Other flora			
austral bear's-ears	<i>Cymbonotus preissianus</i>	messmate	<i>Eucalyptus obliqua</i>
austral bracken	<i>Pteridium esculentum</i>	milkmaids	<i>Burchardia umbellata</i>
austral bugle	<i>Ajuga australis</i>	mountain ash	<i>Eucalyptus regnans</i>
austral cranesbill	<i>Geranium solanderi</i>	mountain grevillea	<i>Grevillea alpina</i>
beard heath	<i>Leucopogon</i> spp.	narrow-leaf bitter-pea	<i>Daviesia leptophylla</i>
bidgee-widgee	<i>Acaena novae-zelandiae</i>	nodding blue-lily	<i>Stypantra glauca</i>
black bristle-sedge	<i>Chorizandra enodis</i>	nodding saltbush	<i>Einadia nutans nutans</i>
black wattle	<i>Acacia mearnsii</i>	pale flax-lily	<i>Dianella longifolia</i>
Black's goodenia	<i>Goodenia blackiana</i>	peach heath	<i>Lissanthe strigosa subulata</i>
black-anther flax-lily	<i>Dianella revoluta</i>	peppermint box	<i>Eucalyptus odorata</i>
blackwood	<i>Acacia melanoxylon</i>	plume-grass	<i>Dichelachne sieberiana</i>
blue burr-daisy	<i>Calotis cuneifolia</i>	prickly tea-tree	<i>Leptospermum continentale</i>
blue finger-flower	<i>Cheiranthra cyanea</i> var. <i>cyanea</i>	purplish blown grass	<i>Agrostis aemula</i>
blue gum	<i>Eucalyptus globulus</i>	red bird's-foot trefoil	<i>Lotus cruentus</i>
blue heron's-bill	<i>Erodium crinitum</i>	red box	<i>Eucalyptus polyanthemosis</i>
blue mallee	<i>Eucalyptus polybractea</i>	red ironbark	<i>Eucalyptus tricarpa</i>
blue pincushion	<i>Brunonia australis</i>	red stringybark	<i>Eucalyptus macrorhyncha</i>
bottle bluebush	<i>Maireana excavata</i>	red-leg grass	<i>Bothriochloa macra</i>
bristly wallaby-grass	<i>Austrodanthonia setacea</i>	rice grass	<i>Tetrarrhena</i> spp.
broombush	<i>Melaleuca uncinata</i>	river red gum	<i>Eucalyptus camaldulensis</i>
brush heath	<i>Brachyloma ericoides ericoides</i>	rock isotome	<i>Isotoma axillaris</i>
bulbine lily	<i>Bulbine bulbosa</i>	rough burr-daisy	<i>Calotis scabiosifolia integrifolia</i>
bull mallee	<i>Eucalyptus bebriana</i>	rough spear-grass	<i>Aurolastipa scabra</i>

Other flora			
cane wire-grass	<i>Aristida ramosa</i>	rough-barked honey-myrtle	<i>Melaleuca parvistaminea</i>
chocolate lily	<i>Dichopogon</i> spp.	saloop	<i>Einadia hastata</i>
clustered everlasting	<i>Chrysocephalum semipapposum</i>	scaly buttons	<i>Leptorhynchos squamatus</i>
common beard-heath	<i>Lencopogon virgatus</i>	scented sundew	<i>Drosera whittakeri aberrans</i>
common bog-sedge	<i>Schoenus apogon</i>	scurfy pomaderris	<i>Pomaderris paniculosa</i>
common eutaxia	<i>Eutaxia microphylla</i>	sheep's burr	<i>Acaena echinata</i> var. <i>echinata</i>
common fringe-myrtle	<i>Calytrix tetragona</i>	shiny everlasting	<i>Bracteantha viscosa</i>
common hovea	<i>Hovea linearis</i>	short-hair plume-grass	<i>Dichelachne micrantha</i>
common lagenifera	<i>Lagenifera stipitata</i>	silver wattle	<i>Acacia dealbata</i>
common raspwort	<i>Gonocarpus tetragynus</i>	silvertop wallaby-grass	<i>Joycea pallida</i>
common rice-flower	<i>Pimelea humilis</i>	slender goodenia	<i>Goodenia gracilis</i>
common tussock-grass	<i>Poa labillardieri</i>	slender rice-flower	<i>Pimelea linifolia</i>
common wheat-grass	<i>Elymus scaber</i>	slender sun-orchid	<i>Thelymitra pauciflora</i>
common woodrush	<i>Luzula meridionalis</i>	small grass-tree	<i>Xanthorrhoea minor lutea</i>
cotton fireweed	<i>Senecio quadridentatus</i>	small mat-rush	<i>Lomandra sororia</i>
cranberry heath	<i>Astroloma humifusum</i>	small poranthera	<i>Poranthera microphylla</i>
creamy stackhousia	<i>Stackhousia monogyna</i>	small St. John's wort	<i>Hypericum gramineum</i>
curved rice-flower	<i>Pimelea curviflora</i>	soft tussock-grass	<i>Poa morrisii</i>
cut-leaf burr-daisy	<i>Calotis anthemoides</i>	southern cane-grass	<i>Eragrostis infecunda</i>
daphne heath	<i>Brachyloma daphnoides</i>	spear grass	<i>Austrostipa</i> spp.
drooping cassinia	<i>Cassinia arcuata</i>	spiky guinea-flower	<i>Hibbertia exaltiacies</i>
drooping she-oak	<i>Allocasuarina verticillata</i>	spreading eutaxia	<i>Eutaxia diffusa</i>
dwarf bluebush	<i>Maireana humillima</i>	spreading wattle	<i>Acacia genistifolia</i>
dwarf geebung	<i>Persoonia chamaepeuce</i>	sticky hop-bush	<i>Dodonaea viscosa</i>
feather spear-grass	<i>Austrostipa elegantissima</i>	sticky sword-sedge	<i>Lepidosperma viscidum</i>
flame heath	<i>Astroloma conostephioides</i>	stinking pennywort	<i>Hydrocotyle laxiflora</i>
fuzzy New Holland daisy	<i>Vittadinia cuneata</i>	supple spear-grass	<i>Austrostipa mollis</i>
gold-dust wattle	<i>Acacia acinacea</i>	swamp gum	<i>Eucalyptus ovata</i>
golden pennants	<i>Glischrocaryon bebrii</i>	sweet bursaria	<i>Bursaria spinosa</i>
golden wattle	<i>Acacia pycnantha</i>	sweet quandong	<i>Santalum acuminatum</i>
gorse bitter-pea	<i>Daviesia ulicifolia</i>	tall bluebell	<i>Wahlenbergia stricta</i>
green mallee	<i>Eucalyptus viridis</i>	tall raspwort	<i>Gonocarpus elatus</i>
green rock-fern	<i>Cheilanthes austrotenuifolia</i>	tall sedge	<i>Carex appressa</i>
grey box	<i>Eucalyptus microcarpa</i>	tall sundew	<i>Drosera peltata</i>
grey everlasting	<i>Ozothamnus obcordatus</i>	thatch saw-sedge	<i>Gabnia radula</i>
grey guinea-flower	<i>Hibbertia obtusifolia</i>	totem-poles	<i>Melaleuca decussata</i>
grey mulga	<i>Acacia brachybotrya</i>	twiggy bush-pea	<i>Pultenaea largiflorens</i>
grey tussock-grass	<i>Poa sieberiana</i>	variable sword-sedge	<i>Lepidosperma laterale</i>
hairy panic	<i>Panicum effusum</i>	varnish wattle	<i>Acacia verniciflua</i>
hedge wattle	<i>Acacia paradoxa</i>	wallowa	<i>Acacia calamifolia</i>
hill red gum	<i>Eucalyptus blakelyi</i>	wattle mat-rush	<i>Lomandra filiformis</i>
honey-pots	<i>Acrotriche serrulata</i>	wax-lip orchid	<i>Glossodia major</i>
kangaroo grass	<i>Themeda triandra</i>	weeping grass	<i>Microlaena stipoides</i> var. <i>stipoides</i>
kidney-weed	<i>Dichondra repens</i>	weeping pittosporum	<i>Pittosporum phylliraeoides</i>
knob sedge	<i>Carex inversa</i>	white box	<i>Eucalyptus albens</i>
kurradjong	<i>Brachybiton populneus populneus</i>	white cypress-pine	<i>Callitris glaucophylla</i>
large-leaf bush-pea	<i>Pultenaea daphnoides</i>	windmill grass	<i>Chloris truncata</i>
lemon beauty-heads	<i>Calocephalus citreus</i>	wingless bluebush	<i>Maireana enchylaenoides</i>

Other flora			
lightwood	<i>Acacia implexa</i>	wirilda	<i>Acacia retinodes</i>
long-hair plume-grass	<i>Dichelachne crinita</i>	woolly New Holland daisy	<i>Vittadinia gracilis</i>
long-leaf box	<i>Eucalyptus goniocalyx</i>	yam-daisy	<i>Microseris lanceolata</i>
magenta stork's-bill	<i>Pelargonium rodneyanum</i>	yellow box	<i>Eucalyptus melliodora</i>
mallee wattle	<i>Acacia montana</i>	yellow gum	<i>Eucalyptus leucoxydon</i>
manna gum	<i>Eucalyptus viminalis</i>	yellow rush-lily	<i>Tricoryne elatior</i>
many-flowered mat-rush	<i>Lomandra multiflora multiflora</i>		

LEGEND:

Aust: conservation status in Australia, after ANZECC (1999) and NRE Flora Information System Database

EPBC: status under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

¹ These species are extinct in the study area

² These species are included in the 'Victorian temperate-woodland bird community' listed under the Victorian *Flora and Fauna Guarantee Act 1988*

³ This species not indigenous to the study area

IUCN (1994b) categories (lower case):

x – extinct
 ce – critically endangered
 e – endangered
 v – vulnerable
 lr – lower risk
 dd – data deficient

Vic: conservation status in Victoria, after NRE (2000a, 2001E) and NRE Flora Information System Database

FFG: status under the Victorian *Flora and Fauna Guarantee Act 1988*

N – nominated for listing, awaiting recommendation;

R – recommended for listing;

X – rejected or ineligible for listing;

L – listed, no action statement published;

numbers indicate action statement number where published

IUCN (1990) categories (upper case):

X – extinct
 E – endangered
 V – vulnerable
 R – rare
 D – depleted
 K – poorly known

Appendix 2

EVCs found in the Box-Ironbark study area

Identification of EVCs

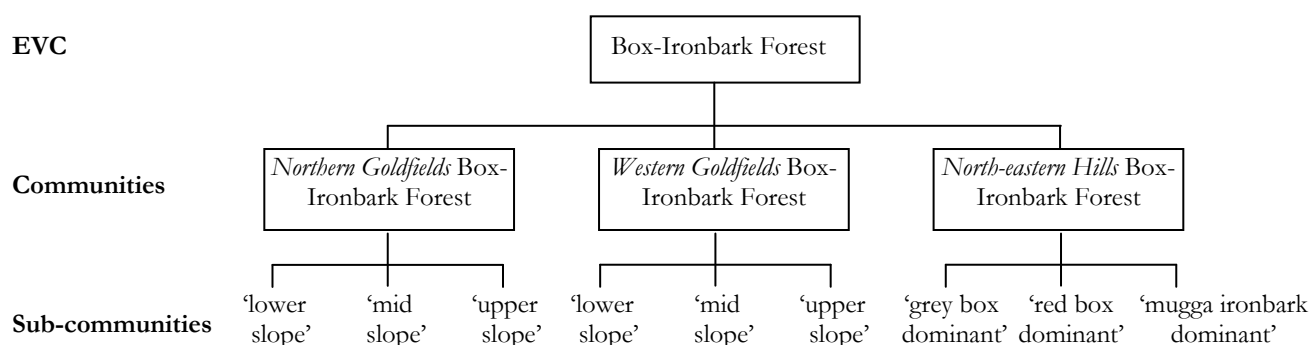
In nature, species with similar habitat requirements tend to co-occur at places where their requirements are met. Ecologists call these co-occurring collections of species **communities**. A vegetation community is a collection of co-occurring plant species—it reflects the vegetation’s response to environmental influences such as geology, soils, landform and rainfall.

Vegetation communities can be identified by recording the abundance of plant species at a large number of sites, and then systematically comparing the sites to identify clusters of sites which are most similar to each other in terms of the abundance of plant species. As long as the procedures for comparing and grouping sites are systematic and consistent, the clusters—or, more accurately, the vegetation associations which they support—will form the fundamental units of any classification of vegetation associations.

Across Victoria, around 32 000 sites have been surveyed and analysed in this way, including over 800 sites in the Box-Ironbark study area. The fundamental units resulting from these analyses are called (vegetation) **sub-communities**. Sub-communities may indicate different types of disturbance, or different stages in the succession of a particular vegetation type. Vegetation communities, then, can be identified by aggregating sub-communities that are similar in terms of their structure, major environmental affinities, and abundance of species.

A further level of aggregation generates **Ecological Vegetation Classes (EVCs)**—groups of one or more vegetation communities which exist under a common regime of ecological processes and which are linked to broad landscape features. The similarity of environmental regimes is apparent in comparable life forms, genera and vegetation structure. The communities within an EVC differ due to geographical separation rather than major ecological differences.

Sub-communities, communities and EVCs are levels in a hierarchy, as illustrated in the following key example for the Box-Ironbark EVC.



Note the use of italics to signify that part of the name of a vegetation unit which pertains to a community.

Mapping of EVCs

Once EVCs have been identified, it is possible to map their distributions with the aid of maps of sites where they are known to occur; aerial photographs; maps of the main environmental determinants of vegetation distribution (such as soils, rainfall, topography); any pre-existing vegetation mapping; and extensive field work to identify boundaries and ground-check that EVCs do indeed occur where they have been mapped. A preliminary map of the current distribution of EVCs on public land was provided in the ECC Resources and Issues Report (1997).

As well as the standard EVCs, the process of mapping generates two variations of the standard EVCs—**mosaics** and **complexes**. A mosaic consists of two or more discrete EVCs which cannot be mapped separately due to the scale of the map. A complex occurs where two or more EVCs are unable to be distinguished in an area but are known to exist discretely elsewhere. A slash is used to separate the component EVCs in the name of a mosaic or complex—Plains Grassy Woodland/Gilgai Wetland Mosaic, for example. Some EVCs occur only in mosaics. The units identified on a single vegetation map, then, may be communities, EVCs, mosaics or complexes, depending on the resolution at which the units were described and mapped. However, for convenience, mapped vegetation units of any of these types are referred to simply as ‘EVCs’.

The extent to which vegetation has been depleted—that is, cleared as a result of European settlement—is a key consideration in the establishment of conservation reserve systems (see Chapter 4). To assess the extent of depletion of each EVC, it is necessary to map the extent of EVCs prior to European settlement, as well as the current distribution of EVCs. The mapping of vegetation prior to European settlement is called ‘pre-1750 mapping’; 1750 being a round-number year closely pre-dating European settlement in Australia. Essentially pre-1750 mapping involves predicting, or modelling, the vegetation that was originally cleared from areas which no longer support indigenous vegetation. It involves a similar process to mapping the current distribution of EVCs, but with much less assistance from aerial photographs and ground-checking.

Pre-1750 EVC mapping has now been completed for the Box-Ironbark study area, and is provided in Map B. This mapping identified 116 EVCs. Of these, 43 EVCs cannot reasonably be considered ‘Box-Ironbark forests and woodlands’ as specified in the terms of reference for the Box-Ironbark investigation—basalt plains, wetland, riverine or mountain forest EVCs, for example—and are listed separately in the legend to Map B. These EVCs cover approximately 122 000 ha (pre-1750) out of a total of 2 950 000 ha. In addition, approximately 4 000 ha could not be assigned to an EVC.

Complementing Map B is Appendix 3 which provides statements of the spatial extent of each of the ‘Box-Ironbark’ EVCs. As anticipated in the Draft Report, new EVC mapping has been used in generating Appendix 3, and it is now entirely consistent with Map B.

EVC Descriptions

The following table provides descriptions of 35 EVCs which, either separately or in mosaics or complexes, make up nearly all of the 73 Box-Ironbark EVCs in Map B. Those not described below occur only in small areas, or are not Box-Ironbark EVCs.

Table 2a: Description of the main Box-Ironbark EVCs in the study area

EVC Name	Structure	Main Canopy Species	Main Shrub and Ground Layer Species	Rainfall (mm)	Altitude (m)	Landform/geology/soils	Distribution
<i>Northern Goldfields</i> Box-Ironbark Forest	open-forest	red ironbark, grey box, red box, yellow gum	golden wattle, gold-dust wattle, twiggy bush-pea, shiny everlasting, drooping cassinia, spiky guinea-flower, wattle mat-rush, black-anther flax-lily, bristly wallaby-grass	400-600	220 (mean)	Gently undulating rises to low hills. Shallow stony soils from Ordovician sediments	Rushworth to Heathcote; around Bendigo; Dunolly to Inglewood; Puckapunyal Military Area
<i>Western Goldfields</i> Box-Ironbark Forest	open-forest	red box, red ironbark, grey box, yellow gum	golden wattle, gold-dust wattle, hedge wattle, drooping cassinia, narrow-leaf bitter-pea, spiky guinea-flower, wattle mat-rush, small mat-rush, black-anther flax-lily, bristly wallaby-grass, slender rice-flower	450-650	270 (mean)	Gently undulating rises to low hills. Shallow stony soils from Ordovician sediments	Dunolly to south of Maryborough; south of St Arnaud; Stawell
<i>North-eastern Hills</i> Box-Ironbark Forest	open-forest	mugga ironbark, grey box	golden wattle, gorse bitter-pea, slender rice-flower, grey guinea-flower, shiny everlasting, black-anther flax-lily, silvertop wallaby-grass, common wheat-grass, rough spear-grass, stinking pennywort	550-700	200 (mean)	Gently undulating rises to low hills. Shallow stony soils from Ordovician sediments	Euroa to Chiltern
<i>Northern Goldfields</i> Heathy Dry Forest	open-forest	red stringybark, red box	daphne heath, mountain grevillea, common rice-flower, common beard-heath, common hovea, blue finger-flower, silvertop wallaby-grass, grey tussock-grass, black's goodenia, milkmaids, tall sundew	450-650	250 (mean)	Upper slopes and ridgetops of undulating terrain and low hills. Shallow stony soils from Ordovician and Lower Devonian sediments	South of Bendigo; Rushworth to Heathcote; north of Dunolly
<i>Northern Footbills</i> Heathy Dry Forest	open-forest	red stringybark, red box, long-leaf box	daphne heath, gorse bitter-pea, slender rice-flower, common hovea, silvertop wallaby-grass, grey tussock-grass, stinking pennywort, blue pincushion, tall sundew	500-700	370 (mean)	Upper slopes and ridgetops of undulating rises and rolling hills; lower slopes of mountain ranges. Shallow stony soils from Ordovician and Cambrian sediments	Castlemaine; south of St Arnaud; Pyrenees; Euroa to Chiltern
<i>North-eastern Hills</i> Heathy Dry Forest	open-forest	red stringybark, hill red gum, red box	daphne heath, grey guinea-flower, silvertop wallaby-grass, small poranthera, stinking pennywort, common woodrush	550-700	320 (mean)	On ridgetops and plateaus. Soils derived from granite or contact metamorphosed Ordovician sediments	Warby Ranges to Chiltern
<i>Northern Goldfields</i> Grassy Dry Forest	open-forest	red stringybark, red box, yellow box	grey tussock-grass, blue finger-flower, kangaroo grass, common woodrush, magenta stork's-bill, short-hair plume-grass	450-650	295 (mean)	On upper slopes and ridgetops of low hills. Often close to Heathy Dry Forest (Northern Goldfields). Shallow, stony soils from Ordovician and Lower Devonian sediments	North of Heathcote; north-west of Dunolly
<i>Northern Footbills</i> Grassy Dry Forest	open-forest	red stringybark, yellow box, red box, long-leaf box	grey tussock-grass, tall bluebell, stinking pennywort, small St. John's wort, green rock-fern, cotton fireweed, magenta stork's-bill, austral cranesbill, common woodrush	550-700	440 (mean)	Sheltered aspects on upper slopes and ridgetops of rolling hills and lower slopes of ranges. Shallow, stony soils derived from Ordovician and Cambrian sediments	Pyrenees; south end of St Arnaud Range

EVC Name	Structure	Main Canopy Species	Main Shrub and Ground Layer Species	Rainfall (mm)	Altitude (m)	Landform/geology/soils	Distribution
<i>Northern Goldfields</i> Heathy Woodland	low open-woodland	red ironbark, red box, grey box	daphne heath, common fringe-myrtle, mountain grevillea, cranberry heath, shiny everlasting	450-550	200 (mean)	Undulating plains, rises and low hills. Sandy or clay soils	Around Bendigo, Dunolly and Tarnagulla
<i>Western Goldfields</i> Heathy Woodland	low open-woodland	long-leaf box, yellow gum	daphne heath, brush heath, flame heath, common fringe-myrtle, wax-lip orchid, scented sundew	450-650	220 (mean)	Undulating plains, rises and low hills. Tertiary sands with a thin covering of clay; sandstone often altered to quartzite gravel	Stawell; south-east and south-west of St Arnaud
Metamorphic Slopes Shrubby Woodland	woodland	grey box, drooping she-oak	wallowa (a wattle), sticky hop-bush, tall raspwort, rough spear-grass	400-500	230 (mean)	Rocky slopes of metamorphic aureoles adjacent to granitic plutons	Dunolly; Tarnagulla; Inglewood
Granitic Hills Woodland	woodland	hill red gum, red box, white cypress-pine	grey guinea-flower, mountain grevillea, daphne heath, nodding blue-lily, tall raspwort, stinking pennywort, cotton fireweed, green rock-fern, common fringe-myrtle	500-700	290 (mean)	Crests and slopes of granitic hills. Coarse, sandy soils	Warby Range; Chesney Vale Hills
Rocky Outcrop Shrubland/Herbland Mosaic	shrubland and herbland	no tree canopy	spur-wing wattle, common fringe-myrtle, nodding blue-lily, rock isotome, mosses, lichens, annual herbs	500-700	270 (mean)	Outcropping of flat sheets of granite. Coarse, sandy soils in pockets between rock slabs	Warby Range; Chesney Vale Hills; Terrick Terrick
Sedge-rich Woodland	woodland	yellow gum	sticky sword-sedge, black bristle-sedge, slender sun-orchid, bulbine lily	500-650	220 (mean)	Flat or slightly undulating terrain with seasonally inundated depressions. Tertiary sands and sandstones. Soils are clay loams with ironstone gravel at the surface	Illawarra; Deep Lead
<i>Low Rises</i> Grassy Woodland	woodland	grey box, white box	golden wattle, spreading wattle, gold-dust wattle, varnish wattle, common eutaxia, twiggy bush-pea, sweet bursaria, sticky hop-bush, drooping cassinia, feather spear-grass, supple spear-grass, rough spear-grass, saloop, fuzzy New Holland daisy, blue burrdaisy, lemon beauty-heads	400-500	200-300	Plains and gently undulating terrain. Soils derived from Ordovician sediments and alluvium	Fringes of Box-Ironbark hills around Rushworth, Costerfield, Heathcote, Goomalibee, Goorambat, Killawarra and Boweya; Kamarooka; Bendigo; Wedderburn; previously found around Ararat, Stawell and the Pyrenees
<i>Rainshadow</i> Grassy Woodland	woodland	white box, hill red gum	kurrajong, lightwood, varnish wattle, gold-dust wattle, sweet bursaria, daphne heath, curved rice-flower, kangaroo grass, wallaby-grasses, red-leg grass, grey tussock-grass, nodding blue-lily, wattle mat-rush, tall raspwort, stinking pennywort	< 700	150-500	Low hills. Soils are sandy clay loams derived from Ordovician metamorphic rocks and Devonian granitoids	Isolated hills around Dookie Agricultural College, Boxwood, north of Heathcote, Warrenbayne
<i>Slopes Box</i> Grassy Woodland	open-woodland	grey box	golden wattle, hedge wattle, black wattle, lightwood, gold-dust wattle, drooping cassinia, wallaby-grasses, spear-grasses, kangaroo grass, grey tussock-grass, black-anther flax-lily, wattle mat-rush, bulbine lily	650-850	200-600	Low hills or lower slopes. Devonian sediments of siltstone and sandstone	Seymour; Glenaroua; Tooborac

EVC Name	Structure	Main Canopy Species	Main Shrub and Ground Layer Species	Rainfall (mm)	Altitude (m)	Landform/geology/soils	Distribution
<i>Shrubby Granitic-outwash</i> Grassy Woodland	open-forest to woodland	hill red gum, red stringybark, red box	various wattles and guinea flowers, daphne heath, common fringe-myrtle, cane wire-grass, spear-grasses, wallaby-grasses, kangaroo grasses, soft tussock-grass, stinking pennywort, common raspwort, chocolate lily, black-anther flax-lily, wattle mat-rush, milkmaids	550-750	< 300	Gentle, lower slopes on the edges of granite hills, often on north to north-western aspects. Soils are freely-draining, deep sandy clay colluviums	Mount Pilot; Mount Barambogie; Warby Range; Chesney Vale Hills
Creepline Grassy Woodland	open-woodland	river red gum	wirilda (a wattle), black wattle, silver wattle, rough-barked honey-myrtle, weeping grass, common wheat-grass, common tussock-grass, tall sedge, rushes	450-650	190 (mean)	Ephemeral drainage lines and smaller intermittent creeks. Wide range of suitably fertile geological substrates with colluvial/alluvial soils	Across study area (tiny remnants). Previously more widespread
Valley Grassy Forest	open-forest	yellow box, long-leaf box, white box	silver wattle, weeping grass, kangaroo grass, common wheat-grass, austral cranesbill, austral bear's-ears, chocolate lily, cotton fireweed, small St. John's wort, small poranthera, stinking pennywort	550-700	335 (mean)	Along creek flats and gully heads in dissected hills. Recent alluvial deposits and soils derived from Ordovician and Cambrian sediments	Fryers Range; Pyrenees; Warby Range; Mount Pilot
Hillcrest Herb-rich Woodland	woodland	yellow box, long-leaf box, grey box	stinking pennywort, magenta stork's-bill, clustered everlasting, cotton fireweed, tall raspwort, creamy stackhousia, green rock-fern, kangaroo grass	450-650	350 (mean)	Broad ridgetops and upper slopes of undulating rises and rolling hills. Soils from Ordovician and Cambrian sediments and metamorphic rock	Maldon; St Arnaud to Bendigo; Mount Bolangum; Pyrenees
<i>Granitic Hills</i> Herb-rich Woodland	woodland	hill red gum, red stringybark, yellow box, long-leaf box	Deane's wattle, black wattle, hedge wattle, cranberry heath, peach heath, daphne heath, grey everlasting, stinking pennywort, austral bugle, austral bear-ear, green rock-fern, cotton fireweed, tall raspwort, wallaby-grasses, rough spear-grass, common bog-sedge	450-700	310 (mean)	Crests and slopes of hills with granite or granodiorite outcropping; also sedimentary sandstones	Mount Korong; Kooyoora; Mount Black; Mount Ida; north-west and south of Stawell
Alluvial Terraces Herb-rich Woodland	woodland	yellow box, grey box, river red gum, white box	golden wattle, hedge wattle, silver wattle, stinking pennywort, sheep's burr, common wheat-grass, plume-grass, weeping grass, wallaby-grasses, common bog-sedge, common lagenifera, common raspwort, slender goodenia, milkmaids, yam-daisy, chocolate lily, yellow rush-lily	450-700	270 (mean)	Lower slopes, drainage lines and old alluvial plains of gently undulating landscapes. Sodic soils derived from Ordovician sediments or Tertiary alluvium	South-west and south-east of St Arnaud; Maryborough to Stawell; Euroa to Chiltern; Graytown
<i>Gravelly-sediment</i> Broombush Mallee	open-scrub to low open-forest	bull mallee, blue mallee, green mallee	gold-dust wattle, broombush, twiggy bush-pea, common fringe-myrtle, mountain grevillea, grey everlasting, totem-poles, golden pennants, black-anther flax-lily, shiny everlasting, cranberry heath, rough spear-grass	400-500	190 (mean)	Gentle rises. Shallow stony soils derived from Ordovician sediments (Lower Devonian sediments in Rushworth area)	St Arnaud; Wedderburn; Kamarooka; Inglewood; Rushworth
<i>Northern Goldfields</i> Broombush Mallee	open-scrub	broombush, wallowa (a wattle), green mallee	cranberry heath, common fringe-myrtle, golden pennants, mountain grevillea, grey everlasting, totem-poles, shrubby dampiera	400-500	190 (mean)	Tops of gentle rises on shallow stony soils (quartz gravel and ferruginised rock) derived from Ordovician sediments	Wedderburn; Inglewood; St Arnaud; Kamarooka

EVC Name	Structure	Main Canopy Species	Main Shrub and Ground Layer Species	Rainfall (mm)	Altitude (m)	Landform/geology/soils	Distribution
Plains Grassy Woodland	open-woodland or woodland	grey box, buloke, yellow gum, river red gum, yellow box	gold-dust wattle, hedge wattle, peach heath, cranberry heath, honey-pots, yellow rush-lily, milkmaids, scaly buttons, sundew, spear-grasses, kangaroo grass	550-700	350-380	Broad flat to undulating plains. Brown clay soils derived from former Quaternary swamp deposits	Across study area (small remnants). Previously widely distributed throughout study area
<i>Riverina</i> Plains Grassy Woodland	woodland	grey box, buloke, yellow gum	golden wattle, mallee wattle, gold-dust wattle, drooping cassinia, spear-grasses, bristly wallaby-grass, windmill grass, kangaroo grass, common wheat-grass, grey tussock-grass, wingless bluebush, saloop, nodding saltbush, woolly New Holland daisy, lemon beauty-heads, knob sedge	400-550	100-200	Broad flat to undulating plains. Sodic, duplex soils (clay loam to sandy clay loam) of Quaternary origin	Across the northern plains (small remnants). Previously widely distributed across the northern plains
Sand Ridge Woodland	woodland to open-forest	white cypress-pine, yellow box, yellow gum, grey box	common fringe-myrtle, grey mulga, lightwood, golden wattle, mallee wattle, gold-dust wattle, spreading wattle, weeping pittosporum, sweet bursaria, drooping cassinia, beard heath, rice grass, hairy panic, common wheat-grass, spear-grasses, wallaby-grasses, small scurf-pea, smooth minuria	400-550	100-150	Source-bordering dunes composed of deep sandy soil. Soils develop on sands blown up by wind action from a prior stream bed	In close proximity to the Goulburn and Murray Rivers; Puckapunyal Military Area
Pine Box Woodland	woodland	yellow box, white cypress-pine, buloke	golden wattle, varnish wattle, mallee wattle, sweet bursaria, curved rice-flower, many-flowered mat-rush, rough spear-grass, bristly wallaby-grass, long-hair plume-grass	400-550	100-200	Generally flat topography with some undulations. Sheets of sandy soils from stream deposits weathered to low relief	Northern half of the plains (small remnants only). Previously more widely distributed
Plains Grassy Woodland/Gilgai Wetland Mosaic	open-woodland	river red gum, hill red gum, white box, grey box	hedge wattle, golden wattle, native daisies, chocolate lily, milkmaids, cut-leaf burr-daisy, purplish blown grass	400-600	100-200	Shallow basins surrounded by low hills and plains. Soils are heavy self-mulching clays which develop a gilgai profile	Graytown; north-west to south-west of Benalla; Glenrowan; Tungamah; south of Echuca; north of Heathcote
Valley Heathy Forest	open-forest	red box, long-leaf box, grey box	prickly tea-tree, small grass-tree, golden wattle, black wattle, hedge wattle, thatch saw-sedge, milkmaids, black-anther flax-lily, variable sword-sedge, small St. John's wort, common wheat-grass, wallaby-grasses, kangaroo grass, spear-grasses	750-850	200-400	Protected colluvial slopes and valleys below low granitic or sedimentary hills. Soils are colluvial sands	Lower slopes of the foothills of the Great Dividing Range – south-west of Seymour; south of Heathcote
Damp Sands Herb-rich Woodland	open-woodland	yellow box	silver wattle, mallee wattle, golden wattle, austral bracken, pale flax-lily, wattle mat-rush, supple spear-grass, common wheat-grass, wallaby-grasses	700-900	100-150	Plateau and dissected landscapes of granite and granodiorite geologies. Gullies, protected slopes and well drained gully heads	North of Reedy Swamp, Nagambie
Spring Soak Woodland	herbland to woodland	hill red gum	prickly tea-tree, narrow goodenia, sedges, rushes	600-700	150-250	Plateau, valleys and colluvial slopes. Mostly granitic geologies of Silurian and Devonian origin	Mt Pilot Range; Warby Range; Killawarra Forest; west of Euroa
Creekline Herb-rich Woodland	open-woodland	swamp gum, river red gum	blackwood, silver wattle, large-leaf bush-pea, sweet bursaria, austral bracken, common tussock-grass, bidgee-widgee, kidney-weed	500-700	250-600	Creek terraces of ephemeral streams	Lexton area
Plains Woodland	woodland or open-woodland	grey box, buloke, yellow gum	gold-dust wattle, cranberry heath, lemon beauty-heads, fuzzy New Holland daisy, grey tussock-grass, black-anther flax-lily, common wheat-grass, bristly wallaby-grass, herbs	< 600	160 (mean)	Fertile, brown clay soils derived from former Quaternary swamp deposits, on terrain of low relief.	terraces along the upper Wimmera Rivers and its tributaries

Appendix 3

Reservation status of Ecological Vegetation Classes (EVCs) expressed as the percentage of pre-1750 EVC extent represented in the conservation reserve system

The following is a detailed key for the column headings and symbols used in the Representation Table which follows the key.

KEY

Data in the Representation Table were derived by GIS analysis, that is overlaying, on computer, maps of:

- the pre-1750 extent of EVCs (Map B); that is, the distribution of EVCs as it is thought to have been immediately prior to European settlement;
- current extent of tree cover; that is, areas where indigenous tree cover is present, based on satellite imagery; and
- existing and recommended public land use categories.

Key features of the EVC-based system of vegetation classification are described in Appendix 2, including brief explanations of the methods used to determine the pre-1750 extent of EVCs, and of changes to the list of Box-Ironbark EVCs identified in the ECC *Resources and Issues Report (1997)*. Descriptions of EVCs are also provided in Appendix 2.

The area of public land covered by the table (other than for pre-1750 area) is 419 915 ha. Of this, 190 493 ha is within the 'Recommended New Reserve System' and 175 934 ha is 'Other public land'. There is an additional 53 488 ha of public land which has been cleared. This is mostly comprised of water storage areas and the large areas at Puckapunyal Military Area which have been cleared.

XXX The most recent available GIS map layers were used for the analysis and, as a result, both the EVC and public land layers differ from those used in the Draft Report. Together with changes in recommendations in response to submissions, and correction of some mistakes, these are the main source of differences between data in this analysis and corresponding data in the Draft Report analysis. Some differences can also be attributed to errors in the Draft Report, and the variability inherent in GIS mapping and analysis. For example, minor changes to the study area boundary since the Draft Report have increased the size of the study area by 400 ha, but the total extent of the study area in this new analysis is approximately 900 ha smaller than the corresponding figure in the Draft Report. While this might sound like a large margin for error, it is less than 0.05% of the study area, and is inconsequential at the broad scale at which ecosystem representation should be interpreted.

Similarly, many small public land units are not picked up in the public land GIS layer. For example, none of these figures include roads and roadsides, for which no estimate of extent exists. ECC estimates indicate that the actual extent of public land in the study area is around 427 000 ha. The approximate nature of this figure also more accurately conveys its level of precision than the single hectare figures produced by the GIS analyses. Accordingly, except where precise figures are required for clarity, round figures are generally used throughout this report for statistics which apply at a broad scale. Again, the difference between round and precise figures is inconsequential at this scale.

In addition to the Representation Table for the study area as a whole, presented here, the ECC has prepared Representation Tables for each of the main bioregions which overlap with the study area. These tables are available by request from the ECC. XXX

Column 1: Ecological Vegetation Classes and Vegetation Communities

The names of the 73 Box-Ironbark EVCs mapped within the study area. Here, the term 'EVCs' is used to describe several units of classification: EVCs *per se*, vegetation communities (components of names which relate to vegetation communities are indicated by italics), and complexes and mosaics—see Appendix 2 for definitions of these units and their relationships to each other. 'Other' includes non-Box-Ironbark EVCs (see Appendix 2), and various small mapping gaps.

Column 2: Pre-1750 extent

The total area in hectares thought to have been occupied by each EVC prior to European settlement, corresponding to the mapped extent of EVCs in Map B.

Column 3: Current extent (public and private land)

The total area in hectares currently occupied by each EVC—that is, that part of the pre-1750 distribution where indigenous tree cover is currently present.

Column 4: Percent Remaining

The current extent (column 3) as a percentage of the pre-1750 extent (column 2), for each EVC. [Note for Council – formatting glitches such as the heading for this column will be rectified when the report is formatted for printing]

Column 5: Conservation Status (JANIS)

The status of each EVC in terms of the categories developed by JANIS.¹ These categories are summarised in Appendix 8; the percent remaining (column 4) is a key factor in assigning EVCs to JANIS categories. These assessments have been completed in consultation with NRE Flora and Fauna Division, as part of a statewide project to assess and document the conservation status of EVCs at the bioregional level.

Column 6: Current Reserve System

The total area in hectares of each EVC in existing public land categories which comprise the conservation reserve system.² The significantly lower total extent of the current reserve system (69,475 ha) in this analysis, compared with the Draft Report analysis, is very largely attributable to the exclusion of existing regional parks from the current reserve system, as explained in Chapter 4.

Column 7: ECC Reserve System additions

The total area in hectares of each EVC recommended (in this report) to be added to those public land use categories which comprise the conservation reserve system.

Column 8: Recommended New Reserve System

The total area in hectares of each EVC in the new reserve system recommended in this report (column 6 plus column 7).

Column 9: Other public land

The total area in hectares of each EVC recommended (in this report) in all public land categories outside the conservation reserve system.

Column 10: New Reserve System as a percentage of pre-1750 extent

The recommended new reserve system (column 8) as a percentage of the pre-1750 extent (column 2), for each EVC.

Column 11: New Reserve System as a percentage of current extent on public land

The recommended new reserve system (column 8) as a percentage of the current extent on public land (column 8 plus column 9), for each EVC.

Column 12: Representation Outcomes

The letters A, B, C and D give an indication (see below) of factors which have limited opportunities to improve representation (where this is not obvious from the data).

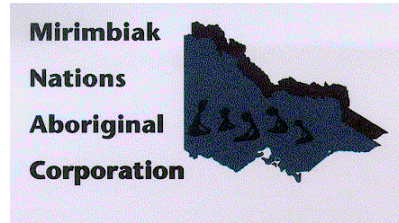
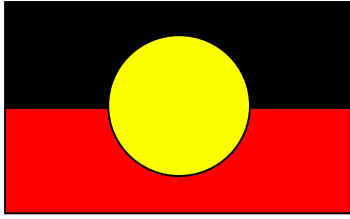
- A:** extent on public land outside the reserve system is largely in small isolated units; * = high proportion of these units may have been cleared and/or severely degraded.
- B:** extent within large public land units and outside the reserve system is mostly in small patches which are most appropriately protected by forest management zoning (which will improve representation level).
- C:** very small absolute extent on public land; * = does not currently occur on public land.
- D:** peripheral occurrence in the study area (main occurrence is outside the study area).

Column 13: Current extent on private land as a percentage of pre-1750

The total area in hectares of each EVC on private land with tree cover as a percentage of the pre-1750 extent (column 2).

¹ JANIS (1997). *Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia*. Report by the Joint ANZECC/MCFFA National Forest Policy Implementation Sub-committee. Commonwealth of Australia, Canberra.

² See Table 4.1 and related discussion in Chapter 4. In summary, the reserve system is composed of national, state and national heritage parks, reference areas, nature conservation reserves, and natural features reserves (other than wildlife reserves where grazing and hunting are allowed, and public land water frontages). The ECC's recommended regional parks have nature conservation as an equal primary use with recreation, and so are also included in the (recommended) new reserve system (column 8).



APPENDIX 4

**OUTCOMES OF CONSULTATION WITH
VICTORIAN ABORIGINAL COMMUNITIES
ON THE
ECC BOX-IRONBARK FORESTS &
WOODLANDS INVESTIGATION DRAFT
REPORT (2000)**

**Report to the Environment Conservation
Council**

NOVEMBER 2000



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Attachment 1 - Future Acts process flow chart

Attachment 2 - MNAC/ATSIC/Victorian Government - *Protocol for the Negotiaion of a Native Title Framework Agreement in Victoria*

Please Note:

The final report from Mirimbiak Nations Aboriginal Corporation also contained specific proposals related to recommended areas in the Box-Ironbark Forests and Woodlands Investigation Draft Report. These comments are not included in this appendix, but have been addressed in the area specific recommendations of this ECC Final Report. Some comments have also been excluded from the appendix because they are considered to be of a confidential nature. The full report is available for viewing at the ECC’s office in East Melbourne.



ECC and MNAC consultation processes

Mirimbiak Nations Aboriginal Corporation (MNAC) was commissioned by the Environment Conservation Council (ECC) to facilitate a consultation process with the relevant Victorian Aboriginal communities (traditional owners) within the Box-Ironbark Investigation area over a 10 week period from August 2000 to October 2000. MNAC is the native title representative body (NTRB) for Victoria for the majority of claimant groups. MNAC is recognised as having a central contact network to the Victorian traditional owners, people, communities and organisations. The tasks required were that MNAC:

- identify the traditional owners affected by the investigation
- set and conduct briefings for the relevant Aboriginal groups and people
- distribute all relevant information to the claimant groups and relevant organisations
- set and conduct workshops addressing the issues and recommendations with traditional owners and other Aboriginal groups
- prepare and distribute MNACs draft report (copies sent to all attendees of workshops)
- circulate MNACs draft report to all relevant traditional owners and groups
- prepare a final MNAC report and present it to the ECC.

Invited groups

All groups affected and involved in the Box-Ironbark investigation area were contacted for individual briefings, which were conducted by MNAC. Once the groups were briefed a workshop date was set for 3-4 weeks following the briefing. All traditional owners and groups involved in the Box-Ironbark study area were contacted and all groups provided comments. The groups invited to comment were:

- ◆ relevant claimant groups and traditional owners
- ◆ cultural heritage program groups
- ◆ other Aboriginal organisations.

Claimant groups and traditional owners

- **Wotjabaluk** North West Victoria (St Arnaud, Horsham areas)
- **Dhuudhoroa** North East Victoria (Albury/Wodonga areas)
- **Taungurung** Central – North East Victoria (Heathcote, Nagambie areas)
- **Yorta Yorta** Northern Victoria (Shepparton/Echuca areas)
- **DjaDjaWurung** Central – North West Victoria (Bendigo areas)

Cultural heritage programs

North West Cultural Heritage Program

- ◆ Bendigo DjaDjaWrung Aboriginal Co-operative
- ◆ Goolum Goolum Aboriginal Co-operative

North East Cultural Heritage Program

- ◆ Bangerang Keeping Place (Shepparton Arts Council)
- ◆ Rumbalara Aboriginal Co-operative



South West Wimmera Cultural Heritage Program

- ◆ Ballarat and District Aboriginal Co-operative
- ◆ Brambuk Aboriginal Co-operative
- ◆ Framlingham Aboriginal Trust

Kulin Nations Cultural Heritage Program

Other organisations

- ◆ Aboriginal Affairs Victoria

Briefings

Individual briefings were given to all groups 3-4 weeks prior to their workshop date. This allowed time for people to review the report and investigate issues further, prior to the workshop. The briefings involved:

- ◆ the MNAC facilitator giving an overview of the investigation and the group's role
- ◆ distribution of documentation to groups.

The following documentation was distributed to all groups involved in the consultation:

Box-Ironbark Forests & Woodlands Resources and Issues Report (1997)

A copy of the report was given to the MNAC facilitator. Other copies were provided as requested for groups.

Box-Ironbark Forests & Woodlands Investigation (BIFWI) - Draft Report for Public Comment (2000)

The chairperson of all claimant groups and organisations received a copy of the full draft report. Copies were also available to workshop attendees.

Box-Ironbark Forests & Woodlands Investigation – Brochure on the Draft Report

This displayed the recommended areas on a map and a brief summary of what the investigation involved. There was one copy available for each person.



Workshops

Workshops were held with various groups from 28th August 2000 to 19th October 2000. The same agenda was followed for all workshops. ECC staff were also in attendance at some of the workshops. The agenda for the workshops was as follows.

Agenda Item	Objective
• Investigation Overview	• To explain what the Box-Ironbark Forests & Woodlands are and the ECC investigation
• Review BIFWI Draft Report	• To review and discuss Chapter 3 of the ECC Draft Report - Aboriginal Heritage, Use and Management • To review and discuss the area recommendations as relevant to the group

Workshop schedule

The following workshops were held throughout Victoria.

MTG001	BIFWI CONSULTATION – BALLARAT CO-OPERATIVE	28/08/00
MTG002	BIFWI CONSULTATION – DJA DJA WRUNG CO-OPERATIVE	06/09/00
MTG003	BIFWI CONSULTATION – KULIN NATIONS CULTURAL HERITAGE PROGRAM	09/09/00
MTG004	BIFWI CONSULTATION – WOTJOBALUK CLAIMANT GROUP	11/09/00
MTG005	BIFWI CONSULTATION – YORTA YORTA LANDS COUNCIL & NORTH EAST CULTURAL HERITAGE PROGRAM	20/09/00
MTG006	BIFWI CONSULTATION – RUMBALARA & BANGERANG KEEPING PLACE (SHEPARTON ARTS COUNCIL)	20/09/00
MTG007	BIFWI CONSULTATION – FRAMLINGHAM ABORIGINAL TRUST	04/10/00
MTG008	BIFWI CONSULTATION – TAUNGURUNG CLAIMANT GROUP	05/10/00
MTG009	BIFWI CONSULTATION – DJA DJA WRUNG CLAIMANT GROUP & NORTH WEST CULTURAL HERITAGE PROGRAM	07/10/00
MTG010	BIFWI CONSULTATION – DHUUDHORO CLAIMANT GROUP & MUNGABAREENA CO-OPERATIVE	10/10/00
MTG011	BIFWI CONSULTATION – GOOLUM GOOLUM CO-OPERATIVE	19/10/00



Introduction

Aboriginal people have been involved in cultivating the environment's resources, for thousands of years. Managing the land and water resources plays a major role in Aboriginal people's lives for survival and conduct of their ceremonial practices. Aboriginal people have been caring for this country for thousands of years and this is one of the reasons that the environment has flourished and survived as it has. The continued practice of 'caring for country' by Aboriginal people has been severely limited due to European settlement. Various reasons have contributed to Aboriginal people being prevented from continuing to be the caretakers of the land. Due to the lack of respect for Aboriginal traditional practices and non-inclusion of Aboriginal people in land management the environment has suffered greatly. Caring for country could still continue today in a greater capacity if there was inclusion of Aboriginal people through management and implementation of traditional practices. It is essential that traditional owners be involved in land and water planning and management.

Traditional owners' statement

The following statement was written by the Victorian traditional owners for inclusion in this report.

"The ECC should be commended on this report. The inclusion of the "Aboriginal Heritage, Use and Management" chapter and the recommendations for consultation with the relevant Victorian Aboriginal groups and communities are supported. We Aboriginal people genuinely would like to be involved in the management of land and waters but do not want to be used as leverage for the implementation of the ECCs recommendations.

Protection of the Box-Ironbark Forests and Woodlands ecosystem is one of our major priorities. We support the ECCs focus on protection and re-vegetation of the Box-Ironbark Forests and Woodlands ecosystem. Aboriginal people have an inherent responsibility to care for country. The involvement of Aboriginal people at all levels of land and water management will benefit the whole community. Aboriginal people have nurtured the environment for thousands of years. The environment is being destroyed by Western methods and industries. The Aboriginal methods for land and water management should be considered as they worked for thousands of years before European contact and the introduction of Western methods.

While the ECCs actions are commendable it must be recognised that Aboriginal people have had grave concerns for the environment since European contact and unfortunately have been excluded from land and water management since this time. Without proper land and water management future generations will be severely disadvantaged.

Governments, relevant authorities, organisations and society in general must not allow further destruction of the environment to continue. All parties who share an interest in the survival of land and water should share the same view and make it their priority also.

Unfortunately we cannot turn back the clock and change what has happened to the environment. Now is the time to try and prevent further degradation and destruction of the environment and its inhabitants.



Comments on Chapter 3 of the ECC Draft Report

Traditional owners made the following comments on this chapter.

Aboriginal people in the Box-Ironbark study area are today largely concentrated in the Shepparton–Mooroopna, Echuca–Barmah, Ballarat, Bendigo and Maryborough areas, but Aboriginal association with the wider area dates back many thousands of years.

Response: This statement tends to ‘pigeon hole’ Aboriginal people and creates a misunderstanding that these are the only areas you will find Aboriginal people. There are many Aboriginal people located throughout the entire state of Victoria. Unfortunately due to the impact of social and economic changes on Aboriginal peoples, it is an unfortunate fact that Aboriginal people are concentrated in the major centres such as Ballarat, Bendigo, Shepparton etc.

Skeletal remains from Kow Swamp, outside the study area but near Terrick Terrick....

Response: This statement tries to justify/prove to the reader that we actually existed from 13,000 years ago to present. There should be a statement like “Existing Aboriginal culture dates back over thousands of years...”.

Strong Aboriginal associations with the area are demonstrated by hundreds of

Response: Strong associations are not just proven by archaeological sites. The mention of language groups and clans should be omitted as there are various views of the boundaries and interpretations of the groups within the Box-Ironbark area

Current knowledge and use of...

Response: Keep this sentence and include continuing **strong** association.

Historic and ethnographic records...

Response: This indicates that if the reader does not believe the report there is proof in historic and ethnographic records.

Chapter 2 in the ECC Resources and Issues Report (1997) describes Aboriginal.....

Response: Not everybody will have this report to refer to. All groups agreed that parts of this chapter should also be incorporated into the final report in brief format. Refer to the next part of this report which illustrates the contrasting environments from pre- to post-contact periods. It will also educate non-Aboriginal people about some of the untold “Australian” history.

3.1 Native title

Aboriginal association with the investigation area is significant.....

Response: Traditional owners commend and support this statement.

Under the Native Title Act 1993 Aboriginal people can claim native title on

Response: Refer to the views expressed on native title in the next part of this report.



However, the existence of native title is not dependent on a claim being lodged.....

Response: Traditional owners support this comment but due to the complexity of native title and what it means it needs to be re-worded so that most people will understand it. Refer to the views expressed on native title in the next part of this report.

The Victorian Government recently announced that an approach of

Response: Traditional owners support this comment but it should be stated at the start of this section. It shows the support of the Victorian Government regarding consultation and negotiation.

In Victoria, the Mirimbiak Nations Aboriginal Corporation (MNAC) coordinates.....

Response: MNAC does not co-ordinate all native title claims in Victoria (there are some groups that represent themselves). MNAC coordinate the majority of native title claims.

Most of the recommendations in this report, if adopted by the Victorian Government.....

Response: The reader may view this as Aboriginal people wanting to restrict the use of parks. It is recommended that the ECC remove this statement from this chapter and move it to the Executive Summary.

3.2 Aboriginal archaeology

Response: This should be changed to Aboriginal cultural sites and places. Archaeology refers only to the past.

An Environment Australia data audit² carried out in 1996 reviewed the extent

Response: There should be no mention of location of sites or artefacts. These areas are highly sensitive and should not be public knowledge. A total number cannot be listed as the number of artefacts and sites constantly increases and it is not a true figure as not all sites have been surveyed or may not be listed due to sensitivity. Refer to traditional owners' views and recommendations on Aboriginal heritage, use and management in the next part of this report.

Rock paintings are known from the Black Range near Stawell, and Mt Pilot.....

Response: Many of these sites are spiritual sites and therefore sensitivity must be shown to traditional owners. Traditional owners must be consulted over any development or interpretation of such sites. Unfortunately, it has been proven in the past that once a location is mentioned or known about it becomes exposed to possible desecration or damage (intentional or unintentional).

Scarred trees, the most common archaeological type in Victoria, are found throughout.....

Response: It is important to note that Aboriginal sites and places should only be listed in general terms with a brief description of what they are. For example "There are thousands of Aboriginal sites and places located through the study area. Aboriginal sites include:

- ◆ scar trees (mostly found near rivers and lakes)
- ◆ shell middens (found near river banks) etc



3.3 Aboriginal historic places

Aboriginal historic places are places dating from the period of initial contact between.....

Response: Historic places should not just be recognised as places that involved contact between other cultures and Aboriginal people. Aboriginal people have historic places that occur without any non-Aboriginal interactions such as corroboree sites, meeting places etc.

They include places involving Aboriginal interactions with explorers and settlers....

Response: The word interactions is too general and does not fully describe the past injustices. As history shows, the study area is also an area where there were large numbers of massacres of Aboriginal people. There are also missions and reserves (past and present) located in the study area. This needs to be documented.

Many historic Aboriginal places in the Box-Ironbark area have no physical remains.....

Response: Aboriginal people do not believe that something has to be physical to prove its existence. Aboriginal people have many locations that are spiritually significant also.

3.4 Survey coverage

Survey coverage for Aboriginal cultural sites and places in the study area is incomplete.....

Response: Traditional owners support the ECCs acknowledgment of inadequate surveys in the study area. Adequate surveys involving traditional owners and relevant cultural heritage officers must be done prior to any planning and development.

Surveys carried out for specific development projects, Telstra cable installations.....identified places correlates with activities such as timber harvesting and road construction.

Response: It should not just be the major corporations that do these surveys. These corporations should be used as an example for other 'smaller' companies. Many cultural heritage programs are working at a local level with these larger organisations who do not start any development until adequate surveys are performed.

Priority areas for new Aboriginal archaeological survey work, identified in the data audit.....

Response: All of the study area should be a priority.

For Aboriginal historic places, the Environment Australia audit report comments that....

Response: Traditional owners support and commend the ECC on the inclusion of this statement.

3.5 Regional Forest Agreement studies

Response: The RFA process should be mentioned but not in so much detail.



3.6 Existing consultation and management

Early in the Box-Ironbark investigation it was judged that separate consultation between.....

Response: This statement is too confusing. The RFAs were not discussed at the meeting as many Aboriginal people are unaware of the RFAs and find it confusing. The Commonwealth and State Governments had little or no interaction with traditional owners in the development of the RFAs.

The identification, protection and management of Aboriginal places in Victoria is primarily....

Response: Refer to traditional owners' views and recommendations on Aboriginal heritage, use and management in the next part of this report.

The Native Title Act 1993 clearly gives rise to the ability of native title holders...

Response: This is already explained in the native title section. It is less confusing if the facts about native title are mentioned first and not repeated.

Draft Report Recommendations

R7 - That planning and management relating to traditional interests and uses be based on recognition of and respect for the traditional relationship of Aboriginal people with the land.

Response: Traditional owners support this recommendation as it acknowledges the relationship of Aboriginal people with the land (also include waters). It is appreciated that this is noted but it only talks about recognition and respect and does not mention participation or management. It should not just mention the traditional but also the contemporary relationship as Aboriginal people still maintain their strong ties and relationship with land and waters. Also refer to the views and recommendations in the next part of this report.

R8(a) That there be ongoing consultation between the Victorian Government and Aboriginal groups and communities in relation to implementation of approved ECC recommendations on public land use and management, and access for traditional purposes.

Response: Traditional owners support this recommendation but 'ongoing participation and management' should be added to 'consultation'. Also refer to the views and recommendations in the next part of this report.

R8(b) That joint management between the Government and Aboriginal groups, for public land areas containing Aboriginal historic or archaeological places or other Aboriginal places, be investigated.

Response: Traditional owners support the recommendation for joint management but it should not be restricted just to Aboriginal historic or archaeological places. Aboriginal people should be part of the whole land and water management process.



R9 That existing consultative processes provided for under the *Native Title Act 1993* and other relevant legislation such as the *Mineral Resources and Development Act 1990* continue with the relevant Aboriginal groups and communities before the issue of any licences or permits which could affect Aboriginal interests.

Response: Traditional owners support this recommendation. The Mineral Resources and Development Act should be replaced by Aboriginal Torres Strait Islander Heritage Protection Act 1975 (Cth) as this overrides the Mineral Resources and Development Act.

R10 That the relevant recommendations of the Royal Commission into Aboriginal Deaths in Custody be implemented through providing opportunities for increased employment and training opportunities for Aboriginal people, particularly as park rangers.

Response: Traditional owners support the recommendation by the Royal Commission into Deaths in Custody. But it should not be assumed that all Aboriginal people want to be park rangers. Aboriginal people should be involved at all levels of land and water management. Park rangers are very commonly seen as token positions for Aboriginal people that do not really give Aboriginal people a say about the environment and their land.



Traditional owners' views on heritage, use and management

Traditional owners recommend that the ECC include additional information in their final report to educate people about Aboriginal people, and the impact of European contact on their culture. Chapter 2 in the 1997 Resources and Issues Report contained a great deal of useful information that should be incorporated briefly into the ECCs final report. The traditional owners have worked on the following issues and wish to see these included in the final report as they believe it is very important to educate people about Victorian Aboriginal history.

Post-contact

The Aboriginal people of Victoria have been severely affected by European contact and settlement. With the arrival of European settlers came a takeover of Aboriginal lands, introduced diseases (such as smallpox) and the forced removal of Aboriginal people from their land to missions and reserves. It was also a time of massacres of Aboriginal people. The Box-Ironbark area contains a large amount of Aboriginal history that has not been told.

Massacres

There are numerous massacre sites within the study area and throughout Victoria. These sites are extremely significant and sensitive to Aboriginal people as this is where their families and ancestors lost their lives. These sites must be protected and they should not be publicised without the authorisation of traditional owners.

There were widespread Aboriginal massacres, more than ever officially acknowledged. Many Aboriginal people were killed by non-Aboriginal officials, settlers, squatters and miners. There were different reasons that the Aboriginal people were killed. One of the main reasons for massacres was the takeover of land. Aboriginal people resisted the invasion of their traditional lands and would therefore be forced to fight for it. This would lead to military style campaigns run by the police where they would break up large groups. Some massacres were carried out by settlers who regarded the Aboriginal race as vermin and thought they should be eradicated. Other massacres occurred simply for the pleasures of the hunt, because of an individual's hatred for Aboriginal people and for reprisals for attacks on white people, livestock and property for which the revenge was often greatly out of proportion to the original offence. Aboriginal people were forced to attack for many reasons such as white man's failure to honour promises. It was also in reprisal for murder, rape or injury. It was also common for the participants to greatly underestimate the number of people killed in massacres, and for the murderers not to be prosecuted.

Aboriginal missions and reserves

There are many mission and reserve sites located in the study area, and throughout Victoria. Missions were first established as a means of controlling the Aboriginal people on their land by restricting their movements. They were also a means of separating families and groups from each other. This made it easier for non-Aboriginal/white settlers to move in and take over the land. Many of these missions would not allow traditional practices by the Aboriginal people. Many people were punished if they were found



doing so. Traditional practices included speaking traditional languages, initiations, or heritage to be passed on to children. The introduction of missions and reserves (and also disease and massacres) saw the rapid decline in the number of Aboriginal people.

Many Aboriginal people were not treated with dignity or respect. They had to obtain permission to travel from one place to another if they wished to visit relatives. Some people never saw their parents, brothers or sisters again because they couldn't get permission to visit them. They had to obtain government permission to get married. Aboriginal people were treated like cattle and moved from one mission to another. This treatment was not only in the distant past.

Removal of children

The practice of removing Aboriginal children from their families was still happening in the late 1960s and into the early 1970s. Mothers are still crying for their stolen babies. Aboriginal people are still looking for their families, and thousands of people in the Victorian community today remain unaware of their Aboriginal ancestry.

European use of the forests and woodlands

Once contact was made in the study area, the forests and woodlands rapidly declined due to various reasons such as farming, mining, timber harvesting and production, irrigation and settlements. These had dramatic effects on the original Box-Ironbark forests. Aboriginal people were dependent on the environment, and respected and cared for it. After contact, the environment quickly declined to its threatened status of today. Many early timber and mining companies left the environment 'cut up like an open sore'.

Traditional Aboriginal uses

Wood is one of the basic materials for much of the Victorian Aboriginal material culture. The large majority of utilised woody plants were trees, and a small number of vines were also used. The Box-Ironbark wood was also used extensively to manufacture implements and tools. Different Aboriginal groups utilised the Box-Ironbark woods for different purposes. Like most resources, Aboriginal people use the whole resource instead of utilising it for one purpose and wasting the rest. Trees from the Box-Ironbark forests produce very popular wood for:

- nulla nullas (clubs)
- spears
- shields
- food
- tools and other implements
- housing.

Food source

Some groups gathered the flower of the eucalyptus blossom and soaked them in 'collomuns' (Aboriginal word for round/oval bark bowls usually cut from the knobs or elbows of trees). Sugary pellets of dried sap are often eaten as a sweet. The eucalyptus oil is used for the treatment of colds.



Implements, dishes, canoes and other social uses

All parts of box-ironbark trees were utilised in various ways. There are hundreds of scar trees located in the study area varying in size. Most of these trees are found near the streams, rivers and lakes. The box-ironbark wood is especially good for the manufacturing of canoes because of its durability and strength. Box-Ironbark wood was and is commonly used for making shields. Shields represent the strong ongoing relationship and connection with the land and environment. Shields are incised with bands of chevron and herringbone patterns. Most shields were used in combat. Broad and thin shields were used to carry spears and narrow shields were used to deflect bows and clubs. The colours, carvings and lines on a shield tells the Aboriginal people who they are and most importantly where they come from. The bark of ironbark trees was also often used for bark huts. The bark was also used for drawings illustrating events and stories and tribal markings.

Saplings of ironbark are used for making spears and limbs are used for making returning boomerangs. The boomerangs are used for recreational purposes and sometimes for killing birds and small animals. nulla nullas (clubs) are made from Box-Ironbark wood due to the woods density and strength. Nulla nullas are used to club animals and are varied in size and patterns. Some may have a pointed bulbous head, cylindrical shaft and a pointed handle. Many of the heads of nulla nullas are decorated with incised zig-zag patterns or a series of dashes. These patterns represent the people and where they are from.



Legislative framework

It was decided by traditional owners that the legislative framework be stated at the beginning to emphasise the importance of the legislation that is currently in place specifically in relation to the consultation and implementation processes with traditional owners. The following are examples of current State and Commonwealth legislation.

- *Native Title Act 1993* (Commonwealth)
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth)
- *Archaeological & Aboriginal Relics Preservation Act 1972* (State)

Common law may also be useful in identifying the rights and obligations of traditional owners and Aboriginal groups.

Aboriginal And Torres Strait Islander Heritage Protection Act 1984

The purposes of this Act are the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginal people in accordance with Aboriginal tradition.

Archaeological & Aboriginal Relics Preservation Act 1972

Archaeological areas are protected by State legislation. The Archaeological Relics Advisory Committee advises the Government about the preservation of relics and areas. Aboriginal sites are also protected under the Commonwealth *Aboriginal Torres Strait Islander Cultural Heritage Protection Act 1984*.

If a person wilfully defaces or damages or otherwise interferes with an Aboriginal object or place they may be prosecuted. Penalties have been put in place and the following maximum penalties may apply.

Under Commonwealth legislation

1. *Individuals: there is a fine of \$10,000 and or imprisonment for 5 years.*
2. *Corporate Bodies: a fine of \$50,000 and or imprisonment for 5 years.*

Under Victorian legislation

3. *A fine not exceeding \$1000 and or not more than three months imprisonment. A person can be imprisoned for a number of different offences relating to Aboriginal archaeological relics and areas.*

Native Title Act - Future Acts Regime

Government and non-government organisations should be aware that under the Native Title Act's Future Acts regime there are obligations (eg Sections 24 and 29 of the Act) to notify, receive and consider comments and in some cases negotiate with traditional owners in relation to acts which may affect native title. Obligations under the Native Title Act may vary according to the type of activity proposed, whether the area to be affected is land or sea, and the tenure of the area to be affected. However, the basic proposition is that traditional owners must be consulted about activities that are proposed to be undertaken on their traditional lands and/or waters.

Traditional owners consider that 'best practice' consultation would necessarily involve comprehensive notification and negotiation towards an agreement between the relevant community and the proponent such that the activity may proceed.



In the event that the obligations under the Native Title Act are not observed, activities are 'invalid' to the extent that they affect native title. This means that the proponent does not have the certainty that they can proceed with their proposals if they do not observe this legislation.

Division 3 of the *Native Title Act* 1993 contains the relevant Future Acts provisions in relation to Box-Ironbark land and resource issues, which will need to be observed in order that activities are valid under the Native Title Act.

The following provisions may be particularly relevant:

- section 24DA (Indigenous land use agreements (alternative procedure agreements))
- section 24KA (facilities for services to the public)
- section 24FA (future acts where procedures indicate absence of native title);
- section 24IA (acts involving renewals and extensions etc. of acts);
- section 24JA (acts involving reservations, leases etc.);
- section 26A (approved exploration etc. acts).

A flow chart describing the Future Acts process is provided at Attachment 1.

Communication of legislation

It is imperative that the Government must notify non-government land and water organisations of the legislation that must be adhered to. The Government should also communicate to organisations the relevant Acts and the penalties that can be enforced when breaching these Acts.

These Acts provide for regimes whereby Victorian Aboriginal people take part in the preservation of their cultural heritage by being members of committees that advise Ministers, as inspectors with wide-ranging powers, and as members of Aboriginal organisations that are responsible for managing cultural heritage issues within their areas. Land and water organisations must devise a similar regime for the management of land and water issues. This regime would allow Aboriginal people to have a say in caring for their country and be involved in the management of their country.

Native title and Indigenous Land Use Agreements

The Bracks Government has announced that an approach of negotiation and mediation, rather than litigation, would be taken in relation to native title claims in Victoria. The intended outcome, Indigenous Land Use Agreements, would not necessarily involve recognition of native title. Native title claimants have a 'right to negotiate' over matters which may affect their rights, for example, with mining companies regarding proposed exploration or mining programs. This does not require formal recognition of native title. Aboriginal people may 'use and enjoy' native title land, waters and resources, including biological resources. A recent High Court decision¹ effectively confirmed the right of traditional use by claimants.

Traditional owners in the study area prefer to negotiate at a direct level, rather than have decisions about land and water management being decided in a court of law. Some cases have taken over five years to get to the negotiation stage, which has proven costly in many ways. Indigenous Land Use Agreements allow traditional owners to be involved.



Native title

Aboriginal association with the investigation area is significant, and Aboriginal communities continue to assert their association with all of their ancestral areas. Aboriginal spiritual and cultural connection to the land and water is intrinsically connected to the natural environment. The exercise or enjoyment of native title rights and interests includes hunting, fishing, gathering, and cultural or spiritual activities.

Under the *Native Title Act 1993* Aboriginal people can claim native title on Crown lands and waters in their traditional lands. Native title holders (including claimants) must be included in decisions about the use, management, protection, and cultural interpretation of public land and resources.

The existence of native title is not dependent on a claim being lodged. The Native Title Act gives rise to the ability of native title holders to negotiate over matters which may affect their native title rights and interests before formally receiving recognition. The National Native Title Tribunal supports negotiated agreements.

Indigenous Land Use Agreements

¹An Indigenous Land Use Agreement, or 'ILUA', is a voluntary agreement made between native title groups (who hold or claim to hold native title) over a particular area and other people or organisations such as governments, miners and other commercial industries, about the use of land and waters in a particular area.

ILUAs allow people to negotiate flexible and pragmatic agreements. They allow parties to formally agree about how things which will work on the ground. Once registered, ILUAs bind all the parties and all persons claiming to hold the native title to the terms of the agreement.

ILUAs are an important tool for dealing with native title in Australia. They are flexible, cater for local needs and offer legal certainty. Negotiating ILUAs is the preferred option for most Victorian Aboriginal communities. What distinguishes an ILUA from other kinds of agreements is that it may be registered on the Register of Indigenous Land Use Agreements (the Register). A registered ILUA binds all persons who hold native title to the terms of the agreement, whether they were party to the agreement or not. It may also limit compensation for certain native title parties to the terms negotiated under the ILUA.

Having an ILUA registered may provide increased certainty about the matters agreed upon. There are three different kinds of ILUAs:

- area agreements
- body corporate agreements
- alternative procedure agreements.

Other organisations

Aboriginal Affairs Victoria

The identification, protection and management of Aboriginal places in Victoria is primarily the responsibility of Aboriginal Affairs Victoria (AAV), an agency within the Victorian Department of Natural Resources and Environment. The Heritage Services Branch of AAV has responsibility for the

¹ National Native Title Tribunal Website: www.nntt.gov.au/ILUA October 2000



investigation, interpretation, protection and management of Aboriginal cultural and archaeological heritage. This branch administers Victorian, and Commonwealth-delegated, Aboriginal cultural heritage legislation such as:

- *Archaeological and Aboriginal Relics Preservation Act 1972*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984.*

Aboriginal heritage places have protection under these Acts. This protection applies whether or not the place has been identified and registered. Consent must be obtained prior to carrying out any potentially damaging activity on or near a registered Aboriginal place. It is also an offence to damage Aboriginal artefacts, or to excavate land for the purpose of finding artefacts, without prior consent from local Aboriginal community organisations.

Exploration and mining licence applications must be referred to AAV under the *Mineral Resources Development Act 1990*.

AAV maintains databases of known Aboriginal heritage places relating to the pre- and post-contact periods. This inventory is incomplete for much of the Box-Ironbark study area. AAV must be notified about the discovery of pre- and post-contact Aboriginal places.

AAV works with Aboriginal communities, other Commonwealth and State Government agencies, local government and the private sector to promote consideration of Aboriginal cultural heritage in the context of relevant policy initiatives and programs, especially those relating to land management.

Cultural heritage programs

Overarching the network of local Aboriginal communities, a statewide cultural heritage program is in place. This program, set up by AAV, divides Victoria into 5 regions. Local Aboriginal communities are placed within one of these administrative regions. The regional bodies act as resource agencies in cultural heritage matters within their regions, and can be a useful source of information and contacts. These regional bodies have a strong interest in Aboriginal cultural heritage and should be contacted when work is being undertaken within their administrative boundaries.

Cultural heritage boundaries

The Commonwealth legislation that defines existing cultural heritage boundaries needs to be amended to reflect the Victorian tribal boundaries and to involve traditional owners. There are groups within Victoria that are not represented within these boundaries, and consequently their cultural heritage is inadequately protected. There is also a lack of resources for protection and research.

Some cultural heritage programs have recommended that each Aboriginal organisation responsible for cultural heritage should work together so that the boundaries do not continue to limit their responsibilities.



General recommendations

Consultation, involvement and management protocols

While traditional owners commend the ECC recommendations regarding consultation, they believe that consultation is the first step in being involved in land and water management. Aboriginal people genuinely want to have the opportunity to have an impact and be involved in every stage of land and water management.

Development has had a devastating effect on Aboriginal sites. Generally, recognition is not given to the Aboriginal communities' need for input and involvement in the process of planning and implementation. Generally, there are no specific provisions for Aboriginal consultation or involvement in land and water management groups. Planning or development by an organisation (state, federal, private and public) should involve consultation with the relevant traditional owners before decisions are made to proceed.

In the past, traditional owners have seen consultation as 'tokenistic' and futile. This is due to the fact that traditional owners are asked to provide comments, and recommendations, which are very rarely heard, let alone implemented. Many government and non-government agencies talk about the importance of consultation with Aboriginal people in various reports (for example, the Regional Forestry Agreements) but rarely is this put into practice. It is also of concern that recommendations made by traditional owners are often used as leverage to implement government decisions.

All organisations involved in land and water management should work together with traditional owners and strive for similar outcomes and goals. There are many benefits associated with establishing joint management structures that would embrace Aboriginal involvement. They would:

- enable Aboriginal people to be directly involved as equal partners
- provide Aboriginal people with an equal share
- allow direct representation in the management and use of land and water areas
- allow protection of Aboriginal culture (sites, places etc)
- educate non-Aboriginal people about Victorian Aboriginal culture (past and present)
- incorporate traditional practices into modern land and water management practices
- provide a different perspective to land & water management projects and principles
- present potential solutions to address environmental degradation.

It is the responsibility of governments to communicate and promote cooperation, negotiation and inclusion of Aboriginal people in land and water management. The Victorian Government, with traditional owners, need to develop principles, protocols and procedures for planning, negotiation and management, and for handling key sensitive issues that may arise. Aboriginal people should also be appointed to land and water management planning bodies where policy decisions are made, and employed in positions in land and water agencies responsible for implementation and management. Currently there are a few organisations throughout Victoria working at a local level with traditional owners.



The Government should amend existing legislation or develop new legislation that embraces the above principles. Various models and protocols exist in Australia and overseas. These models present successful working relationships and professional land and water management agencies.

It is acknowledged that the recent *Protocol for the Negotiation of a Native Title Framework Agreement for Victoria* (see Attachment 2) signed by the State of Victoria, Aboriginal and Torres Strait Islander Commission and Mirimbiak Nations Aboriginal Corporation goes a long way to addressing some of these issues.

Consultation

Consultation with traditional owners should be part of the normal process for all government and private sector land and water planners and managers. Consultation protocols should be implemented prior to any planning and development of any land and water areas. In the past Aboriginal people that have been consulted on various projects have found that their issues or recommendations were not heard or addressed. Consultation should allow Aboriginal people to have a 'real' say.

Negotiation

Fundamental to consultation taking place is that traditional owners need to be recognised and respected as equal parties at the negotiation table. Access to resources and the perceived power of the parties needs to be acknowledged and 'evened-up'. Establishing Terms of Agreements, ILUA's and Memoranda of Understanding are some of the mechanisms that could be used as negotiation tools.

Representation

Government agencies should appoint and resource Aboriginal people so there is representation and contribution at this level. There are few Aboriginal people appointed to land and water planning bodies, or policy-making committees. Aboriginal interests cannot be truly represented or heard if there is no Aboriginal person involved on these bodies/committees. Decisions that can affect Aboriginal people and their culture should not be made without involving the relevant traditional owners.

For a consultation process to work effectively it is imperative that Aboriginal people are involved in the decision-making and management of land and water areas. It is futile having an Aboriginal representative if they have no impact on decisions being made. Often Aboriginal representatives sitting at a table are the only people not being paid to be there. This issue needs to be addressed where it is relevant. Also, often representatives do not have the institutional support behind them that other representatives have. Another key concern for Aboriginal representatives on committees and boards is the extent to which they listened to, and their concerns taken into consideration and acted upon. It is not uncommon for Aboriginal representatives to stop attending meetings because they are not taken seriously. Committees and boards need to have a genuine commitment to change and embrace the incorporation of Aboriginal concerns in their activities.

It is often difficult for Aboriginal representatives to undertake consultation with their community as this work is generally performed in their own time (voluntarily), and hence with little or no funding or resources. Organisations should be aware of this issue in the appointment of Aboriginal people onto land and water management boards and committees.



Employment

Aboriginal people should be employed at a local, regional and state level so that they can have an overall impact on major decisions made regarding land and water implementation and management. Currently there are very few Aboriginal people involved or employed in the management of land and water resources. Opportunities for employment should be provided for Aboriginal people to work in identified positions by government and non-government organisations. There needs to be a clear policy to implement Aboriginal employment; for example, designated Aboriginal liaison positions, Aboriginal employees placed together, career paths, permanent positions, training and education to name a few elements of such a policy.

Provision of information

For Aboriginal people to make informed decisions and recommendations, all relevant information should be provided at the commencement of a consultation process. This information should be available in an accessible form and upon request. Examples of relevant information that should be provided are:

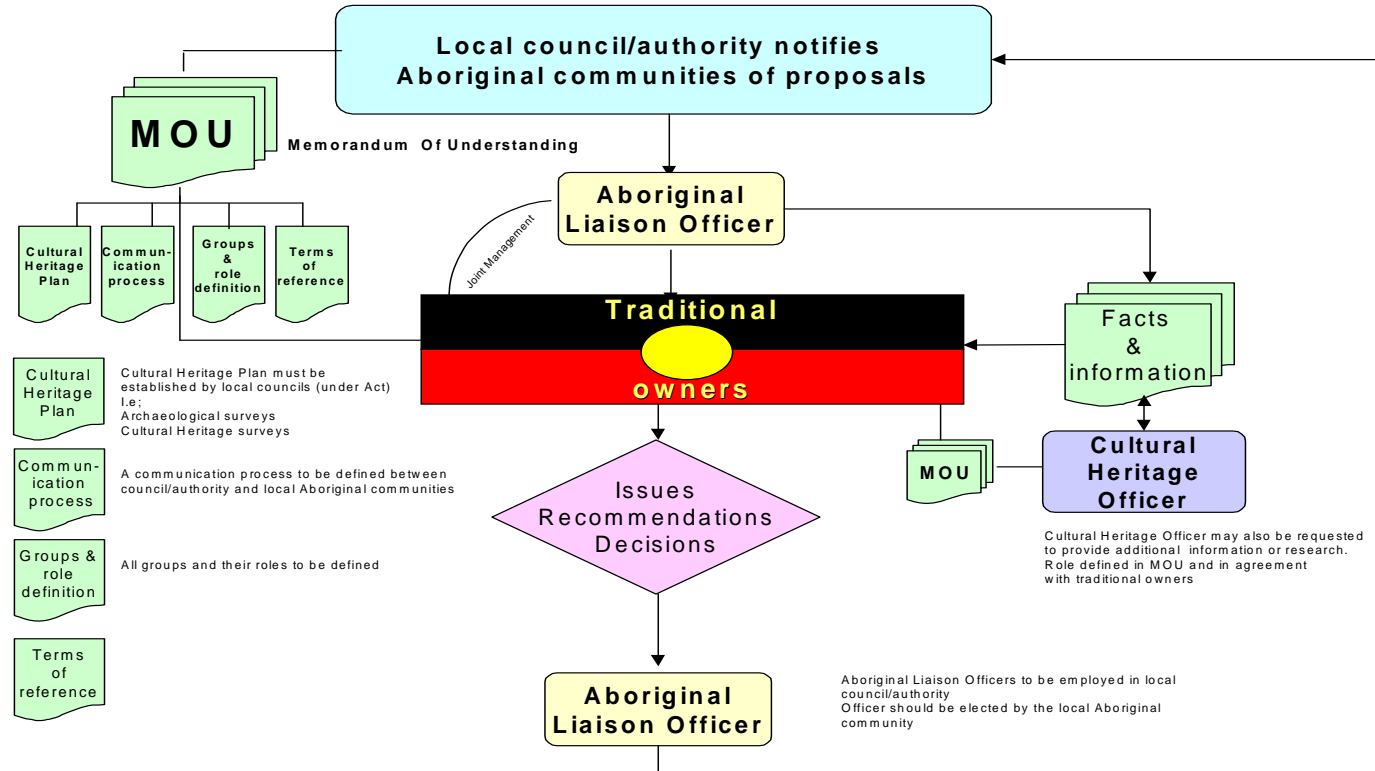
- site reports (eg vegetation, visitor numbers, etc. of the proposed site)
- all relevant cultural heritage/archaeological surveys/impact assessments
- financial statements (stakeholders, economic gains, value of works)
- licence/lease numbers and types
- supporting infrastructures to be developed (where, when and purpose)
- reporting on a regular basis on the status of areas, for example vegetation growth, number of visitors to area, status of flora and fauna.

Site visits

Site visits must be performed before a recommendation can be formulated. Site visits give an opportunity for the affected people to obtain a clearer interpretation of the proposed plan/development and be able to make more informed decisions. Site visits must also be resourced by the developer and authorised by the traditional owners. This will then prevent adverse impacts on Aboriginal cultural heritage and the environment.

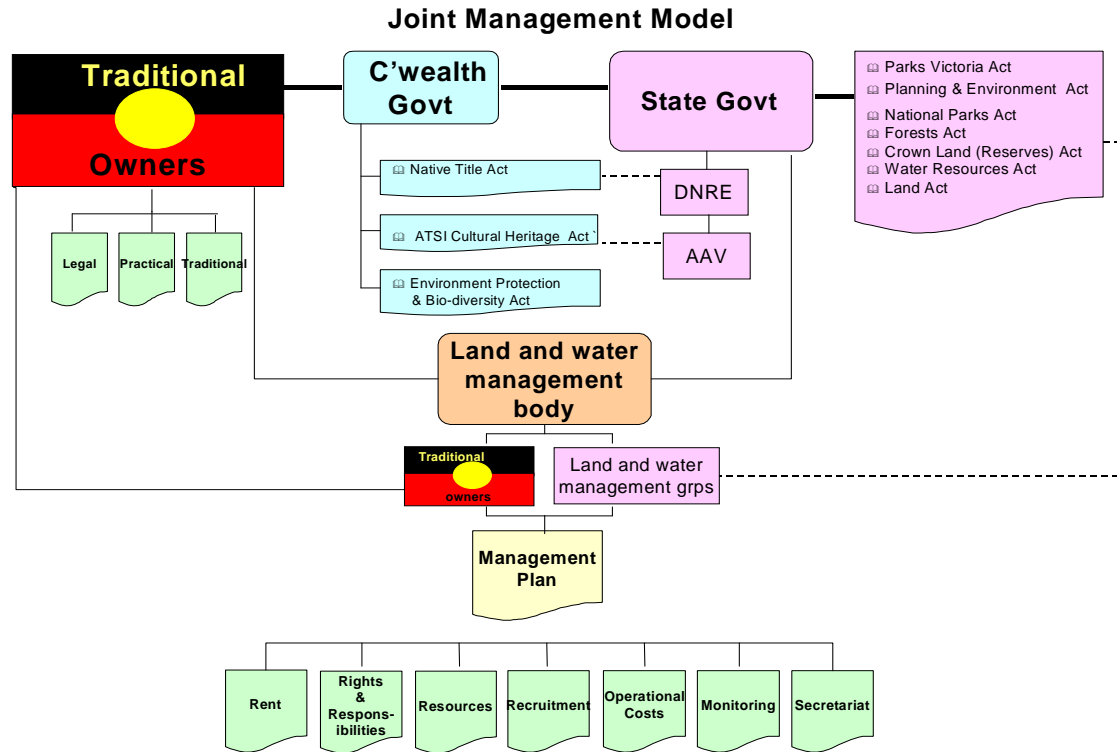


Traditional owners have proposed models similar to the following consultation and negotiation process. This particular model is working successfully with various local councils in the Western region. It is acknowledged that this type of process is more relevant at a local level rather than at a state level.





The following is an example only of a joint planning model. MNAC recognises that there is no one board of land and water management and that there are other relevant legislation and agencies.



* Joint management means equal voice, share, equal resources



Land, water and resource rights

The health and biodiversity of this country is the result of thousands of years of Aboriginal land and water management that includes ceremony, hunting, harvesting, burning and fishing. There needs to be government recognition of the land, water and resource management aspects of Aboriginal culture in Victoria. Recognition includes the integration of Aboriginal land and water cultural practices into government protocols and legislation.

Changes need to occur to legislation to give protection to, and recognise the rights of traditional owners' rights to access the land, water and resources for family, economic and ceremonial practices without incurring prosecution or having to acquire a permit. Other states, notably New South Wales, have already given recognition to this right. Many places are of cultural significance and traditional owners use these places. A fundamental practice for Aboriginal people is to respect and nurture the environment. Aboriginal people are prevented from performing this tradition due to enforced restrictions and lack of consultation and involvement from some of the current organisations involved.

Aboriginal people continue to practise their culture in the study area today and should not be restricted from doing so. Aboriginal permit systems that protect biodiversity are working in other parts of Australia. Requiring traditional owners to obtain a licence to access land and waters to continue these practices should not be necessary.

Exploitation of knowledge, sites and resources

Despite the Section 24 notices (see page 21 for more information) submitted by various groups focussing their activity around the study area, such as tourism groups and government agencies, exploitation still occurs throughout Victoria's national parks. Unfortunately not all groups are adhering to the Section 24 process. They are continuing various forms of exploitation such as building walking tracks, 4WD tracks, roads, caravan parks, toilet blocks and other various facilities without notification and consultation. Preference and priority is given to activities of this nature without consideration of Aboriginal peoples' views about such commercial or recreational use and its impact on the cultural heritage places within these areas.

There are culturally significant sites located in the study area, such as Yeddonba art site in Mount Pilot and Bunjil's cave near Stawell. It is important that sites like these are authorised and interpreted by the traditional owners and that they decide whether sites are suitable for the public to have access. Before a site is revealed to the public, it is imperative that the process involves the traditional owners' permission to do so.

Tourism

Tourism is a growing industry in Victoria. There are many more developments being conducted for tourism purposes in national and state parks than ever before. With the increase of tourism there is also a higher risk of damage to Aboriginal culture and the environment. There is often significant exploitation of Aboriginal culture in tourism. Some tourism operators are promoting and exploiting Aboriginal culture to increase their own financial gains. The local Aboriginal community must be the authorising body in any instance where there is promotion of Aboriginal culture.

Appendix 5

Potential Social and Economic Effects of Recommendations for Victoria's Box-Ironbark Forests & Woodlands Area

Stage 3

Executive Summary

Prepared for the
Environment Conservation Council

By
Midas Consulting

May 2001



Aboriginal people should have the right to speak in the interpretation and promotion of their culture. Any cultural interpretation (intellectual and physical) must be authorised by the local Aboriginal community and preferably conducted by an Aboriginal person.

Only Aboriginal people should be authorised to conduct traditional practices. Non-Aboriginal organisations should not be benefiting financially from something that is not theirs. Aboriginal people want to provide opportunities to negotiate with the relevant organisations.

Tourism organisations and operators should employ Aboriginal tour guides to conduct cross-cultural tours and training for the public and employees.

Where there is an increase in tourism in public land areas there may be detrimental effects on the environment and Aboriginal culture (sites, middens etc). Areas need to be assessed to avoid damage and destruction to Aboriginal culture and the environment.

A percentage of financial gains made from tourism could be spent on preventing damage to these areas.

Economic sustainability and development

Traditional owners should be assisted and involved in the business opportunities of land and water resources. There should be the appropriate promotion of Aboriginal business ventures. Sharing in the economic benefits of tourism and other industries is also an issue. Sharing in the economic benefits would assist in the provision of funding for programs to be run by Aboriginal communities for purposes such as:

- cultural heritage management
- environmental management
- land and water management
- cross cultural training.

Signage and acknowledgment

Acknowledgment of the traditional owners and their traditional names should be included and displayed on park signage boards. This would educate non-Aboriginal people about the parks they are entering into, and the Aboriginal people of that area. The details of each park board would be discussed at a local level with the traditional owners. A park board could display:

- a map of the park
- activities (permitted and prohibited) in the park
- the name of the traditional owners
- a brief history of the area
- archaeological site information (including what to do if you find a site, types of sites and contact details).

Land and water access

Where areas are difficult to access there needs be further investigation as to whether tourist access is appropriate, and if there are alternative methods of access. For example, are people walking off designated paths and damaging or destroying protected or sensitive areas.



Traditional burning – Fire management

Fire is a key element to Aboriginal spiritual and social life. Aboriginal people have an ongoing and fundamental relationship with fire. Aboriginal people have practised fire management for thousands of years. Colonialism and European settlement impacted on traditional fire burning performed by Aboriginal people to a point where it has now almost ceased in Victoria. Many Aboriginal communities throughout Northern Australia undertake fire management regimes.

Burning practices in some areas contribute to the distribution of fire-dependent and fire-sensitive species. Fires started by lightning fires and long-term changes in climate provided the setting for the evolution of flora and fauna of this land for millions of years. In some areas fire-dependent flora and fauna species have been affected due to the cessation of Aboriginal fire regimes. There is a significant difference in the vegetation structure between environmentally similar sites that are occupied and unoccupied by Aboriginal people.

The Aboriginal approach to fire management is different to non-Aboriginal practices. If public lands are to be managed sustainably, it is crucial that the involvement and incorporation of Aboriginal people and their fire knowledge be included in non-Aboriginal fire management practices.

At the recent Fire Symposium held in Hobart in May 2000, the Victorian Aboriginal delegates recommended that a similar symposium that embraces and builds upon Victorian Aboriginal fire knowledge be held.²

² Native Solutions Fire Symposium September 2000



National and state park recommendations

Comments on the general recommendations for national and state parks

That the national and state parks shown on Map A

(a) be used to;

(i) conserve and protect biodiversity and natural processes

- ◆ *This recommendation is supported*

(ii) protect significant historic sites and places

- ◆ *This recommendation is supported. It should also include (Aboriginal and non-Aboriginal historic sites and places).*
- ◆ *Traditional owners must be consulted with and involved in the protection of their sites and places.*

(iii) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments and cultural heritage;

- ◆ *This recommendation is extremely important. Aboriginal cultural interpretation must be authorised and conducted by the traditional owners.*
- ◆ *Cross-cultural training should be given to all people involved in the park such as park employees, developers and visitors.*

(iv) protect natural landscapes

- ◆ *Traditional owners support this recommendation and request involvement in the protection of the parks*

and that:

(b) the following activities generally be permitted:

(i) apiculture on licensed sites, subject to the outcome of research into the ecological impacts of this industry, and park management requirements;

- ◆ *Apiculture must remain controlled and there should be further research into the effects of apiculture on the environment.*
- ◆ *Traditional owners should be included and involved in the management of these areas.*

(ii) bushwalking, car touring, mountain and trail bike riding on formed roads, picnicking and camping;

- ◆ *Proposed roads and trails must be surveyed prior to any development. Strict penalties must be enforced if visitors are found taking alternative routes other than the formed ones.*

(iii) nature observation, bird watching and visiting historic features;

- ◆ *This recommendation is supported as long as cultural sites are not disturbed.*

(iv) orienteering and rogaining; and

(v) research subject to permit;

- ◆ *This recommendation is supported.*

and that:

(c) in accordance with the ecological management strategy proposed in Recommendation R11 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees; and



- ◆ *Traditional owners have reservations about ecological thinning as this is seen by some groups as another form of logging. However, if it can be proven to be of benefit to the forest structure and its ecosystem, this view may change. Traditional owners want to be consulted about any research which takes place, and if thinning is to be implemented, traditional owners should be consulted and involved in the process.*
- ◆ *It is also recommended that traditional practices be considered and implemented.*

and that;

(d) the following activities not be permitted:

(i) harvesting of forest products including eucalyptus oil, grazing by domestic stock, hunting and the use or possession of firearms; and

- ◆ *Domestic permits need to be controlled by the land managers in conjunction with the traditional owners.*
- ◆ *Traditional owners do not support commercial timber harvesting or domestic firewood collection in the area.*

(ii) exploration and mining, other than continuation of operations within existing licences, as approved; and

- ◆ *Current mining licences in the area must be monitored and cultural heritage surveys be completed prior to any further exploration licences being permitted.*
- ◆ *Traditional owners do not support the re-issuing of mining licences. Traditional owners should be involved in the authorisation of any permits.*
- ◆ *If mining is to continue it must be controlled and mining companies must repair and re-vegetate the site to its original state. If a mining company is found not to do this they must receive large penalties.*

(iii) metal detecting, prospecting, fossicking and gold panning;

and that:

(e) they be included on a schedule to the National Parks Act 1975, and managed by the Department of Natural Resources and Environment

- *This recommendation is supported. Traditional owners request involvement in the management of these parks.*

State parks

Except for parks where specifically excluded, metal detecting (prospecting) be permitted in designated zones defined in Park Management plans

- ◆ *Traditional owners support the prospecting zones. These zones must be adequately surveyed prior to any further prospecting or permits.*
- ◆ *Prospectors should be given cross-cultural training prior to obtaining a permit.*



Regional park recommendations

Comments on the general recommendations for regional parks

That regional parks shown on Map A (numbered C2 to C9)

- (a) be used;
- (i) for informal recreation associated with the enjoyment of natural surroundings by large numbers of people;
 - *Recreation activities and visitor numbers should be monitored and controlled*
 - (ii) to conserve indigenous flora and fauna, and natural features
 - *This recommendation is supported.*
 - *Should re-introduce endangered indigenous flora and fauna.*
 - (iii) to protect features of historical or cultural significance
 - *Strong support for this recommendation*
 - *Aboriginal historic sites and places must be protected.*
 - (iv) for apiculture and recreational prospecting, where consistent with (i), (ii) and (iii) above, and subject to the approval of the land manager
 - *Apiculture and recreational prospecting must be strictly monitored and controlled.*
 - *Authorisation for these activities should involve traditional owners in conjunction with the land manager.*
- (b) not be available for timber harvesting or grazing
- *Strongly support this recommendation.*
- (c) be subject to a management plan with zoning to protect biodiversity and significant features;
- *Traditional owners should be represented in the management planning process.*
 - *Cultural heritage zones should also be introduced.*

and that:

- (d) in accordance with the ecological management strategy proposed in Recommendation R11 (Chapter 4), dense eucalypt regrowth be thinned to enhance the growth of retained trees;
- *Traditional owners have reservations about ecological thinning as this is seen by some groups as another form of logging. However, if it can be proven to be of benefit to the forest structure and its ecosystem, this view may change. Traditional owners want to be consulted about any research which takes place, and if thinning is to be implemented, traditional owners should be consulted and involved in the process.*
 - *Traditional practices should be considered and implemented.*

and that:

- (e) regional parks be reserved under the *Crown Land (Reserves) Act 1978*, and managed by the Department of Natural Resources and Environment, except where otherwise specified.
- *Traditional owners should be involved in the management of these areas in conjunction with NRE.*



Conclusion

Aboriginal culture is one of the longest continuing cultures in the world. Hundreds of generations of living with the land have allowed Aboriginal people to come to know the environment as the central part of their culture. For thousands of years Aboriginal peoples have used Australia's indigenous biological resources for sustenance, medicinal, cultural and other purposes. These traditional practices continue today, albeit often in more contemporary forms.

Aboriginal peoples assert a right to access land and waters for the continued enjoyment of cultural and spiritual practices including education, cultural heritage protection, hunting and gathering of traditional Aboriginal foods, fishing and gathering of traditional Aboriginal tools, medicines, ceremonial and cultural items.

Generally, the Victorian Aboriginal people wish for their connection to country to be recognised and respected, and their rights and interests to be protected and enhanced. It is only natural that this occurs in any holistic, integrated approach to land use and management, particularly in regards to the protection of Australia's biological diversity and the sustainability of future commercial developments.

References

- ECC Box-Ironbark Resources and Issues Report (1997)
- ECC Box-Ironbark Forests & Woodlands Investigation Draft Report (2000)
- MNAC Submission to the ECC (1998)
- Museum of Victoria Website
- Native Solutions Fire Symposium Proceedings (2000)
- Workshop Minutes - Copies of minutes available upon request from Mirimbiak Nations Aboriginal Corporation Phone: (03) 9326 3900

Acknowledgments

Thank you to all Victorian traditional owners, communities and organisations for contributing a great amount of effort and knowledge to this report. Your participation has been essential to the advancement of Aboriginal people's involvement in land and water planning and management.

INTRODUCTION

This summary has been prepared for the Environment Conservation Council (ECC) by Midas Consulting. The report provides an assessment of the potential social and economic impacts which may arise from implementation of the ECC's *Box-Ironbark Forests & Woodlands Investigation final recommendations*. Copies of the full report are available from the ECC. Many people assisted the consultants during this study and they are acknowledged in the full report.

The objectives of the study were:

- to identify and assess the effects of the ECC's revised recommendations on individual operators
- to estimate the potential social effects, including employment gain or loss, of the revised recommendations at the local and State level
- to modify the social benefits and costs including environmental benefits and costs arising from the ECC's Draft Report recommendations as identified in the Stage 2 report, to take into account ECC's revised recommendations and new information

The report draws on previous studies commissioned by the ECC and provides updated assessments of the impacts on individuals and communities potentially affected by the ECC's recommendations.

The emphasis for this consultancy is on benefit cost analysis, which determines whether there is a net gain or loss to the economy from the ECC's recommendations. The loss in net economic contributions of the industries affected is calculated as part of this exercise.

A regional impact analysis is also provided, which identifies the effects of the ECC's recommendations on communities in the study area. The regional analysis is concerned with economic activity — in particular, expenditures, gross incomes, and jobs.

As a generalisation, benefit cost evaluations from the viewpoint of the Victorian economy will be concerned with changes in net economic value or net economic contribution while evaluations from the viewpoint of the region will be more concerned with changes in economic activity.

The report includes a discussion of the implications for biodiversity conservation, tourism and recreation, commercial timber harvesting, gold mining and prospecting, and eucalyptus oil production. Assistance measures to mitigate any negative impacts on individuals and communities are also considered.

As part of this study, a socio-economic survey was completed for a sample of those primary producers likely to be adversely affected by the ECC recommendations, including 27 timber cutters, 4 eucalyptus oil producers, and 5 small-scale gold miners and prospectors.

An employment survey of 26 timber cutters focused on the labour requirements for producing timber products, in order to more precisely estimate the effect of the ECC's recommendations on jobs in the timber industry.

A socio-economic profile of the region is included in the full report and examines: population levels and trends; employment structure; income levels; and unemployment levels and trends

BIODIVERSITY VALUES

The four main reasons for preserving biodiversity relate to: ecosystem processes and environmental health; ethical views with respect to species extinction; aesthetic and cultural values; and economics. Economic values include use values — such as recreation and tourism in areas of natural beauty; and non-use values — such as the value people get from simply knowing that a species or ecosystem is to be protected. Many Australians place high values on native plants and animals and are willing to pay for their preservation, whether or not they actually visit the protected areas. Biodiversity also provides a genetic pool for use now and in the future in agriculture, forestry, medicine, and other industries.

Over the past 200 years, fragmentation of the forests and woodlands within the study area has led to their inevitable decline in terms of species diversity and relative abundance. The original Box-Ironbark forests and woodlands covered some 3 million hectares from Wodonga in the east to Stawell in the west. Today, only about 500,000 hectares (17%) of the original area remains (Appendix 3, ECC Final Report). However, in terms of the Box-Ironbark Forest Ecological

Vegetation Class (EVC), approximately 208,000 hectares (51%) remains out of an original 411,000 hectares. The ECC recommendations would lead to protection of approximately 17.6 per cent of the original extent of Box-Ironbark Forest EVC, 2.5 % of the original extent of Grassy Woodland EVC, and only 0.3 % of the original extent of Plains Grassy Woodland EVC.

The significance of the Box-Ironbark ecosystem has been recognised by the Australian Heritage Committee with the inclusion of several remnant areas of Box-Ironbark on the National Estate Register.

A description of biodiversity features in selected proposed parks and reserves is included in the full report.

A consistent response from industry and recreational users of Box-Ironbark forests interviewed in the Stage 3 survey was that they considered that their practices did not compromise the biodiversity values in the forests, and in fact that they had enhanced biodiversity values in recent years through improved forest management practices. The respondents were proud of their knowledge of, and care for, the forests. If some of these people are displaced as a result of the ECC recommendations, employment in forest stewardship roles would clearly be a desirable possibility. All respondents rated the biodiversity issue as either very important or important. None of the respondents believed that their practices were incompatible with biodiversity conservation.

There is little doubt that forest management practices have improved in the past 20 years and are likely to keep improving (although cuts to staff and resources have hindered this improvement, in the view of many people that we interviewed). In addition, forest extractive uses and biodiversity values are not always incompatible, and there may even be areas of complementarity. Partly for these reasons, the non-use values attached to biodiversity conservation as a result of the ECC recommendations were reduced in the pessimistic and conservative scenarios in the benefit cost analysis.

Valuation of biodiversity

Native animals, plants and other natural resources can have economic value because:

- people use them (i.e. they have ‘use values’ such as those associated with harvest of honey, minerals, timber, recreation etc.) or
- people value their existence, even if they do not use them (i.e. they have ‘non-use values’).

Each of these classes of value is a legitimate component of the economic welfare derived from the preservation and use of natural resources. However, the non-use values are sometimes referred to as *non-market values* because they are not traded in markets in the same way as other goods and services and therefore do not attract market prices. Some of the use values, such as recreation, may also fall into the non-market category.

People are willing to pay to conserve and protect natural resources. This principle of willingness to pay (WTP) underlies the idea of the demand for environmental goods and services and forms the basis of several widely-used methods to value unpriced benefits, the best-known of which are the travel cost method (TCM), the contingent valuation method (CV), and choice modelling (CM). The full report includes a description of the CV and CM methods used to estimate non-market values.

Although there have not been any comprehensive valuation studies of the Box Ironbark forests in the study area, several contingent valuation studies considering the values associated with forest preservation have been undertaken in Australia and overseas. These studies provide approximate economic values of the worth of preservation of particular forests:

The Stage 2 report reviewed a number of studies and estimated conservative values of between \$1m and \$2m per year for the non-use benefits of the ECC recommendations captured by Victorians. These values are equivalent to \$0.75 and \$1.50 per household per year and are well below those estimated in most studies.

A study by Lockwood is of greatest relevance to the ECC study. It included market and non-market valuations of conserving remnant native vegetation (RNV) on private land in north-eastern Victoria and overlaps the ECC study area, containing the forested areas to the east of Wangaratta around Chiltern and Beechworth.

Lockwood used two stated preference methods, contingent valuation (CV) and choice modelling (CM), to assess the non-market economic values of remnant native vegetation (RNV) in the two study areas. Each of these methods involved the use of mail surveys of approximately 600 Victorian voters to determine community willingness to pay (WTP) for RNV conservation.

The economic estimates from the two methods were not significantly different and resulted in values of \$4.25m per year for Victorian voters, or \$6.90m per year for all Victorian households. It is likely that Victorians would be willing to pay more for biodiversity conservation in national and state parks than in remnant native vegetation areas on private land so these values are likely to be conservative.

For the purposes of the benefit-cost analysis, non-use values for biodiversity are assumed to be \$1m per annum for the pessimistic case, \$2m per annum for the conservative case, and \$4m per annum for the optimistic case. These values are all well below those found in most studies but are discounted because of the difficulties in transferring results from other studies, and because (as mentioned earlier) modern forestry practices may deliver some of the benefits of biodiversity protection, even in the absence of the ECC recommendations.

Non-use values, by definition, do not directly create jobs. Also, willingness to pay for the values does not mean that people actually pay. It is relatively common in the USA for conservationists to directly pay for the preservation of ecosystems but it is less common in Australia. In the case of the ECC recommendations some people currently working in the forests may lose their livelihoods if government accepts the recommendations. Conservationists (and others) on the other hand potentially gain at little expense to themselves. In the consultants' view there is a strong case for financially assisting those who are disadvantaged by the ECC's recommendations.

Administrative responsibility for managing recreation on land proposed to be included in a new Park or Reserve will be transferred from NRE (Forests Service) to Parks Victoria. Parks Victoria have higher management costs with respect to visitors because of the higher level of facilities and promotion associated with Parks and Reserves compared with State Forest.

NRE and Parks Victoria would retain responsibility for fire protection, management of pest plants and animals, and researching ecological management, as appropriate, hence those costs should not be affected.

For the purpose of the benefit cost analysis we have assumed additional park management costs of \$400,000 per year. There may be some reduction in the number of NRE staff and increases in the number of Parks Victoria staff if the ECC's recommendations are adopted. Using the relationship of one job per \$100,000 expenditure, as used elsewhere in the report, this would imply that an additional four jobs would be created.

TOURISM AND RECREATION

The following tourism and recreational activities take place on public land in the study area:

bushwalking (overnight)*	guided tours*	picnics and barbecues*
camping*	horseriding*	prospecting**
car rallies**	hunting**	trail bike riding*
car touring*	moto-cross	visiting historic features*
cycling*	nature observation*	walking and running*
four-wheel driving*	orienteering and rogaining*	walking dogs**

Those with an asterisk will continue to be permitted activities in the national and state parks recommended by the ECC, although it should be noted some have been or will be subject to conditions. Those with a double asterisk will be allowed in certain areas or under defined circumstances.

Feral animals are a significant problem for park and state forest management and there may be a case for periodic organised hunts supervised by Parks Victoria in suitable locations.

Prospectors were distrustful of promises that they would be allowed in most areas of the parks (other than national parks) — based on previous experience of changes in government policy. This an important issue as approximately 20 per cent of tourism to the area is associated with prospecting.

Designation as a Park and subsequent marketing is normally expected to increase visitation to public land. However, the Parks in the study area are generally low key and receive little marketing compared with Victoria's icon Parks such as the Grampians and Wilson's Promontory.

Nevertheless, the Box-Ironbark forests and woodlands are the setting for many visits by tourists:

- Many of the cultural heritage attractions of the area are located in forest reserves.
- People visiting friends and relatives may use the local forests for recreational activities.
- Tourist drives (the Goldfields touring route, the Sunraysia Highway etc) travel through Box-Ironbark forests.
- Forest scenery provides the setting for historic gold towns such as Maldon and Beechworth.

The contribution of the Box-Ironbark forests and woodlands on public land to tourism in the region is likely to be significant. A description of tourism and recreation features for selected proposed parks and reserves is included in the full report.

Visitor numbers to parks and reserves

The Stage 2 study derived estimates of existing visitation at 17 sites of relevance to the ECC's recommendations. The estimates of visitor numbers have been derived from two main sources:

1. Wherever possible, visitor numbers to particular parks and reserves were taken over the two years 1996/97 and 1997/98 from a database provided by Parks Victoria.
2. Estimates of visitation to particular sites in State Forests have been taken from a database compiled for the Department of Natural Resources and Environment

An exception is that the estimates for the Bendigo sites represent guesstimates by the Stage 2 consultants, made after discussions with rangers of Parks Victoria who have observed, but not counted, visitors to the areas of State Forests and parks/reserves which are adjacent to Bendigo.

It should be noted that the ECC is now recommending that the Bendigo park be upgraded from a regional park to the Greater Bendigo National Park. This gives us more confidence that the estimated increase in visitor numbers will be achieved, at least for the 'pessimistic' or 'conservative' scenarios..

The total visitation to the 17 sites for which data were available is about three-quarters of a million per year. This analysis excludes visitation to approximately 45 smaller parks and reserves for which visitation data are not available: There is no basis for forming even guesstimates of visitation for those parks and their omission is a source of possible under-estimation of tourism benefits.

For reasons discussed in the full report, we have placed the Stage 2 visitor figures in the 'optimistic' case for benefit cost analysis and assessment of economic activity.

The 'pessimistic' and 'conservative' cases reduce visitor numbers substantially for some areas. The 'pessimistic' scenario results in total visitor numbers of 423,000, compared with 767,400 in Stage 2. The 'conservative' scenario results in visitor numbers of 580,500.

Economic valuation of recreation and tourism

The Stage 2 analysis of values associated with the existing and future visitation to proposed parks was deliberately conservative and used the following unit values:

- \$5 per visitor day for visitation to existing State Forests sites; and
- \$12 per visitor day for visitation to all parks/reserves.

By applying these unit values to the estimates of present visitation at each park, it was estimated that the net economic surplus due to the existing level of recreation and tourism at sites affected by the ECC's recommendations would be approximately \$6.5 m per year.

A change in status from State Forest to Park, for example, or from Regional Park to State or National Park, is likely to increase visitation in most instances. The precise scale of change cannot be predicted with certainty, since this depends on a variety of factors including:

- accessibility to major markets
- nature of the scenic resource
- presence of key attractions (including well-known natural or cultural heritage sites)
- potential activities available for visitors (e.g. whether the areas host water sports, major touring routes etc.)
- existing level of investment in surrounding tourist facilities
- expenditure by park managers on facilities and promotion

The Stage 2 study assumed an increase of 30 per cent in visitation following designation as a national park. This assumption is important to the benefit cost analysis and to the analysis of economic activity. It was also criticised during the Stage 3 survey. We therefore submitted the Parks Victoria data to statistical analysis and concluded that the assumption of a 30 per cent increase is probably conservative.

It is emphasised that these are percentage increases over the currently relatively low visitation level, and do not imply that the Box-Ironbark parks attract as many visitors as the Grampians.

However, from a state-wide perspective, increasing visitor numbers for Box-Ironbark parks may be at the expense of visitation to other parks in the state. It is also debatable that all of the increases noted should be attributed to the characteristics of the parks. For example, in the case of the Chiltern-Pilot proposal, it may not be necessary to increase the area of the park to the extent proposed as many tourists may go no further than the Woolshed Falls. We therefore discount the increases to 10 per cent for the pessimistic case, and 20 per cent for the conservative case, while leaving the optimistic case at 30 per cent.

The detailed analyses for the 'optimistic', 'pessimistic' and 'conservative' cases are included in the full report. In summary, the net economic values for tourism that potentially arise as a result of the ECC's recommendations are estimated to be approximately \$0.34m per year in the pessimistic case, \$1m per year in the conservative case, and \$1.9m per year in the optimistic case.

Economic activity: expenditure and employment

An increase in visitation will generate an increase in expenditure by visitors. From the Stage 1 report for this study, the expenditure by visitors to public land is assumed to be as follows:

- Nearby residents account for 35 per cent of all visitors to public land, with an average expenditure of approximately \$10 per person per day.
- Tourists (ie, those travelling more than 50 km) account for 65 per cent of all visitors to public land, with an average expenditure of \$36 per person per day.

In the optimistic case, additional expenditure is estimated to be approximately \$6 million per year. It is estimated that each \$100,000 in expenditure would support one full-time job equivalent. The additional total expenditure would therefore support approximately 60 jobs, located mainly throughout the study area, but also at service outlets along the highway between Melbourne and the study area.

In the pessimistic case, additional expenditure is estimated to be approximately \$1.1m, supporting an additional 11 jobs.

In the conservative case, additional expenditure is estimated to be approximately \$3.1m, supporting an additional 31 jobs.

The towns likely to benefit most from the increase in visitation are Bendigo (as the principal regional centre) and the towns of the north east (Beechworth, Chiltern, Wangaratta, Benalla etc). ECC officers have advised us that the effect on Castlemaine was not able to be quantified as there are no visitor data for the existing historic area, however Castlemaine, which now receives some 80,000 tourist visitors, is also likely to benefit from increased visitation. Smaller increases in visitors are likely for the towns and areas west of Bendigo and Castlemaine.

One way of off-setting some of the potential loss of forest-based jobs and creating employment opportunities to the areas west of Bendigo and Castlemaine would be to establish visitor centres in or near the national parks. Candidate sites might include Maryborough, St Arnaud Range National Park, eg. near Teddington Reservoir, Greater Bendigo National Park, Heathcote-Graytown National Park, and Chiltern-Pilot National Park.

The centres would be located some distance from existing shopping centres and cater to a wide range of visitor needs, including food and dining facilities as well as information on the features of the park. The new visitor centre at the Mt Field National Park, near Westaway in Tasmania is a good model. It is staffed and managed by local people under licence from Parks and Wildlife Service Tasmania, providing employment for about six people. We estimate its capital cost at approximately \$0.75m. The centres would of course, also give a higher profile to the new parks than would otherwise be the case.

While it is important to avoid over-estimating potential tourism benefits from the ECC recommendations, it is also important not to under-estimate them. The best indications are that tourism has already been an economic saviour for many rural areas in Australia, and it is likely to become increasingly beneficial to others. This process will be subject to fluctuations from year to year but the underlying forces include shifts in consumer preferences from consumption of primary commodities to nature-based activities as disposable incomes rise.

TIMBER HARVESTING AND RELATED ACTIVITIES

Approximately 93 per cent of the total timber volume cut commercially in the Box-Ironbark study area (approximately 48,000 m³ per year), is derived from the Bendigo Forest Management Area (FMA). Timber volumes for the Bendigo FMA have been averaged for the five years 1993/94 to 1998-99 as this period represents a relatively stable level of harvesting.

Timber products

Firewood represents by far the major product in terms of volume harvested and employment. The Bendigo FMA supplies approximately 36 per cent of the total quantity of firewood harvested from public lands in Victoria.

Firewood from public lands in the study area represent about 1.7 to 3.5 per cent of the total quantity of firewood consumed in Victoria. Other forest management areas, and firewood harvested from private land and interstate, provide the remainder.

A recent study is pessimistic about future supplies of firewood from interstate and advocates development of a firewood plantation industry in Victoria.

The proportion cut by domestic collectors has declined in recent years to about 40 per cent of average total firewood for 1993/94-1998/99, while commercial cutting has increased to 60 per cent.

We estimate that the net economic contribution of firewood is about \$295,000 per year for harvesting 42,000 m³. The net economic return includes commercial and domestic firewood, based on the assumption that the net value to domestic collectors is the same as that for commercial firewood. The Stage 2 report only included commercial firewood in analyses.

The main cost of firewood harvesting is labour. We estimate employment of 43 Full-Time Equivalent (FTE) commercial cutters, where a full-time equivalent person is assumed to work a 38 hour week. Much of the commercial employment in the firewood industry is taken up by part time firewood cutters. It is not appropriate to include domestic firewood collectors in job figures.

It is likely that there will be a continuing strong demand for firewood from native forests in the region, particularly in the vicinity of regional cities and towns. In the event that local supplies became more scarce, consumers within the study area would have to pay increased prices for firewood, or move to substitutes such as gas or electricity for heating.

Other things equal, policies for public land affect firewood collection and habitat on both public land and private land. For example, if firewood collection were reduced, or excluded from some areas of public land, an immediate effect would be to increase firewood collection on private land, and hence the pressure on habitat on private land would be increased if no other actions were taken.

Fencing timber in NRE databases includes posts, strainers, stays and rails — with posts the dominant product by volume and value. Most licensees who cut mainly fence posts or sleepers, would also have an allocation to cut some firewood.

Our analysis reveals a net economic contribution of \$74,500 per year for fencing timber and \$22,500 per year for sleepers. The main cost for posts is labour. Sleepers is the only product where royalty costs appear to exceed labour costs. Employment is estimated at 18 FTEs for posts and 4 FTEs for sleepers.

Sawlogs and sleepers. On average, 780 m³ of sawlogs are cut each year from the Bendigo FMA. Sleepers are cut from sawlog trees, with an average of 500 m³ cut each year in the Bendigo FMA. Around 115 m³ of sawlogs are cut each year from other FMAs in the study area. The total annual sawlog cut for the study area is about 1,400 m³, including sleepers.

Our analysis reveals a net economic contribution of about \$67,000 per year for sawlogs. The main cost is labour. We estimate that the total level of employment in sawlog production is equivalent to about 13 FTE.

Several small-scale saw mills, including operations at Talbot, Inglewood and Rushworth now produce small dimension sawn timber products from tendered or residual sawlogs, or post logs that would otherwise have been cut for fencing material.

Relative importance of each timber product group

Comparisons of the costs and revenues associated with the commercial cutting of timber, for each of the main product groups, are shown in the full report. These indicate the average returns for each product group, with the highest return per m³ going to sawlog licensees who provide a mixture of green and kiln-dried timber to the local region. The returns per m³ to firewood and post licensees are considerably lower.

The relative importance of each product group is summarised in the table below. Firewood production comprises 63 per cent of total timber products from the study area by value, 55 per cent by employment and 88 per cent by volume. Sawlog production comprises 15 per cent of total timber products from the study area by value, but 2 per cent by volume.

Product shares	Firewood	Fence timber	Sleepers	Sawlogs
By value	63%	16%	5%	15%
By employment	55%	23%	5%	17%
By volume	88%	9%	1%	2%

Note: jobs are not attributed to the 40% of firewood that is collected by domestic collectors

Saw log processing presents a more specialised, high value product, and tends to employ a higher proportion of capital equipment than the other three products.

Some timber cutters believe that the trend by NRE towards tendering parcels of wood may gradually lead to a loss of local workers as large syndicates move in to take up the parcels, perhaps using teams of cutters from distant areas, or even from interstate. This trend may have a bigger adverse long-term impact on employment of local timber cutters in the Box-Ironbark area than the ECC recommendations.

Employment implications for the local timber industry

The purpose of the Employment Survey was to clarify what constitutes a ‘full-time equivalent’ (FTE) post cutter or firewood cutter in the Bendigo Forest Management Area (FMA). To determine these FTEs in terms of the annual average number of fence posts and volume of firewood cut respectively, a selection of full time and part-time cutters were interviewed.

The Box-Ironbark timber industry is characterised by a large number of individuals with Forest Operators’ Licenses, many of whom work part time as post or firewood cutters. Some also own farms, or have other seasonal or regular work; others have a small timber allocation, and may prefer to cut more. Several have relatively large allocations, and employ full time or part time staff to assist in cutting that amount. Some cutters harvest both products, typically the posts first, then the heads as firewood within the following two years. A few cutters produce ‘value-added’ products

from their timber allocations, sometimes in addition to fence posts or firewood. The Employment Survey was aimed at producing a reliable estimate for a normal cutting year, taking into account all these variations.

Of 36 cutters suggested by ECC with input from NRE, 26 (72 per cent) provided useful responses. Of the 26 respondents, 13 had previously been interviewed by the consultants in the socio-economic survey.

The weighted averages of labour coefficients for all products, in comparison with those used in the earlier Stages 1 and 2 studies, are shown below. It is assumed in the analysis that a full-time job involves a 38 hour week for 48 weeks of the year

	Posts*	Firewood	Value-added
Stages 1 and 2	FTE/m ³	FTE /m ³	FTE /m ³
	.0018	.00091	.012**
	Pieces/FTE	m ³ /FTE	m ³ /FTE
	14,444	1,100	83**
Stage 3	FTE/m ³	FTE/m ³	FTE/m ³
	.00410	.00169	.00893
	Pieces/FTE	m ³ /FTE	m ³ /FTE
	6,342	592	112

* Assuming the conversion rate of 26 posts per cubic metre (NRE Forests Service)

** Calculated for the Box-Ironbark sawmill industry

Part of the difference between the estimates for the current survey and those for Stage 1 & 2 can be explained by the earlier estimates not allowing for the operators working more than a 38 hour week, or not using up all their allocations. In addition, the current survey included all labour required to produce and market the product, including office work.

The figures shown for posts (6,342 pieces/FTE) and firewood (592 m³/FTE) from the current survey are used in the analyses of job losses for the Stage 3 socio-economic survey. The Stages 1 & 2 estimate for sawlogs are used to estimate job losses in the sawmill industry as they are based on more representative data than those from the current survey.

Future levels of timber production

The levels of timber production that may be derived from the Box Ironbark Forests of the study area in the future are potentially affected by at least two important countervailing factors: the potential to harvest more timber than the levels achieved in recent years; and the possibility that even without the ECC's recommendations, other forest planning processes may lead to significant reductions in available timber.

Actual versus potential timber yields

The Forests Service completed its Box-Ironbark Timber Assessment (BITA) Project in 1998. Subsequently Forests Service developed an uneven age spreadsheet model for forest growth, using the BITA data, and this indicated that overall *actual harvest* levels have been substantially below the preliminary estimates of potential production for the net productive area of State Forests.

Based on the Forests Service's modelling, the level of timber harvesting could increase substantially in the absence of any changes to the available forest land base resulting from ECC recommendations, government decisions or forest management planning. In future discussion we refer to the modelled estimates as the *potential harvest*.

During the Stage 3 survey, it became clear that local NRE forest officers, and timber cutters, were sceptical of the estimates provided by the modelling exercise. They believe that future timber availability will be significantly curtailed by the ECC recommendations. In particular, they believe that the ECC has recommended withdrawing some of the better forest areas (in terms of currently available timber volumes) from production. The local NRE forest officers also indicated that at present there are about 8 too many firewood cutters, and one too many post cutters in the Bendigo FMA, but that it may be possible to relocate some of these to other areas.

The ECC agrees that it has recommended numerous areas with larger trees to become parks and reserves in order to meet objectives of biodiversity conservation. These areas are not necessarily better in terms of site productivity (or timber growth rate) but they have medium to large trees suitable for sawlog and post harvesting in the near future, and their unavailability is likely to mean in the short to medium term that there may be *scheduling problems* as NRE Forests Service tries to meet allocations for cutters.

NRE modelling indicates that the effect of the ECC recommendations is approximately proportional to the reduction in productive forest area. The consultants have chosen to focus on the *actual* rather than the *potential* (modelled) harvest for purposes of the benefit cost analysis and estimates of job losses.

It is more likely that the ‘actual’ estimates will prevail in the short to medium term. It is also likely that there will be job losses over this period whereas the modelled results predict job increases from existing levels. The modelled estimates do hold out some hope for the industry in the long term but many cutters do not believe that their businesses will survive long enough to benefit from the potentially increased future harvest. They also discount the future due to the risk of new conservation and forest practices placing further restrictions on their activities.

In our analyses, the conservative case — 39% reduction in timber volume — is based on the reduction in available state forest area following ECC recommendations. The optimistic case assumes 15% more timber volume will be available than in the conservative case, on the basis of the modelling, and because NRE has consistently advised that Bendigo FMA has been cut at a rate lower than the estimated sustainable yield in recent years. The pessimistic case assumes 15% less timber volume will be available than in the conservative case, reflecting possible ‘worst case’ scheduling difficulties and the views of several timber cutters that the volumes available will be less than those based simply on the proportion of forest area left for production.

ECC versus RFA/JANIS effects on timber yields

The ECC advised the Stage 2 and Stage 3 consultants that other forest management planning processes would have necessitated reductions in the future availability of timber resources in the Box-Ironbark study area. Victoria has obligations to plan for the application of JANIS criteria in regional forest agreement (RFA) planning, and similar criteria for representation and protection are applied in FMA planning.

Preliminary, analysis by ECC staff, based on JANIS target percentages for relevant EVCs, indicates that application of the JANIS criteria would lead to a reduction in forest area of about 33 percent, even if the ECC recommendations did not go ahead.

The Stage 2 study included this predicted RFA effect in the benefit–cost analysis. However, while it is important to contemplate the RFA effect, we do not include it in the overall benefit-cost analysis in Stage 3. If we are to adjust timber values for the RFA effect, we should also adjust other costs and benefits accordingly. For example, most of the biodiversity values would not be attributable solely to the ECC recommendations because they would be provided under RFA processes.

Economic valuation of timber losses

Based on the Stage 3 socio-economic survey, net economic contributions are \$63 per m³ for sawlogs, \$17 per m³ for posts and \$7 per m³ for firewood.

Based on the Stage 3 employment survey, calculations for jobs are based on 0.012 jobs per m³ for sawlogs and sleepers; 0.0041 jobs per m³ for posts; and 0.00169 jobs per m³ for firewood production.

The analysis of net economic contribution and the analysis of economic activity (ie. jobs) were completed for ‘*actual* timber yields’.

Loss in timber values as a result of the ECC recommendations

	Timber volume	Net economic contribution	Employment	Gross income
	(m ³ /year)	(\$/year)	(FTE)	(\$m/year)
‘Actual’ timber yields	47,900	460,000	77	3.28
<u>Losses due to ECC recommendations*</u>				
Optimistic (30% reduction)	14,380	140,000	23	0.98
Conservative (39% reduction)	18,700	180,000	30	1.28
Pessimistic (48% reduction)	23,000	220,000	37	1.58
<u>Stage 2 losses</u>	8,630	155,000	13	1.00
(Potential yields and RFA effect assumed)				

The 'losses due to the ECC recommendations' in the table above are the figures that we carry forward to the benefit cost analysis, and the analysis of economic activity (employment) effects. The main difference between our analysis and the Stage 2 analysis is in the number of jobs at risk.

Assistance measures

Of those directly employed in the Box-Ironbark forests, timber cutters are likely to be the most affected if the ECC's recommendations are adopted. In the short to medium term at least, several of them may lose their livelihoods completely while others may face cut-backs in their timber allocations.

In contrast, most of the benefits of the ECC's recommendations are likely to go to Victorians as a whole, in the form of environmental values obtained through the conservation of biodiversity. In other words, the benefits of the ECC recommendations are widely dispersed while the costs are localised. This helps to explain the vigorous opposition to the recommendations in some localities of the study area.

The existing income distributions of those expected to suffer losses are likely to be below those expected to gain, even if adjusted for the relative living costs of rural vs urban areas. The ECC's recommendations are therefore potentially regressive, providing a strong case for assistance.

If the ECC recommendations had gone through RFA processes the majority of the timber cutters adversely affected would have been eligible for assistance under the Victorian Forest Industry Structural Adjustment Package (Vic FISAP). In particular, they would have been assisted under the Business Exit Assistance Guidelines or the Worker Assistance Guidelines.

There is some doubt that FISAP funds will be available to the Box-Ironbark timber industry but principles of social justice present an undeniable case for financially assisting the timber workers from other sources if necessary.

There is agreement among many economists and sociologists that adjustment in rural industries can be more difficult than that in urban industries, other things equal. The lack of access to re-training facilities, the average age of those affected, the need to consider moving house and home, and the lack of other job opportunities are just some of the reasons for this view. They present yet another case for assisting those affected, and this case applies to all those who work in the Box-Ironbark forests — including eucalyptus oil producers and small gold miners who are adversely affected.

The consultants have reviewed the assistance measures available to timber cutters under the Vic FISAP package, and have also benefited from discussions with those that administer the scheme. We have also reviewed some assistance schemes for other rural industries and discussed their administration with a Victorian Financial Counsellor based in the study area.

It is our view that the timber cutters adversely affected by the ECC's recommendations should be assisted at least to the levels that they would be eligible for under Vic FISAP. However, that package appears to focus on large-scale timber mills, cartage contractors and their employees. Some aspects of the package, in particular its emphasis on asset computations, may not be appropriate for the Box-Ironbark timber cutters who are generally small scale operators.

The criteria for assistance used by the Victorian network of Financial Counsellors may be more appropriate for the timber cutters, and for eucalyptus producers and small goldminers. In essence, those affected would need to be able to produce evidence of the ECC impacts on their net cash income or net profit and receive assistance on a sliding scale. The assistance should be available whether or not those affected rely 'full-time' on the forests for their income.

Pest and weed management on private and public land has become a serious problem in recent times. Many of those interviewed during the socio-economic survey expressed particular disquiet about the lack of management of these problems in national and state parks and reserves, although the same problems exist in some state forest areas.

We suggest that particular attention be paid to the resourcing of new parks and reserves recommended by the ECC. In the tourism section of this report we have suggested that attractive visitor centres be built into the ECC recommendations. Additional resources for park management would also create possibilities for increased employment, particularly in those areas likely to be hardest hit by the recommendations. Timber cutters may not necessarily win the new positions but many of them are well qualified to care for the forests.

We have not quantified the benefits from the sale of ‘ecological thinnings’ in the new parks and have assumed that these practices will be cost-neutral for NRE. However, timber cutters may find positions of employment in this activity and this could be seen as a component of assistance packages.

On grounds of economic efficiency, we support the use of tender processes rather than the use of bans on particular products to assist in the allocation of output from the forests. The use of bans may unnecessarily increase the need for industry assistance.

EUCALYPTUS OIL PRODUCTION

The Victorian Eucalyptus Oil Distillers Association (VEODA) is the peak industry body and has seven members, all of whom have licences to extract oil from public land in the study area. The oil is mainly harvested from public land, although at least one producer also extracts from mallee eucalyptus oil on privately owned forest blocks.

The oil producers sell their produce in bulk to pharmaceutical companies, and in smaller quantities through door sales. At least two producers bottle their own oil and sell exclusively at the farm gate. One producer, with headquarters in Melbourne, is a vertically integrated firm which makes pharmaceutical products from the oil.

Australia is currently a net importer of eucalyptus oil, mainly from China which supplies about 80% of the world market. Brazil is also a large producer. The world market is around 3,000 tonnes per year; Victoria supplies less than 1% of this demand. Australia currently produces approximately 100 tonnes of oil annually. The existing Victorian producers are therefore price takers and command little power in world markets.

Farmers and the government in Western Australia have been investigating the development of a major eucalyptus oil industry. Mass planting of blue mallee has been carried out as a measure aimed at overcoming salinity in the wheat belt areas of WA. These and future WA plantings have an oil production target of 1,500 tonnes per annum, according to Paul Miller and Associates. This would be more than ten times current Australian production and approximately half world production, and would rely on opening new markets for the product in order to sell it. If the oil is supplied as a by-product of salinity management, a lower price may be acceptable to producers if they are direct beneficiaries of salinity reduction. If they are not direct beneficiaries, they would probably need subsidies from government.

Some 17 million oil mallee seedlings have been planted in the wheatbelt of WA. The commercial feasibility of an Integrated Tree Processing Plant has now been validated. However, oil mallee is not yet a proven commercial success in WA.

If the WA program is successful, the Victorian producers may find it hard to sell their oil at a price which is more than the cost of production, at least in the short run. However, Victorian producers believe that there are a number of reasons why the WA project may not succeed in the medium to long term.

If the WA project does succeed there would be lessons for Victoria — after all, there is a serious salinity problem here too. It would make sense for the Victorian government to collaborate with the WA government on their project. It is also a reason to retain the Victorian eucalyptus oil industry so as not to lose an important skills base. The mallee areas are in the Murray–Darling Basin and plantation development may attract Commonwealth support under programs directed at controlling dryland salinity.

Paul Miller & Associates analysed the economics of plantation oil production and are pessimistic about its future in extensive applications. However, they include land and capital equipment costs in their analysis so there may be scope for existing producers with private land to at least avoid some of the cash flow disadvantages.

There appears to have been few entrants to the industry for some years. It is likely that the skills and experience of the industry (and the “industry heritage”) will decline if new operators are not introduced.

There is scope for continued production as an important adjunct to the tourism industry. Some of the producers already run associated tourist activities, partly based on antique farm machinery and coach tours.

The total area cut for eucalyptus oil production is approximately 2,785 hectares, representing about 30 per cent of the area of mallee vegetation recommended by the Land Conservation Council for this use and licensed for extraction, and about 10% of the total remaining extent of Broombush – Mallee in the Box-Ironbark study area, including public and private land. The extent of the reduction in area due to the ECC recommendations is estimated to be 644 hectares. This represents approximately 23 per cent of all public land which is now cut for eucalyptus oil in the study area.

For the three operators surveyed, we estimate a net economic contribution of \$76.63 per ha. We have assumed approximately 644 ha removed due to ECC recommendations giving a loss in net economic contribution of approximately \$50,000 in our 'conservative' case. We adopt \$30,000 as our 'optimistic' case, and a figure of \$70,000 for the 'pessimistic' case.

Our analysis suggests that there would be a loss of up to 3 full time job equivalents, based on a loss of gross expenditure of approximately \$100,000 in the pessimistic case. Losses for the conservative case are estimated to be 2 FTEs for \$75,000 expenditure and for the optimistic case, 1 FTE for \$50,000 expenditure.

Amelioration measures for eucalyptus oil producers

We support the amelioration measures suggested in Stage 2 that could be put in place to lessen the impact of the ECC recommendations, including:

- Revising the allocation of licence areas to ensure that working operators who have lost their licence area can have access to other available licence areas;
- Assist all operators to take part in production from plantations in order to create a more economically viable industry on private land;
- Increase the term of licences from 1 year to 5 years to encourage investment and a positive outlook for the industry.
- as an additional measure, to provide a phase-out period of 6 years, to enable time to establish plantations and otherwise adjust to the loss of resources

It should also be possible to reward more efficient production by changing the royalty system to charge on the basis of area cut, or volume of oil produced, rather than on the price for which the product is sold.

We remain sceptical of the scope for an industry based on private plantations unless governments see justification, eg. from considering the externality effects of dryland salinity, to provide the necessary support in the establishment years.

The industry is part of Victoria's cultural heritage and we have not been able to put a value on the cost to the state should this cultural heritage component be lost. In that sense we may have under-estimated the costs of the ECC's recommendations. This underlines the importance of government seriously considering assistance to the industry.

GOLD PROSPECTING AND MINING

The Box-Ironbark study area produced 70% of total Victorian gold production period 1850 to 1996, valued at \$29.2 billion at current gold prices of approximately \$530 per troy oz. The long-term trend has been downward for over 20 years, although some analysts believe that gold prices have bottomed in the current cycle, and that we may see an upward trend if the US dollar and equity markets weaken. Gold prices have risen in recent months, probably largely due to the fall in the value of the Australian dollar relative to the US dollar.

The total production of gold in the area has decreased over the past three years and is well below the targets and predictions of government and industry sources quoted in the Stage 1 report. However, the study area remains the principal focus of mining and exploration for gold in Victoria.

The ten largest gold producers in the study area in 1995/96 had mining licences over 6,901 hectares of which 1,686 hectares (24%) were in box ironbark forest, predominantly on public land (ECC, 1997). These miners appear to account for all but a small proportion of gold production in that year in the study area. The value of gold mined on public land in the study area is estimated at \$16.6 million per year. Exploration expenditure on public land in the study area is estimated to be \$6.2 million per year.

The larger producers generally run open cut or underground mining operations. Surface gold deposits have largely been worked out but there are some small commercial operators who seek surface deposits through so-called *doze and detect* operations. These operators are concentrated in a belt between Talbot and Wedderburn. They account for a very small proportion of gold production — probably less than 0.5%.

Small scale prospecting is principally a recreational activity based on the use of metal detectors and its share of gold production is marginal. However, prospecting is an important component of tourism on public land in the study area, contributing approximately 20% of all tourism expenditure. Based on submissions to the ECC, it generates a significant and perhaps dominant proportion of tourism expenditure in some small towns in the study area, including: Dunolly, Inglewood, Maryborough, St Arnaud and Wedderburn.

Data for *employment in gold and mineral mining* in the municipalities of the study area show that Northern Grampians (Stawell) and Greater Bendigo mining companies account for 68% of employment in the sector.

The Prospectors and Miners Association of Victoria PMAV (1998) survey of 596 persons interested in prospecting and small-scale mining showed:

- 188 lived on or near the Victorian goldfields
- 48 held a registered mining tenement at the time
- 37 were full time prospectors
- 177 were part time prospectors
- 351 were hobby prospectors

Economic impacts on gold production

The Stage 2 report noted that the recommendations of the ECC would have economic impacts on gold-mining in the Box-Ironbark area arising from:

1. the re-designation of a number of parcels of public land from management regimes in which mining and mineral exploration is permitted to regimes in which it is made more difficult or impossible to undertake;
2. changes to the management regimes of several blocks of public land to prohibit surface mining;
3. changes to mining licences, with stricter requirements for rehabilitation of the land following mining. (The ECC's draft proposal for an economic benefits test to apply to small miners has now been dropped); and
4. requirements to purchase replacement land

The direct economic impacts may include:

- the potential loss of mineral production and revenues to miners
- additional costs of production resulting from changes in management and licence requirements
- the costs of purchasing replacement land

Each of these impacts is examined separately.

Potential loss of gold production

The ECC's recommendations for new state and national parks on public land which currently accommodates exploration and mining will permit existing mining tenements to continue, and exploration to continue under existing licences. If an economic resource is found, the Government will decide on a specific proposal for a mining operation. However the Council's recommendations will effectively prohibit the granting of new exploration licences in new state and national parks. Gold remaining in the ground in the new state and national parks will no longer be available for extraction, except by firms holding existing exploration or mining licences.

Virtually all areas with a history of significant gold production have existing exploration licences. In the cases of the recommended Greater Bendigo National Park, Castlemaine Diggings National Heritage Park and Deep Lead Nature Conservation Reserve, Council proposes that mining be permitted at depths greater than 100 m under the surface.

Gold mining on any significant scale follows exploration and discovery of a resource which is economic to mine. The Stage 2 study assumed that, other things being equal, the value of gold produced has a direct relationship to the scale of the exploration effort. They based the relationship on Minerals and Petroleum Victoria (MPV) data for exploration expenditure and gold mined in Victoria during the period 1992/93 to 1997/98.

The Stage 2 study found that the weighted value of gold produced from successful mines was 355% of exploration costs two years earlier. Analysis of the MPV data by the Stage 3 consultants shows that statistically significant relationships of between 150% and 300% exist, depending on assumptions made about gold prices and lags. So the gold values may be over-estimated to some extent.

The Stage 2 study estimated that the cost of exploration in the proposed parks is of the order of \$220,000 per year. The annual value of foregone gold production in the proposed state and national parks could be \$0.78 million per year, and the producer net revenue (the net economic contribution) could be \$0.07 million per year.

Whether these impacts will actually be experienced may depend on:

- the identified resource in the ground
- the conditions for gold production (price, techniques employed etc)
- the political and legislative framework for allowing continued exploration and mining in Parks
- the willingness of particular mining firms to accept additional investment risks in Parks

The estimates of foregone gold revenue are approximate and subject to considerable uncertainty in terms of the amount of gold that would actually be mined in the areas proposed for parks and reserves. While the Stage 2 report assumed a potential loss of up to \$0.10 m per year in foregone net economic contributions from gold production, we assume that it may range from \$0.15 m per year in the pessimistic case to \$0.10 m in the conservative case, to \$0.05 m in the optimistic case. The pessimistic and optimistic cases are based on arbitrary changes to the conservative case of plus and minus 50 per cent, respectively — reflecting the uncertainty involved. These losses apply mainly to large gold miners.

Potential changes in management costs for miners

There are two types of management changes:

1. It is proposed that new national park areas south of Bendigo and in the Whipstick – Kamarooka link would be exempt from mining to a depth of 100 m, but that underground mining would be permitted below that depth. A similar provision would apply to prospective areas under the Castlemaine National Heritage Park, and Deep Lead near Stawell.
2. A series of general provisions is proposed to apply to all exploration and mining on public land, which may impose additional costs on all miners.

Prohibition of mining to a depth of 100m in specific areas

The ECC proposes to prohibit mining to a depth of 100m in three blocks of the Greater Bendigo National Park, Castlemaine Diggings National Heritage Park and Deep Lead Nature Conservation Reserve, but underground mining below that depth will still be allowed. Low impact exploration would be permitted. This may impose additional costs on mining in these areas, depending on:

- the discovery of economic mineral deposits in the area
- the depth at which those deposits are located
- the cost of surface mining compared with underground mining, and the likelihood of obtaining government approval for open cut vs underground mining
- the practicality of the site in relation to proximity to urban areas

The Stage 2 report suggested that the probability that additional costs to miners will be incurred is greater than zero, but was unable to determine an expected value of these costs. We can only regard this as a source of possible under-estimation of economic impacts for the gold mining industry.

It should be noted that allowing *any* mining under national parks is innovative and will not please all interest groups. However, other things equal, it will reduce the losses due to foregone gold production.

Impacts of general management provisions

The ECC recommendations for mining on public land are for the inclusion of current environmental best practice as standard mining licence conditions for *all* public land, not just the land proposed for parks and reserves. Best practices in this context include:

- low-impact exploration to have minimal effects on public land (requiring prior site assessment, careful use of the site and high quality rehabilitation)

- compensation to be provided for the loss of land cleared for mining (and this could be in the form of the purchase and donation of land to the public estate, or the provision of an equivalent monetary amount)

There will be effectively no impacts on the larger miners as a result of ECC recommendations, as they are putting such measures into practice now. For smaller miners, however, the impacts may be significant.

In the stage 3 survey it became clear that gross returns were higher than 'official' returns and averaged about \$38,000 per year for the five small miners interviewed.

These returns do not include the recreational and way of life value that small miners receive as a result of their activities. It should be noted that these types of values are directly analogous to the non-market values attaching to biodiversity, tourism and recreation and were referred to widely in the survey by miners, timber cutters and eucalyptus oil producers. In many cases it was clear that the industry people, particularly the part-timers, were more concerned with losing their way of life than with the loss of money. We have not included allowances for these values in our calculations, so this is a source of possible under-estimation of losses.

Small miners may face cost increases of 50 per cent or more as a result of the ECC recommendations. However, it should be noted that the economic significance test which was proposed in the Draft ECC recommendations, has now been removed for small miners. In the Stage 2 report this was estimated to cost \$10,000 per licence so its removal represents a significant concession. For this reason, it is unlikely that all small mining operations would cease, as was assumed in the Stage 2 study.

Excluding the licences held by large companies, there are 54 licences which are potentially 'doze and detect' operations. If 20 operations were to cease as a result of the higher standards in ECC recommendations, we estimate that the potential reduction in expenditure would be \$206,000.

Loss in net economic value of gold production

The value of foregone gold production (\$0.05m to \$0.15 m per year) discussed earlier is attributed to the larger miners. To these losses should be added the losses of small scale miners.

From the Stage 3 survey it was estimated that net losses by small miners due to the ECC's recommendations averaged about \$2,450 per year, including an allowance for licensee labour at the rate of \$30,000 per year full-time. These losses were based on the miners' perceptions of exclusion from the resource, which averaged 61 per cent. But at the time of the survey the economic significance test was assumed to be part of the ECC's recommendations affecting small miners.

If the losses for the five miners interviewed are extrapolated to the 54 licence holders, they would total approximately \$0.13 m per year for 61 per cent exclusion. We assume losses in net economic contribution of \$0.13m per year for the pessimistic case, \$0.09 for the conservative case, and \$0.05 per year for the optimistic case.

It is emphasised that the tourism benefits of gold prospecting are not included here; they appear in the section on tourism and recreation. The overall benefit cost analysis assumes that prospecting is permitted to continue, largely unhindered in the new state parks, and that it continues to contribute about 20 per cent of tourism revenue.

For purposes of the benefit cost analysis, we apply total gold mining losses in net economic contribution of \$0.28 m per year in the pessimistic case, \$0.19 m per year in the conservative case, and \$0.10 m per year in the optimistic case. In arriving at these figures, we have discussed a number of sources of possible over-estimation and under-estimation so it is difficult to be precise about the final results.

Regional impacts of gold losses

The components of potential regional economic impact arising from the ECC recommendations are provided below.

Components of regional economic impact

Component of potential change in expenditure	Loss of expenditure	Loss to the study area	Potential jobs lost*
Exploration in new parks	\$220,000	\$176,000	4
Mining in new parks	\$490,000	\$392,000	8
Prohibition of surface mining to 100 m in Bendigo NP	not known	not known	not known
Small miners throughout study area	\$206,000	\$165,000	4
Total	\$916,000	\$733,000	16

Source: derived in part from the Stage 2 report, Table 5.4

Assumes that 20% of mining expenditure by local miners normally takes place outside the study area

* Assumes 1 job per \$50,000 expenditure (due to inclusion of a large number of small miners)

The loss of expenditure from cessation of new mining and exploration activities in new parks, and the additional imposts on small miners, could be \$733,000 per year in the study area, resulting in the loss of approximately 16 jobs. However, these figures are subject to considerable uncertainty, as discussed earlier. We therefore adopt ranges of plus and minus 50 per cent, resulting in losses of expenditure of \$1.1 m per year, \$0.73 m per year and \$0.37 m per year, for the pessimistic, conservative and optimistic cases, respectively. Job losses range from 24 in the pessimistic case to 16 in the conservative case to 8 in the optimistic case.

Any impacts would be felt in Bendigo (as the principal source of supplies for the regional mining industry) and the smaller towns close to the newly designated parks, including St Arnaud, Avoca, Nagambie, Benalla and Beechworth.

Amelioration measures for small miners

The ECC recommendations have severe implications for small miners, although their severity has been substantially reduced by the ECC's decision to remove the net economic benefit test for small miners. In addition, the ECC's recommendation to allow purchase of equivalent land, rather than demand prohibitively expensive rehabilitation of mined land, is innovative and addresses some of Rolfe's recent criticisms of biodiversity policy for mining.

Small-scale miners and prospectors interviewed during the Stage 3 socio-economic survey suggested that the introduction of an intermediate style *prospector's licence* would help lessen the adverse impacts on their industry. In combination with a bond system, they are convinced that less disturbance would be needed compared with current practice.

Small miners also propose that a prospecting licence would not require Native Title clearance. This would lead to further substantial cost savings in the exploration phase, with Native Title clearance only being needed if an application for a mining licence was justified.

The consultants suggest that the introduction of an appropriately designed prospector's licence system should be considered, with its adoption being contingent on it maintaining or improving upon current measures aimed at conservation of biodiversity.

There is a continuum from recreational prospecting, through more serious prospectors to small-scale mining and on to medium-scale mining. Prospectors are sceptical of the statement that prospecting will not be unduly hindered in new parks. As mentioned elsewhere in this report, the consultants' analyses of benefits and costs are contingent on prospecting activities generally continuing in these areas. We understand that the ECC recommendations are aimed at ensuring that prospecting will be permitted to continue in new state parks, except in selected relatively limited areas.

We suggest that a review of any bans on prospecting be conducted for existing state parks, conditional upon insistence on appropriate practices should prospecting be re-introduced. The economic rationale for this proposal is that it would further off-set the losses of net economic contribution and jobs that potentially arise from the ECC recommendations.

For similar reasons, we suggest that the proposal for the establishment of a ‘*prospecting park*’ in a small part of the Chiltern-Pilot National Park should also be considered. Tourism in the Chiltern/Beechworth area has *apparently* declined in recent years, despite the establishment of the existing Chiltern National Park. It is important to the local economy that the ECC recommendations do not lead to further decline in tourist numbers through discouraging prospecting. A proposal for establishing an attractive visitor centre in the area has been described under the timber section and this presents another possibility for halting or reversing any decline in tourist numbers.

COMPARING BENEFITS AND COSTS

The benefits and costs associated with the ECC recommendations that have been estimated in previous sections are brought together in the table below.

Despite a large number of changes in assumptions and data, the net result for the Stage 3 study for the conservative case (\$2.07 m per year) is similar in magnitude to that estimated for Stage 2 (approximately \$1.65m per year). **[See Table 22 at the end of this appendix]**

However, there are important differences between the two studies in how the net result was obtained. The Stage 3 study estimated substantially higher benefits in terms of biodiversity conservation, but lower benefits for the ECC recommendations in terms of tourism. The Stage 3 study also found greater losses for all forest-based industries (other than grazing) compared with those estimated in the Stage 2 study.

The benefit cost analysis was also done using the modelled potential timber yield data provided by NRE.

A summary comparison of all three benefit cost analyses is shown below.

The conclusion from the benefit cost analysis is that the ECC’s recommendations are likely to be beneficial to Victorians, generating approximately \$2 m per year in net benefits on a state-wide basis.

However, the consequences for the people living in the Box-Ironbark region are quite another matter.

Net economic benefits of ECC recommendations (\$m per year)

	Pessimistic	Conservative	Optimistic
Stage 2		1.65	
Stage 3	0.29	2.07	5.15
Stage 3 (modelled timber yields)	0.11	1.91	5.02

Regional implications

The bulk of the net benefits identified in the benefit cost analysis arise from the benefits attributed to the conservation of biodiversity. As these benefits are population-related, approximately 93 per cent of the benefits accrue to Victorians living outside the study area. As noted earlier in this report, these types of benefits do not necessarily create jobs in the region, and are based on an apparent ‘willingness to pay’ by the beneficiaries, irrespective of whether they actually pay.

If the biodiversity benefits for those living outside the study area are deducted from the benefit cost analysis to give regional net benefits, we find that there is a net loss of \$0.64m per year in the pessimistic case, a small gain of \$0.21 m per year in the conservative case, and a gain of \$1.43m per year in the optimistic case.

The regional effects become more serious when the impact of the ECC’s recommendations on employment is considered.

The Stage 3 study estimated higher job losses than those estimated in Stage 2. On the basis of the socio-economic and employment surveys, we estimated higher job losses in the timber and gold mining industries and lower gains in the tourism industry, compared with Stage 2. The net effect is a potential *loss* of approximately 14 FTEs for the conservative case, spread over some full-time workers and many part-time workers. This compares with an estimated *gain* of 42 FTEs in the Stage 2 study. **[See Table 24 at the end of this appendix]**

We estimate a gain in economic activity for the region of approximately \$1.34 m per year for the conservative case. This compares with a gain of \$5.20 m in the Stage 2 study.

The distribution of incomes and levels of employment in the Box-Ironbark region currently do not compare favourably with those in Melbourne. In short, the ECC's recommendations have the potential to be regressive, transferring income and jobs from the less well off to the better off.

In our view it is important to consider ways of off-setting the potentially regressive nature of the ECC's recommendations. We have suggested some of these in earlier sections, including the establishment of attractive visitor centres in national parks, investing more heavily than is normal in park management, and assisting the eucalyptus industry to become a component of programs to control dryland salinity. We understand that the ECC will also be recommending assistance to both the timber and eucalyptus industries to establish and expand their production in plantations.

However, some of the proposed means of assistance may not succeed, or may only succeed in the long run. There is therefore a need for more direct financial assistance to the people likely to be affected, and this is discussed in the next section.

FINANCIAL ASSISTANCE MEASURES

Various methods for ameliorating the effects of the ECC's recommendations on forest industry people have been discussed in the industry sections of this report. This section focuses on financial assistance that could be made available to those adversely affected.

Most of the people interviewed during the socio-economic survey strongly preferred to stay in their industry. Most also felt that they did not have the skills to take up new occupations and were too old to acquire new skills. Most did not want to leave the area and were traumatised at the thought of being forced to move to large cities. On the other hand, most did not want to become welfare recipients.

Of the assistance options offered in the survey, timber cutters and gold miners preferred to receive a grant to exit the industry while eucalyptus oil producers preferred to receive a grant to expand the business. But it should be recalled that for all but two people interviewed, their strongly preferred option was to stay in the industry. The lowest ranked option for all industry groups was the option to move to Melbourne.

Average annual losses anticipated by the individuals interviewed in the Stage 3 survey are summarised below. They were based on their perceptions of resource availability if the Draft ECC recommendations were to go ahead. The final ECC recommendations are generally not as restrictive as those in the draft so there is an element of over-estimation of adverse effects. The reductions in net forest income are generally greater than the reductions in net forest area because, for example, of timber cutters' perceptions of scheduling effects, and because the effects have been calculated as if the fixed costs of production are spread over smaller volumes of harvest for every cutter. In practice, the latter effect would be less serious if some cutters are assisted to leave the industry and the remaining cutters are able to maintain their volumes of output.

The above losses are per operator, not per FTE. On average over all industry groups, the operators surveyed are employed 73 per cent of their time in forest-based industry and employ 0.36 permanent staff and 0.48 casual staff. Losses per FTE are therefore approximately 64 per cent of those shown.

Perceived average annual economic impacts of ECC recommendations

	Reduction in net forest income**	Reduction in net forest income	Reduction in overall net income	Reduction in return on total forest assets	Forest income	Forest expenses	Net forest income
	(\$)	(%)	(%)	(%)	(\$/year)	(\$/year)	(\$/year)
Timber harvesting	24,906	78	65	69	80,652	48,921	31,731
Eucalyptus oil	15,699	58	20	55	52,719	25,687	27,032
Gold mining	17,046	61	50	35	38,000	10,268	27,732
Overall*	22,938	75	65	66	71,915	41,187	30,728

As was suggested in the timber section, the Vic FISAP scheme for the timber industry may not be entirely appropriate for many Box-Ironbark timber cutters due to their relatively small scales of operation. An alternative is to base assistance on loss in net cash or net profit as a result of being displaced by the ECC's recommendations. This approach can be applied to all those affected, including eucalyptus oil producers and small gold miners. Of course, assistance would need to be based on satisfactory financial evidence of net incomes.

We estimate that there are approximately 120 timber cutters (mostly part time), 4 eucalyptus oil producers, and 40 small gold miners and prospectors who *may* be eligible for financial assistance as a result of the ECC's recommendations.

Based partly on the above table, and extrapolating losses to all those potentially affected in each industry, we arrive at the possible levels of loss shown below.

Financial losses to operators

	Number of operators	One year's losses @75% ^a	One year's losses @50% ^b
		(\$m)	(\$m)
Timber harvesting	120	2.53	1.69
Eucalyptus oil production	4	0.06	0.04
Gold mining	40	0.68	0.45
Total	164	3.27	2.18
		(\$)	(\$)
Average per operator		19,960	13,300
Average per FTE		12,770	8,500

^a losses as perceived by interviewees ^b losses reduced to reflect final ECC recommendations

If assistance measures are based on one year's losses, the total cost would range from \$2.2m to \$3.3m, at an average of \$13,300-20,000 per operator, or \$8,500-13,000 per FTE, based on 50% or 75% losses, respectively. However, as was noted above, one year may not give the operators enough time to find and adjust to new employment opportunities. Those directly affected would almost certainly feel that these estimates of losses are conservative.

The above averages include some operators with large capital investment in sawmilling equipment and other assets. If affected, these operators would need to be treated differently from small scale operators, and the FISAP guidelines would be applicable.

Our estimate of the total cost of financial assistance that would be needed as a consequence of the ECC's recommendations is \$4m. This is a modest once-off amount relative to the annual net benefits that we calculated for the recommendations —approximately \$2m per year for the conservative case. The estimate of \$4m would be reduced if other assistance measures discussed in this report and by the ECC were adopted by government.

CONCLUSIONS

The emphasis for this consultancy is on benefit cost analysis, which determines whether there is a net gain or loss to the Victorian economy from the ECC's recommendations. A regional impact analysis for the study area is also provided, which identifies the effects of the ECC's recommendations on local communities.

The benefit cost analysis determined that there is likely to be a net gain to Victorians of about \$2m per year. However, the consequences for the region are not as attractive, the benefit cost analysis indicating only a modest net gain for the conservative case, centred on larger towns, and net job losses of the order of 14 full time equivalents, spread over a larger number of full-time and part-time workers. We have not been able to separate out the regional consequences for urban versus rural people but it is likely that most of the losses will fall outside the major centres such as Bendigo, and that these centres will be net beneficiaries.

It is not surprising that the biodiversity benefits estimated in this study are significant, given the increasing public and scientific concern about the conservation of biodiversity. The biodiversity benefits are estimated on the basis of 'willingness to pay' methodologies. We suggest that the beneficiaries *actually* pay, by contributing, directly or indirectly, to various forms of government assistance.

A substantial proportion of the losses to the region that are likely to arise as a consequence of the ECC's recommendations would have arisen under RFA processes. Under those processes, disadvantaged timber workers would have been eligible for various forms of financial assistance. In addition, the losses are regressive — the ECC's recommendations potentially transfer wealth from lower income people in rural and regional areas to higher income people in urban areas.

We have suggested a number of ways of off-setting the potential inequities in the ECC's recommendations, including providing financial assistance to the people who are adversely affected. None of the suggestions on assistance will satisfy fully the disaffected — the vast majority of those interviewed in the Stage 3 surveys hold strong views about the worth of forest-based industries and obtain significant life-style benefits in addition to the monetary value of their products. Many are distraught at the thought of not being able to continue working in the forests.

Our analysis supports the adoption of the ECC's recommendations from an economic viewpoint, but the social implications suggest that substantial assistance should be forthcoming for disadvantaged forest workers and their regions. Assistance programs should ensure that they are able to adjust to the new forms of public land use with dignity — these people work in heritage industries and have a proud history.

Table 22 Summary of benefits and costs (Stage 3) - all benefits and costs included

	Pessimistic	Conservative	Optimistic
	(\$m per year)	(\$m per year)	(\$m per year)
BENEFITS OF ECC PROPOSALS			
Increased biodiversity and natural values	1.00	2.00	4.00
Increased value of tourism and recreation in new and expanded parks/reserves	0.34	0.97	1.90
Total benefits	1.34	2.97	5.90
COSTS OF ECC PROPOSALS			
Additional park management	0.40	0.40	0.40
Reduction in value of future timber harvest	0.22	0.18	0.14
Reduction in value of future minerals exploration	0.28	0.19	0.10
Reduction in value of future eucalyptus oil production	0.07	0.05	0.03
Reduction in income for graziers excluded from floodplain grazing licences	0.08	0.08	0.08
Total costs	1.05	0.90	0.75
NET BENEFIT	0.29	2.07	5.15

Table 24 Summary of regional and social impacts (Stage 3)

Sector/community	Economic activity (\$m per year gross incomes/expenditure)		Employment (full-time equivalents)		Main towns affected
	Gains	Losses	Gains	Losses	
Tourism industry	\$1.1, \$3.1 , \$6 m*		11, 31 , 60, spread over a number of establishments (restaurants, motels, petrol outlets etc)		Bendigo, Castemaine, Inglewood, Beechworth, St Arnaud, Nagambie, Wangaratta, Benalla, Maryborough, Avoca
Saw mills and timber workers		\$1.6, \$1.3 , \$1.0 m		37, 30 , 23, spread over some full-time workers and many more part- time workers	Rushworth, Heathcote, Avoca, Dunolly, Maryborough, Talbot, St Arnaud
Eucalyptus oil producers		\$0.1, \$0.08 , \$0.05 m		3, 2 , 1*, spread over 5 to 10 workers	Bendigo, Wedderburn
Miners		\$1.1, \$0.7 , \$0.4 m		24, 16 , 8, including large mining companies and full or part-time self- employed miners	Bendigo, St Arnaud, Avoca, Nagambie, Inglewood, Benalla, Beechworth
Grazing enterprises		\$0.08 m		less than 1 , probably spread over 70 grazing enterprises	Nathalia, Numurkah, Picola
Parks Victoria	\$0.40 m		4		Bendigo, Wangaratta, Benalla
BALANCE**	\$1.34 m			14 FTE	

* Pessimistic, Conservative, and Optimistic cases, respectively

** Based on conservative case

Appendix 6: Submissions from groups

Group	Sub no
Albury Lapidary & Allied Crafts Inc	185
Albury Wodonga Orienteering Club	1371
Albury-Wodonga Environment Centre	1025
Alexander Land Protection Association Inc	595
ALP Green Network	1261
Antrim Stained Glass & Gifts	795
Ararat & District Field Naturalists Club Inc	1262
Ararat Landcare Group Inc	111
Artisoz Web Publishing, Video Productions & Photography	350
Atisha Centre	51
Atriplex Services	610
Australian Bowhunters Association, Greater Victorian Branch	575
Australian Democrats	958
Australian Greens, Bendigo Branch	446
Australian Heritage Commission	165
Australian Institute of Geoscientists, Victorian Branch	1026
Australian Institute of Mining & Metallurgy, Central Victoria Branch	L38
Australian Labor Party, Maryborough Branch	730
Australian Native Orchid Society Victorian Group	1160
Australian Plants Society Victoria Inc	76
Australian Woodlands Conservancy	1161
Australian Workers Union, Victorian Branch	1192
Ballarat Goldfields N.L.	1020
Ballarat Light Car Club	959
Barkly Park Committee of Management	1162
Barmah Forest Preservation League	L34
Barrie Johnson Detector Sales & Service	528
Bayside Bushwalking Club	332
Bealiba & District Pony Club	1021
BEAM-Mitchell Environment Group	1195
Beechworth Environment Group	1163
Beechworth Mining Co	994
Beehive Company	369
Benalla Field & Game Inc	1331
Bend of Islands Conservation Association	960
Bendigo & District Adult Riding Club	726
Bendigo & District Environment Council Inc	275
Bendigo Alpine Club	368
Bendigo Car Club	794
Bendigo District Donkey & Mule Club	455
Bendigo Field & Game	395
Bendigo Field Naturalists Club Inc, Mammal Study Group	798

Group	Sub no
Bendigo Gem Club Inc	250
Bendigo Mining N.L.	180
Bendigo National Park Group	1022
Bendigo Neerim Plant Group Inc	712
Bendigo Orienteers Inc	725
Bendigo Pistol Club Inc	488
Bendigo Reef Action Group	743
Bird Observers Club of Australia	1165
Birds Australia	1046
Birds Australia, Victorian Regional Group	1164
Brisbane Metal Detectors Club	1366
Broken Creek Field Naturalist Club Inc	716
Broken Creek Improvement Landcare Group	713
CAMS Limited	1045
Capilano Honey Limited	106
Castlemaine Cemetery Trust	110
Castlemaine Community House Inc	962
Castlemaine Field Naturalists Club Inc	1023
Castlemaine Slate, R.& A. Maltby & Sons	133
Centaur Mining & Exploration Ltd	367
Central Goldfields Shire Council	961
Central Victorian Apiarists Association	1024
Cheong Park Gem & Mineral Club	233
Chewton Domain Society Inc	593
City of Greater Bendigo	422
Coliban Water	447
Colonial Park Stud & Show Preparation Centre	228
Construction Materials Processors Association, Special Issues Committee	1166
Costerfields Residents	1019
Country Fire Authority, North Central Area Region 2	71
David Bishop & Co	565
Deakin University, Landscape Ecology Research Group	1000
Department of Defence	752
Department of Infrastructure	L52
Dunolly Horse Activity Club Inc	974
Echuca Gem Club	423
Ecological Surveys & Planning Pty Ltd	539
Eldorado General Store	224
Ellerslie Pastoral	1207
Endmore Pty Ltd	1043
Environment Victoria Inc	1167
Environmental Review Committee	979

Appendix 6
List of submissions received on the Draft Report (May 2000)

Appendix 6: Submissions from groups (continued)

Group	Sub no
Essendon Lapidary Club Inc	1044
Euroa Environment Group Inc & Euroa Arboretum Inc	1308
Federation of Victorian Walking Clubs Inc, Vicwalk	351
Field & Game Australia - Bendigo Inc	249
Field & Game Australia Inc	1041
Field & Game Australia Inc, Clunes Branch	L84
Field Naturalists Club of Ballarat Inc	963
Field Naturalists Club of Victoria	793
Freight Australia	393
Friends of Big Hill	L117
Friends of Chiltern National Park Inc	1185
Friends of Mount Alexander Diggings	1017
Friends of the Box-Ironbark Forests, Mount Alexander Region	1173
Friends of the Warbys	1040
Geelong Environment Council Inc	964
Geelong Gem & Mineral Club Inc	129
Gell's Honey Maryborough	392/1276
Glen Eira Environment Group Inc	590
Gold Net Australia Online	333
Gold Search Australia	1170
Golden Gully Tourism Services	1169
Golden Point Landcare Group	1206
Golden Point Orchard	1204/1205
Golden Triangle Caravan Park	981
Goldfields Club of South Australia	1203
Goornong Rural Fire Brigade	487
Goulburn Broken Catchment Management Authority	1260
Goulburn Valley Environment Group Inc	1013
Goulburn-Murray Water	1312
Great Dividing Trail Association	293
Green Triangle Enduro Club	356
Gregson Consulting	168
Guildford Primary School	448
Hamilton Field Naturalists Club	1039
Hartland's Eucalyptus Distillery	1171
Hepburn Shire Council	L44
Heritage Victoria	781
Hilltop Cottage Rose Gardens	1172
Historic Rally Association	274
Horsham & District Lapidary Club Inc	965
Hunters Discussion Group	1202
Hunting Advisory Committee	L20

Group	Sub no
Indigenous Flora & Fauna Association	L69
Indigo Shire Council	164
Ironbark Heritage & Tourism Group	710
Ivanhoe Fossickers Club Inc	391
J. & S. McCluny & Co	302
Jones Eucy Factory	L66
Kalimna Park Preservation Committee Inc	1035
Kaweka Wildflower Reserve Committee of Management	1201
Kerang Lapidary Club	968
Kooroongoora Rockhounds	64
Latrobe University Bendigo, Depart. of Outdoor Education & Nature Tourism	792
Listening Earth	334
Loddon Shire Council	1036
Lower Broken Creek Pumpers Association	966
Maldon Heritage Committee	1309
Maldon Urban Landcare	1200
Maryborough Field Naturalists Club Inc	724
Maysleith Farms Pty Ltd	967
Melbourne Walking Clubs	199
Midlands Historical Society Inc	729
Miners Den	102
Mitchelton Wines Pty Ltd	564
Monash Sporting Car Club	352
Mordialloc Lapidary Club Inc	969
Mount Alexander Diggings Committee	295
Mount Alexander Shire Citizens Association Inc	390
Mount Alexander Shire Council	L08
Mount Sugarloaf Protection Society	L83
Muckleford Catchment Landcare Group Inc	819
Murray-Goulburn Bird Observers Club	389
N.H.Hall Pty Ltd	52
National Native Title Tribunal	7
National Parks Advisory Council	L120
National Trust of Australia (Victoria)	1180
Neilborough Apiaries	1075
Newstead & District Historical Society Inc	566
Newstead Landcare Group	709
Ngurai-illam Tribe, Mute Speakers	731
Nissan Car Club Australia, Nissan Nightmoves Trial	1174
North Central Catchment Management Authority	1034
North Eastern Apiarists Association	1014
North Eastern Car Club Inc	L61

Appendix 6: Submissions from groups (continued)

Group	Sub no
North Eastern Deer Stalkers Association	1259
North Grampians Shire Council	718
Nuggety Hill Store	335
Outdoor Press Pty Ltd	294
Overland Gold Adventures	970
Pascoe Vale Naturalists	971
Peninsula Field Naturalists Club	486
Perseverance Corporation Ltd	1376
Prospectors & Miners Association of Victoria Inc	77
Prospectors & Miners Association of Victoria Inc, Central Victorian Branch	1033
Prospectors & Miners Association of Victoria Inc, Gippsland Branch	722
Prospectors & Miners Association of Victoria Inc, South Western Branch	721
Prospectors & Miners Association of Victoria Inc, West Gippsland Branch	449
Prospectors Home Club Inc	485
Public Land Council of Victoria Inc	89
Pyrenees Apiaries	450
R.C.& D.J. Phillips Pty Ltd	1199
Reef Mining N.L.	296
Reference Areas Advisory Committee	537
Returned & Services League of Australia, Stawell Sub Branch	972
Riverbank Caravan Park	1179
Rockhounds Maffra	723
Rural City of Wangaratta	786
Rushworth & District Lions Club	1258
Rushworth National Park Advancement League	1037
Rushworth Urban Fire Brigade	720
Scrumptious Pty Ltd	782
Seymour Field & Game Inc	1031
Shepparton & District Gem Club	366
Shepparton Adult Riding Club	424
Shepparton Field & Game Inc	1311
Shire of Campaspe	1175
Shire of Campaspe, Southern Ward	1.62
Spring Gully Reservoir & District Environment Group Inc	273
St Arnaud Field Naturalists Club Inc	451
St Arnaud Motorcycle Club	353
St Arnaud Tyre Service	425
St Arnaud Urban Fire Brigade	365
Stawell & District Field Naturalists' Club	1032
Stawell Conservation Group	354
Stawell Gold Mines Pty Ltd	388

Group	Sub no
Stuart Mill Water Supply Incorporation	72
T. W. Jones Hewn & Sawm Box-Ironbark Timber	1016
Tahbilk Pty Ltd	90
Talager Pty Ltd	717
Taradale & District Walking & Landcare Group Inc	1030
Tarnagulla Cleaning Service & Kleen Heat Gas Supplies	975
Taylors Home Centre	1218
The Diggers Hut	1266
The Horse Riding Clubs Association of Victoria Inc	1.80
Timber Communities Australia	1176
Timber Communities Australia, Rushworth Branch	1015
Torch Bearers of Freedom	617
Tourism Victoria	1.47
United Dairyfarmers of Victoria, District Council 10	1.63
Vernons Eucalyptus Distillery	538
Vicroads	78
Victoria Prisons Practical Pistol Club Inc	1.09
Victorian Apiarists Association Inc	719
Victorian Association of Amateur Herpetologists	117
Victorian Chamber of Mines	1177
Victorian Eucalyptus oil Distillers Association	1168
Victorian Farmers Federation, Central Goldfields Branch	1310
Victorian Farmers Federation, Land Management Committee	1257
Victorian Fossickers Club	1198
Victorian Game & Deer Stalking Association	973
Victorian Gem Clubs Association Inc	200
Victorian Metal Detectors & Prospectors Association Inc	355
Victorian National Parks Association	1178
Victorian Orienteering Association Inc	1018
Victorian Rogaining Association Inc	714
Victorian Seekers Club Inc	1070
Waggarandall to Katamatite Landholders	105
Wangaratta Four Wheel Drive Club Inc	128
Warral Apiaries	1350
Warrnambool Gem Club	336
Wedderburn Tourism Inc	1184
Western Suburbs Lapidary Club of Victoria Inc	426
Whipstick Apiaries	196
Whroo Miners Retreat	145
Wimmera Honey	1029
Yundool School Site Committee of Management Inc	364

Appendix 6: Submissions from individuals

Name		Sub no
Ablett	Janet	1067
Abson	Rodney	1347
Adair	Dorothy	708
Adams	John	603
Ahern	L.D.	1361
Al-Dabbagh	Khalid	568
Alden	Jennifer	484
Alderson	John J.	707
Alderton	Anna	L4
Alderton	C.G.R.	109
Alexander	Karen	1256
Allam	Fred & Wilma	526
Allen	Kathryn	1157
Allen	Tom	894
Allsop	David	L81
Anania	Joseph	4
Anderson	Don	L59
Anderson	Mark	1155
Andrews	R.B.	248
Andruchow	Pat	1064
Anfruns	Peter	1028
Anstey	Lorna M.	1288
Anstey	Ronald W.	826
Antos	Mark	123
Argall	Thelma G.	865
Armour	L.J. & J.A.	207
Armstrong	Peter	278
Armstrong & family	Ron & Margaret	L56
Arundell	Elizabeth M.	483
Ash	John	1352
Ashby	J.R.	23
Astbury	Don	27
Atkins	Paul	563
Atkinson	Elaine	1154
Aughton	Ida & Bob	349
Austin	Debbie	415
Averay	David	1065
Avery	Hugo	939
Bacon	Jenny	935
Badminton	Margaret	1255
Baehnisch	Bruce	525
Baker	Alex	1181
Baker	Marilyn & Alan	524
Ballinger	Megan	292
Bamberger	John	480
Bamford	John	827

Name		Sub no
Banks	Chris	259
Bannear	David	317
Barber	Gloria B.	363
Barclay	Helen	331
Bardsley	John	19
Barker	Janet	271
Barkla	David J.	144
Barnham	Stephen	79
Barr	Ailsa	481
Barr	Alan	482
Barrett	Heather & Neil	706
Barrett	Heidi	361
Barri	Mark	1355
Barry	Patrick T.	1068
Bartlett	Colin	562
Barwick	Graeme	705
Bashford	Garry	1069
Baxter	F.I.	360
Baxter	Lorraine	L50
Baxter	Rohan	139
Baxter	Stewart & Wendy	1289
Baxter MLC	W.R.	820
Bear	M. & M.	445
Beattie	Barbara	122
Beattie	Darren & Leanne	658
Beattie	K. & K.	657
Beattie	N. & L.	656
Beck	Geoff	359
Beck JP	Bruce M.	L23
Beckett	Shane	199
Beecher	Alan	737
Beer	Catherine	1252
Bek	Mark	48
Belfrage	Jane	755
Bell	Cheryl A.	1253
Bell	John	1254
Bell	Judy	L110
Bell	Neville	63
Bellamy	Mike	121
Bellette	Marc	736
Bendigo*		1333
Bennett	L.	1012
Bentley	David	1287
Bentley	Rita	1153
Bertalli	David	478

Name		Sub no
Beringer	Almut	479
Berwick	Sue	1152
Best MLC	R.A.	818
Bickford	Allan	523
Bickford	David	533
Billings	John	527
Bilney	Ray	1251
Binney	Deryl	561
Birch	Suzanne	1250
Bird	Graeme	41
Birthisel	T.N.	864
Bishop MLC	Barry	L73
Bittles	Charmaine	126
Black	Neil	266
Black	R.	976
Blackney	J.R.	1249
Blackwell	B.C.	452
Blake	Cathie	829
Bland	Jim	477
Blyth	B.H.	576
Bond	Richard J.	247
Bormann	Robert	936
Bosnjakovic	B.	258
Bosnjakovic	J.	213
Bosnjakovic	Mary	214
Botheras	Gary	655
Bottari	Margaret	1290
Botterill	Laura	1151
Boundy	Keith A.	215
Bourke	C.W. & W.J.	1063
Bourke	D.F.	L15
Bourke	E.J. & M.T.	L16
Bourke	N.	154
Bradbury	G.N. & D.J.	704
Brain	Lindsay	830
Breaden	Andy	937
Bretton-Watson	B.	L70
Bridley	Anne	476
Brindle	Monica	940
Brisbane	Jeff P.	L77
Bristow	Peter	291
Broad	Robert J.	348
Broadway	George	475
Brock	Daniel	756
Broderick	Kate	583
Brooks	R.H. & B.M.	40
Brown	Doug	1353

Name		Sub no
Brown	Heather	895
Brown	John	15
Brown	N.R. & D.D.M.	1374
Browne	Lyla J.	L114
Brumby	Dorothy	831
Bruning	Miriam R.	1156
Bryer	Julie	840
Bucci	Leah	866
Buckley	Wayne	268
Budge	Trevor	757
Bull	Alan K.	1150
Bull	Lenore A.	1149
Bumfrey	Betty J.	941
Bunting	Janet	17
Burris	Suzanne	347
Burris	W.B.	1248
Burt	Ella	832
Burt	L.G. & M.M.	529
Burtonclay	John	290
Butt	Andrew	867
Butter	Cliff & Anne	1071
Byass	Rosalind	896
Byrne	M.	938
Byrne	Tamsin & Pat	1286
Byron	Geoff	817
Cadmore	Ray	758
Cains	Michael	1372
Cambrey	Rex	16
Cameron	John	759
Cameron	Les	116
Campbell	Don	1327
Campbell	John	68
Campbell	R.W.	833
Candy	John	1285
Cane	Max	1148
Carboon	H.V.	246
Carboon	Roma	245
Carless	Ronald L.	1284
Carr	Marcia	120
Carroll	Denis M.	868
Carroll	G.	532
Carter	A.	897
Carter	Andrew	703
Carter	Doug	L111
Carter	Jacqueline	760
Carter	L.	898
Carter & family	Monica	L21

Appendix 6: Submissions from individuals (continued)

Name		Sub no
Carthew	Stephen	416
Cass	Jim	357
Chaffey	Tania	474
Challis	Tom	L91
Chamberlain	Beth	1107
Channing	Toby	834
Chater	Cecily M.	414
Cheers	Brenda & Garry	1193
Chenery	Mary Faeth	816
Chmielewska	Barbara	270
Christie	G.M. & J.W.R.	1283
Church	Charlie & Jenny	345
Church	Leonard J.	276
Church	W.R.	L19
Gincotta	Frances	1062
Claris	Ricky	653
Claris	Shilo	654
Clark	Brian & Maree	1147
Clark	John H.	1291
Clark	Kay	1072
Clark	Rod	702
Clark	Woody	1336
Clarke	M.I.	1010
Clarke	Sally M.	522
Cluney	Marie	761
Cohn	Shelley	560
Cole	Jenny	815
Cole	Nina	652
Coles	Wallie H.	1011
Collie	Slobhan	18
Collier	Jenni	814
Comber	G.V.	L39
Comrie	Christopher	762
Conn	John F.	520
Conn	Margaret	521
Connell	Paul	1282
Conquer	Ean & Nyree	835
Cook	A.D.	L106
Cook	Damien	1061
Cook	Frank	L95
Cook	Louis	L49
Cook	Pat	651
Cook	Peter	519
Cooper	Cam	942
Cooper	Elsie	316
Cooper	John I.	943

Name		Sub no
Copley	Caroline	753
Corner-Simpson	Gail	362
Costa	Louise	82
Costermans	Leon	763
Courtney	Eileen	104
Cousins	George	171
Cowen	Frank	606
Cox	N.C.	315
Cremmins	Valma & John	358
Croke	Geoffrey	1281
Crothers	John	1191
Cuffley	Brian W.	711
Culvenor	Beverly	170
Curtis	Elizabeth & Lloyd	1280
Curtis	Helen	50
Curtis	Nancy	346
Curtis	Peter	701
Curtis	Syd	518
Cutler	Noel	39
Dale	Bill	261
Dale	Lindsay G.	559
Dalgliesh	Will	836
Dalman	Claire	963
Dalziel	Lesley	735
Darcy	Judy	837
Dashwood	Robert	700
Davidson	Ian	473
Davidson	Matthew	1146
Davidson	Rosemary	57
Davidson	Terry	977
Davies	Anna	1279
Davies	David	10
Davies	Doug & Yvonne	L13
Davis	A.	216
Dawes	Les K.	124
Dawson	J.E.	212
Day	Brian	1247
Day	E.R.	650
Day	Kenneth	211
Deal	Russell	699
Deayton	Gary	L24
Deayton	Lisa	1246
Deboo	M.H.	314
Dehaan	John & Joan	1325
Dehm	Julia	813

Name		Sub no
Delai	Joe	838
Dempster	Rachel M.	313
Dentry	John & Shirley	153
Derrick	E.	649
Devlin	Doug	2
Dickie	John	L74
Dingwall	Jennifer	1008
Dixon	W.	169
Dods	John & Jan	95
Dodson	Audrey	L7
Dodson	Jeff	143
Doncon	Daryl W.	1106
Dooley	Sean	899
Douglas	Bruce	181
Douglas	Jeff	558
Douglas	Linda	1073
Douglass	Ian S.	869
Dow	Malcolm	81
Downing	Phil & Kay	69
Downs	John	1105
Doyle	Steve	L89
Dredge	Ken & Maureen	387
Drehlich	Friedrich	312
Driscoll	Daryl W.	471
Driscoll	Heather J.	472
Duff	Estelle	839
Duggan	Shane	49
Duke	Jennifer J.	870
Duncan	Susie	1027
Dunse	Yvonne & Robin	344
Durant	Ashley	217
Durham	Geoff	289
Dzioka	T.R.	557
Eales	Kathryn	812
Eastaway	Norma	933
Ebert	W.G.	1060
Ebery	Alla	828
Edmonds	John	1354
Edwards	Cranston	791
Edwards	Sandy & Rod	764
Ellis	Peter N.	1145
Ellis	R.J.	L14
Ellis	Reg	386
Elmi	Robyn	288
Emmins	Kevin	1144

Name		Sub no
Estoppey	D.	1351
Evans	David	1342
Evers	Jill & John	13
Falconer	Doug	607
Falconer	Stephanie	579
Falkenberg	W.G.	1278
Family	Slee	370
Farnan	Jane	287
Fawkner	Geoffrey	1074
Fazzolari	Mick	1356
Finegan	Pat	1245
Fischer	A.U.	1348
Fischer	Anneliese	1277
Fitzsimons	James	311
Flack	Alan	765
Flack	Jan	932
Flanigan	James E.C.	1329
Flanner	Barry	577
Fleming	Anthea	1009
Fleming	Brian	343
Flora	Rosemary	L102
Floyd	Geoffrey W.	470
Foran	I.	385
Forbes	Peter	698
Ford	Brett	198
Ford	Douglas W.J.	L55
Ford	L.I. & S.C.	197
Foster	Jean	L40
Foster	Lyn	1187
Foster	Patricia	310
Fowler	Lynton & Carmel	83
Fowler	Valerie	556
Fox	Lee	38
Fox	Peter A.	1244
Francis	Ray	384
Francis	Wayne	383
Franklin	A.B. & L.E.	22
Fraser	Graham & Pam	L3
Fraser	Peter	244
Fraser	Sophie	468
Free	Edward C.	900
Freeman	Katherine	260
French	Rob	567
French	Shane	1292
French	Wendy	1243
Friar	A	74

Appendix 6: Submissions from individuals (continued)

Name		Sub no
Frost	Garnett	151
Frost	Megan	1293
Fry	Brian D.	469
Fullarton	Greg	309
Furphy	Clem & Kate	809
Furphy	Jane	810
Furphy	Sam	692
Futo	Les	1242
Gambold	G.R.	555
Gannon	William	97
Garbellini	William	308
Gardner	M.	413
Gardner	Stewart	381
Garnett	Penelope	155
Gee	L.P.	210
Gell	Rod	444
Gemmill	G. & D.	1360
Gence	Baldus & Georgina	1059
George	Jean	206
Geradts	Karin	790
Gibbs	Gregory	25
Gibson	Peter	1275
Gibson	Raymond	1076
Gigliotti	Tony	648
Gilbert	Michelle	1337
Gilbert	Penelope	1332
Gill	Ian	182
Gillard	Ian	112
Gillespie	Colin R.	1294
Gillespie	Neil	118
Gillings	June	142
Glanville	Maurice R.	15
Gledhill	C.T.	262
Gleeson	John	841
Gleeson	Linron	871
Glen	Max	517
Gloury	Nancy	554
Gloury	P.H.	16
Godde	Terry	37
Goldsmith	Lenard	1077
Goonan	Richard	872
Gould	W.D.	412
Goulden	John & Margaret	647
Graham	John	117
Graham	Roslyn	930

Name		Sub no
Graham	Sue	1058
Grant	Irene & Gavan	342
Gravenor	D. & T.a	611
Gray	J.	137
Gray	Jocelyn	1121
Gray	Jocelyn E.	138
Gray	John P.C.	985
Gray	N.	136
Gray	Peter T.S.	135
Green	Darren	67
Green	Kylie	1143
Green	Martin J.	808
Greenhalgh	R.M. & J.E.	420
Greer	John	1322
Greig	Marty	122
Gribble	Pauline	1241
Griffin	Ken	646
Griffiths	John	114
Grigg	Martin	108
Grinblat	Harry	56
Grummett	Eric	66
Guardiani	Anthony	269
Guardiani	N.	645
Gunn	Miriam	754
Gurney	Cara	1240
Hadden MLC	Dianne	101
Haines	Luke	842
Hall	Anne	612
Hallam	Christine	1274
Ham	Peter W.	580
Hammond	K.C.	1115
Handley	Graeme	70
Hanly	Rita	443
Hannon	Geoff	873
Hansen	K.G. & M.A.	1359
Hapke	Peter	1142
Hardman MP	Ben	160
Harker	James	1295
Harkin	Virginia	613
Harper	Ken	382
Harper	Lee	697
Harris	Brian	863
Harris	Geoff	821
Harris	Geraldine	1001
Harris	Lincoln	1078
Harris	Michael	1092
Harris	Natasha	931

Name		Sub no
Harrison	Gordon	164
Harrison	Neil	602
Harrison	Samuel	1141
Harry	Robert & Barbara	1057
Hart	Frank	178
Hart	Michael	1079
Hartmann	Rick	585
Harvey	Kevin & Shirley	644
Hassall	Mike	75
Hattersley	Margaret	341
Hawker	John	1140
Hawkins	Jennifer	766
Hay	Peter	553
Hayward	Ian	134
Hayward	Richard	113
Hearn	Maureen	944
Heathcote	Abbie & Bridget	24
Hedt	Chris	696
Helmore	Sharon D.	172
Henderson	Allan	179
Henderson	Christine	330
Henderson	R.J.	1239
Herd	H.M.	125
Herrmann	Gerd & Ericka	80
Heuperman	Alfred	843
Hewston	Estelle E.	516
Hewton*		1335
Higgins	Frank	1080
Higgins	Jessica	643
Higgins	Olivia	695
Higgins	Terry	1139
Hill	Gwyneth J.	307
Hill-Coleman	Louise	861
Hines	F.C.	256
Hines	M.L.	257
Hines	Yvonne	581
Hinkley	Simon	694
Hinzes	Regina	182
Hird	Peter	442
Hird	R.N.	255
Hoath	Dean	1138
Hockley	Ian	110
Hodges	Graeme & Sue	230
Hodgson	Jason	243

Name		Sub no
Hodgson	Neil	329
Hogan	Elvyne	807
Holland	Isobel	1137
Holland	Jean & Arthur	806
Holland	Karen	441
Holland	Keith & Jeanette	1135
Holland	M.V.	1081
Holland	Morice	1136
Holland	Neville	1134
Holland	Sue	1082
Holmes	E.J. & A.R.	1358
Holmes	Greg & Georgie	1296
Holsworth	W.N.	1002
Holyman	Stuart	1133
Horner	David	535
Hone	Lloyd	172
Hooper	Anthony	1273
Horrocks	Greg	411
Hortle	Allan	901
Houston	R.B.	902
Hovius	Mary	1132
Howard	Julie	29
Howard-Jones	Mark	805
Howe	Bill	784
Howes	Hilary	1042
Howes	John W.	119
Hubert	Clive	53
Hubert	L.	46
Huck	J.	1066
Hughes	Anne	410
Hughes	Rae	874
Hull	Ken	642
Humphreys	Margaret	167
Hunt	D.G. & M.J.	1328
Huzzey	Jeff	1131
Ingamells	Phillip	1083
Ipsen	John G.	945
Irwin	William	601
Ives	Helen	862
Jacobs	Ann	306
James	Richard	36
Jamieson	Gavin	804
Jamison	John E.	946
Janner	F.W.	641
Jasper MP	Ken S.	165

Appendix 6: Submissions from individuals (continued)

Name		Sub no
Jefferson	Terry	340
Jeffrey	Pappin	L67
Jenken	Deborah	929
Jenkins	Ches	1007
Jenkins	Robyn	1130
Jerome	Catherine	515
Jerome	K.	552
Jessup	Rachel Ann	286
Jessup	Scott	1084
Johns	Brian J.	875
Johnson	Allan	594
Johnson	Kathryn	693
Johnson	Peter	1085
Johnson OAM	H. R.	11
Johnstone	David	L105
Jones	Amy, James & John	1038
Jones	Alan	600
Jones	Betty M.	409
Jones	Betty M.	1159
Jones	Beverley I.	1297
Jones	Dianne	L96
Jones	George M.	803
Jones	George S.	845
Jones	John	30
Jones	Kaye M.	846
Jones	Mike	640
Jones	Paul	305
Jones	Philip & Albert	1129
Jones	Ron	860
Jones	Shirley E.	380
Jones	Stuart A.	1238
Jones	Ted W.	1016
Jones JP	John F.	379
Jordan	Colin & Lyn	1237
Jorgensen	Kevin	928
Jorgensen	Mark	62
Justin	Robert	947
Kaefer	Frank	14
Kaitler	Tom	1056
Kavanagh	John	582
Kavanagh	Patrick	304
Kay	Don	767
Kay	John	531
Kean	Robert	847
Kee	Margaret E.	903
Keenan	Jarrah	691

Name		Sub no
Kellehan	P.J.	1346
Kelly	Daydd	467
Kelly	Helem M.	690
Kelso	H.	926
Kelynack	Robert	1182
Kemsley	Delwyn	263
Kennedy	Neil & Margaret	285
Kennedy	Pat & Frank	328
Kennedy	Simon	825
Kennett	Jeffrey W.	466
Kent	Raoul & Patricia	639
Kern	Lincoln	61
Kinghorn	Phillip	229
Kinsey	Fiona	1128
Kirby	D. & G.	738
Kirsten	Indre	96
Kneebone	Barbara	1086
Kneebone	W.H.	1236
Knight	Robert	1003
Kraemer	Audrey	689
Krkonoska	Elizabeth	421
Krohn	Jack	586
Kuhlen	Richard	54
La May	Valerie E.	L93
Laboureau	Delphine	629
Lacey	Geoff	1127
Ladds	Genevieve	1357
Laidley	Mark	927
Lambie	David	1190
Land	Pam & John	L92
Langenhorst	Fred	327
Langford	Brenda	156
Lansley	Peter	1126
Lanzi	D.	1125
Larin	John	218
Law	Thelma	L116
Lawrence	Bruce & Dennice	948
Lawrence	P.J.	440
Laycock	Ben	1235
Laycock	Judith M.	L43
Laycock	Peter	605
Laycock Walsh	Rylka	1212
Laycock-Walsh	Family	84
Leary	John	638

Name		Sub no
Leatham	C.	219
Lechte	Graeme & Sharon	L53
Lee	Anne	1234
Lee	Arthur J.	637
Lee	Elizabeth J.	242
Lee	Karen	636
Lee	Roger	635
Lehmann	Christine	284
Leitch	Garry	127
Lenfer-Thomson	Asadeh	112
Leone	Carmela	511
Leversha	Mary & Don	907
Lewis	Barry	530
Lewis	Maurice	47
Leyland	Morry & Liesl	12
Lidgerwood	L. & L.	45
Lidgerwood	Peter	55
Liebert	Andrea	1004
Lister	Stuart	551
Lloyd	Patricia J.	378
Lobley	Noel	514
Lobosco	Tony	L54
Lockwood	Nell & Pat	326
Lodge	Geoff	768
Lodge	Stephen	1373
Loftus-Hills	Lois	L97
Lomas	D.	176
Lonie	Neil & Pat	604
Lottkowitz	Kate	925
Lougoon	Charles	688
Lowe	Kathryn R.	L2
Lubke	G.A.	1087
Lucas	D.	924
Lucas	G.W.	922
Lucas	Karthy	241
Lucas	Warren	584
Lynch	Penny	1345
Mabucke	Bill	L1
Mackay	Geraldine & Abraham	325
MacMillan	Andrew	769
MacNally	Ralph	550
MacNeill	A.	303
Madigan	Ellen	949
Maggs	Barry	240
Maguire	Patrick	L112

Name		Sub no
Mahon	Simon & Elise	20
Maltby	Dennis & Christine	789
Mann	Catherine	L28
Mann	Sally	1005
Manohtsakis	Manuel & Shirley	L41
Mansfield	B.J.	173
Marino	Guiseppe	513
Markey	Mary	85
Marks	John	634
Marold	Linda	125
Marold	M. & L.	L75
Marold	Mischael	1006
Marriott	Nancy	205
Marriott	Neil	324
Marshall	A.H.	597
Marshall	L.K.	512
Martin	David	1349
Martin	Liz	878
Mason	Howard	549
Matthews	Greg & Judy	1330
Maughan MP	Noel	L45
Maund	Barbara	195
McAdam	Seve	1272
McAlpin	Ann	465
McArdle	T.R.	201
McCann	I.R.	934
McCarthy	Joseph	633
McCaughey	Grace	848
McClure	Malcolm J.	254
McConville	Doug	283
McCormack	J.F.	239
McCracken	Elizabeth	950
McCrohan	Damian	L26
McDonald	R. & E.	923
McDonald		157
McDonald	Bryan	1344
McDougall	R.	464
McFarlane	Jill	132
McGowan	Paul	L31
McGregor	B. & A.	408
McGufficke	C.B.	510
McHardy	Andrew	849
McKay	Robert L.	687
McKenry	Rosemary	438
McKenzie	Cheryl	158

Appendix 6: Submissions from individuals (continued)

Name		Sub no
McKenzie	Peter	174
McKillop	I.	632
McKinnon	Sue	159
McLeish	John	439
McLeod	Andrew	168
McLeod	S.S.	893
McLeod	Sandra	1158
McLurg	Jim	209
McManus	Kevin	1298
McMullen	Claire	850
McNamara	James W.	508
McNamara	W.J.	509
McShanag	Lynn C.	770
McVicar	Judy	1088
Meadows	R.K.	166
Meaklim	P.	548
Mealia	John	1271
Mee	G.F.	65
Michael	Belinda	1233
Miles	Eric	1231
Miles	Rita	1232
Miller	Darren	771
Miller	Sarah	136
Milley	R.E.	437
Mills	G.F.	951
Mills	Ivan N.	463
Mills	Margaret J.	377
Mills	N.J.	407
Mills	Rita	462
Milthorpe	Pat	1089
Miron	Bernard	146
Mitchell	Bette	436
Mitchell	I.G.	157
Molloy	Leah	220
Monahan	David & Lynette	1123
Mookhoek	A.V.	686
Moor	Pat J.	978
Moor	Peter	1122
Moore	E.D.	802
Moors	R.H. & G.J.	631
Morgan	Angela	1230
Morgan	George	739
Morgan	R.	21
Morgan	Sally	1270
Morgan	W.D. & H.	1121
Morieson	John	685

Name		Sub no
Morison	Peter	461
Morley	Isobel	194
Morris	Chris	630
Morris	John	684
Morrison	Ken	547
Morrow	Geoff & Margaret	227
Morton	Tony	574
Moylan	Eddie	683
Muir	Max	880
Mullane	Elisha	1124
Mullett	Trudi	879
Munro	Angela	253
Munro	J.J.	682
Munro	Karina	881
Munro	Lyn	882
Murfett	Barry	1229
Murley	Colin & Marie	460
Murphy	F.C.	507
Murphy	Gayle	506
Murphy	Geraldine	1090
Murphy	Jim	1321
Murray	Jean	194
Myles	Brian L.	505
Nad	Danielle	1370
Naish	Terry	35
Nankivell	K.J.	226
Needham	Douglas	9
Needs	Mavis	1055
Neill	R. & R.	435
Neilson	David	1299
Nevill	Geoff	1320
Newman	K. & L.	404
Neylar	Dawn	188
Nicholls	Felicity	1228
Nicholls	V.	277
Nielsen	Rod	906
Norden	Bruce	238
Norden	Wendy J.	237
Norris	Jim	1091
Norris	Ken & Barbara	859
Norris	Kerrie	883
Norris	L.G. & P.M.	1227
Novak	Mike	772
Novak	Rod	788
Nowell	Dennis	178

Name		Sub no
Nurse	S.	614
Nye	A.	160
Oakes	Michael	146
O'Brien	Kevin & Marj	1226
O'Brien	Phyllis	844
O'Connor	Peter	115
O'Dal	John	746
O'Dal	Lorraine	852
O'Dal	Michael	681
O'Dal	Sally	999
Odgers	Rex & Julie	680
Officer	Colin	1111
O'Gallagher	Ellen	587
Ogilvie	Harold	161
O'Hara	Coral V.	232
Old	K, E, J. & M.	1054
Oleszek	Z.	1225
O'Mahoney	Lee	679
Ormond	Gwen	1093
Ormond	Rex & Judith	952
O'Rourke	Denis	301
Orr	C.A.	1194
Orr	Helen	504
Orr	Rodney	1269
Orthehook	K.	1053
Osredkar	F. & J.	1364
Paige	J.	236
Pallett	Les	111
Palmer	Ralph	578
Panter	Frank	1052
Panter	Margaret	1196
Pardee	Marshall	678
Parish	Alison	135
Park	Brian L.	300
Parker	Pat	851
Parnaby	David K.	376
Parnaby	Shirley J.	323
Passmore	Andrew	34
Patrick	Ian	876
Patrick	Keiran C.	1301
Patrick	Lindsay	1369
Patrick	Murray K.	130
Pattie	Steve	877
Paul	Terry	1050
Pearce	Alan B.	434
Pearce	Greg A.	107

Name		Sub no
Pearce	Rosemary	1104
Pease	Richard	980
Peidy	L.H.W.	1224
Pender	Kirsten	417
Pentland	Dorothy	628
Perkal	Haviva	403
Perkins	Ern	732
Perkins	Lesley	406
Perry	B.M.	433
Perry	Elise	432
Perry	Michael	1051
Perry	Val	94
Pescott	Trevor	1118
Pethybridge	L.C. & J.A.	1049
Phillips	Bruce	503
Pianta	Debbie	715
Pickthall	Robert	747
Picone	Andrew	823
Pigdon	Pat	133
Piggott	Steve	598
Pilling	Trish	405
Pitaro	Joan	884
Plowman MP	Tony	282
Plowright	Jill	198
Plowright	Peter	93
Porter	Rosemary	1319
Powell mp	Jeanette	148
Poyntz	Gary	748
Pratt	Gordon	677
Priestley	Fay	1223
Probst	Bill	318
Puckey	T.M.	1362
Purser	Simon	339
Purvis	Leah	1338
Quinn	Bruce	824
Quinton	Ann	627
Radford	June	675
Radford	Natasha	676
Raeburn	Diane M.	502
Ralph	Adam	1300
Ralph	Doug	674
Ralph	Kerry & Stuart	281
Ralston	Janet	149
Ralton	Greg & Glenda	1375
Randell	Peter	176
Rasin	Clay	1222
Rath	Gill	615

Appendix 6: Submissions from individuals (continued)

Name		Sub no
Raven	Graeme	459
Raybould	John	264
Rea	Benjamin	773
Reed	Graeme	774
Reed	Lucy	801
Reid	Beverley	885
Reid	Jack H.	1048
Reynolds	Eunice	375
Reynolds	John	919
Richards	Mark	L61
Richards	Stephen	142
Richardson	Bob	626
Rieff	E.M.	28
Ringrose	Leslie	179
Risstrom	Hazel	431
Risstrom	Kaye	374
Risstrom	Ronald S.	545
Risstrom	Shaun	853
Risstrom	Wes	1094
Ritchie	R.J.	953
Roberts	Don	389
Roberts	Keith	280
Roberts	Nick	86
Robertson	David	997
Robertson	James	1316
Robertson	Nina	1317
Robertson	Phil	1318
Robertson	Richard	625
Robinson	Bill	141
Robinson	Doug	998
Robinson	Doug	1013
Robinson	Heather & Ron	1186
Robinson	Phil	920
Robinson	Phillip & Moira	775
Rogers	Colin D.	673
Rogers	Lucy	1
Rosier	Gill	800
Rosser	Joy	1221
Rossiter	Allan G.	544
Roth	Marianne	501
Rouch	F.L.	624
Rowley	Lyndall	886
Rowley	M.	500
Rudd	Ada J.	996
Ruff	Manfred & Anna	299
Rundell	Stan	279

Name		Sub no
Rundle	John	1365
Russell	Samantha	1339
Russell	Tony	402
Russi	Angela	338
Ruzic	Helen	L113
Ryan	Catherine	252
Ryan	Geraldine	L29
Rye	L. & M.	1095
Sadlier	Fred & Gwen	L119
Sagar	Janice	L87
Sager-Nutting	Solway	401
Salmon	R.	1268
Salter	Joan	60
Sandy	John	1120
Sanson	Peter	749
Saunders	Gary	750
Saunders	Philo	751
Saunders	Ray	854
Saunders	Thor	982
Say	Vic	298
Sayers	Clarence	418
Scala	Stephen	193
Schaeche	Helen	L90
Schedvin	Natasha	1096
Schirmer	P. & L.	954
Schoo	Adria	776
Schurr	Gary	1097
Scolyer	Glenn	623
Scolyer	Kevin	1302
Scott	Chris	394
Scott	L.W.	175
Seenan	Trish	1188
Seligman	Helen	995
Semmens	Bob	622
Semmens	H.J.	L51
Sendy	Dawn	430
Serafter	Deidre	1368
Shalders	Keith	499
Sharp	Barbara	621
Sharp	R. & H.	1326
Sharpe	Kath & David	L10
Shaw	Peggy	192
Shaw	Peter J.R.	L86
Shaw	Russell	799
Shaw	W.J.	458
Shearing	Ian J.	498
Sheen	Janice	1267

Name		Sub no
Sheldon	Gloria M.	191
Shelley	Christine	L108
Shepherd	Don	969
Sheppard	Graeme	87
Sherwell	D.	183
Sherwell	Ian	787
Shirley	Glenys	921
Shone	Brad	1340
Short	H.B.	918
Short	Howard	905
Short	Neil	887
Sibley	Peter	457
Silby	C.A.	372
Silver	Bronwyn	1220
Simons	Rob & Anne	917
Simpson	Lance J.	373
Simpson	Neil	955
Simpson	Rod	672
Simpson	Valerie	190
Simpson	W.	497
Sinnott	John	1119
Skeoch	Andrew	888
Slattery	Deidre	740
Sloan	John	103
Sloan	L.T.	1098
Smidt	Alan & Marjorie	1219
Smith	Adrian	44
Smith	Colin	496
Smith	Colin	741
Smith	Colin G.	1118
Smith	David	671
Smith	Debbie	983
Smith	Gerard	L85
Smith	Greg	371
Smith	Jack H.	100
Smith	Kerry	1047
Smith	Laurie	777
Smith	Peter J.	620
Sneddon	Sally	592
Sobey	Chris	984
Soderquist	Todd	1315
Soulsby	L.C & J.M.	745
Spain	Devon	L32
Speirs	Greg	456
Spence	Alan & Hennie	670
Spiby-Jones	Bobby	619

Name		Sub no
Spiby-Jones	Laura	618
Sprague	Susan	742
Steele	Geoff	992
Steggall MLA	Barry	669
*	Brett	150
Stevens	Bruce	495
Stevens	David	267
Stevens	Elizabeth	429
Stevens	Jon	668
Stevens	Max	99
Stevhenson	Robert	1303
Steward	Gillian M.	L122
Stewart	A.J.	140
Stewart	Alistair	1314
Stewart	Merle	1117
Stewart	Peter	6
Stewart	Ray	1116
Stürk	Fred	858
Stockdale	Lara	494
Stockwell	Keith	58
Stockx	Cathy & Thea	L103
Stone	Reg	493
Strang	Geoff	1363
Straub	Allan	783
Stubbs	W.C.	221
Styles	Glenn	1304
Styles	Malcolm	73
Sudbury	Aidan	573
Sullivan	Mark	33
Sullivan	Richard A.	855
Suttie	Greta	993
Swanton	Shane	1305
Swarby	Anne	204
Swindle-Jasper	Dan	147
Swinerton	Ray & Lynn	1099
Sword	Rosalie	322
Symes	Jordan	492
Symes	Ken	454
Symmonds	Eleonora	88
Taig	Jeff	1115
Tait	Chris	152
Tangey	Georgina	667
Tanner	Bev	203
Tate	Les	400
Tate	Robert F.	225
Tatnall	David	399
Tattersall	Angela	666

Appendix 6: Submissions from individuals (continued)

Name		Sub no
Taylor	Karina & Glen	235
Taylor	Sue	222
Taylor	Yvonne	137
Teague	Adam & Kathleen	92
Temple	Carol	889
Thackray	Hazel	265
Thiele	Margaret	956
thod8*		1334
Thomas	Colin	398
Thomas	G.	297
Thomas	Maurice & Kate	904
Thomas	Roger	665
Thomas	Zoe	890
Thomason	Narelle	1216
Thomason	Tambyn	1217
Thompson	Greg	664
Thompson	Mary	986
Thompson	Mary	1017
Thomson	Hedley	189
Thomson	Nicola	428
Thoring	Arnold	915
Thornton	Kenneth	188
Thorp	Frances	1189
Thorpe	L.B.	202
Timms	D.	916
Timms	Robert	572
Tippet	Lois	1367
Toler	T.	543
Tonkin	Rachel	914
Tough	Janet	427
Townsend	Chris	1100
Trainor	Barbara	599
Trainor	Kaye	797
Trakell	Lynn	1101
Tree	Eliza	1101
Trefz	Harry	542
Tregear	Judith	663

Name		Sub no
Treloar	Helen	397
Treneman	Brett	988
Trigar	S.	127
Trotman	H.C.	541
Tucker	Janet	1215
Tuckey MHR	Wilson	8
Tudor	Anthony	616
Tudor	James	588
Tuohey	Jacinta	591
Turnbull	George	856
Turner	Donald J.	727
Turner	R.W.	1313
Turvey	Jennifer	891
Twycross	Michael	337
Tzaros	Chris	908
Upstill	Rob	272
Vallance	R.J. & K.E.	187
Vatta	A.M.	909
Vatta	A.M.	1197
Vearing	Les	453
Veater	Lesley-Caron	536
Vercoe	Barry	177
Verhardt	Bert	1102
Verryt	T.	131
Vickery	Annabel	1104
Vincent	Colin	1103
Vincent	Michael	1214
Vugs	Vic & Val	1306
Waight	John	130
Walker	Calum	1112
Walker	D.J. & F.N.	1113
Walker	Gillian	26
Walker	Jim	987
Wall	Graeme	1114
Wallis	Graham	419
Walsh	Jacinta	251
Walsh	Kalia	1213
Walsh	Richard & Aine	778
Walton	Anthony P.	148

Name		Sub no
Wanhope	M.	1323
Ward	Fred G.	162
Ward	J.F.	98
Ward	R.J.	91
Ware	Paul	1211
Warneke	Martin	589
Waters	Jason	822
Watson	Jeff	1183
Watt	Graham	1210
Watters	David	1110
Watts	Dale	910
Watts	David	163
Watts	Margaret A.	396
Weatherhead	Peter & Debbie	728
Weber	Graeme B.	911
Webster	Alex	608
Wells	Mary	989
West	Norm	571
Westcott	S.M.	208
Weymouth	K.B.	223
Whaley	Tamsin	662
Whatley	Royce	785
Wheeler	W.D.	171
Wheelhouse	B. L. & P. J.	3
Whillas	David & Sandra	912
Whillas	David	734
Whitelaw	Alan	661
Whitford	William J.	1109
Whittaker	Ken F.	231
Whitten	Jeff	32
Whitten	Peter	59
Whyte	Darren	1263
Wilkie	Ian	1324
Wilkinson	E. Rosalie	1265
Wilkinson	G.D.	913
Wilks	Paul	43
Williams	Bev	158
Williams	Carl	491

Name		Sub no
Williams	Jonathon	184
Williams	Lance	990
Williams	Mary	733
Williams	Phil	609
Williamson	Ann	321
Williamson	S.R.	1209
Willis	N.H.	320
Williams	Ron & Jill	1264
Wilson	G.R.	490
Wilson	Kevin	957
Wilson	R.	1307
Wilson	Roy D.	186
Wilson	W K	5
Winchcomb	Johanna	779
Winter	John	1108
Winter-Irvine	A.	892
Winzar	B.J. & B.N.	489
Wise	Joanne	570
Wise	Peter	534
Wiseman	Barry	659
Wolseley	John	857
Woods	Betty	1109
Woods	Trevor	540
Woods	W.G.	796
Woodward	Alan	31
Woodward	Jeff	1341
Woodward	Ron	42
Wright	Dennis	319
Wright	Geoff	991
Wright	Jean	660
Wright	Natasha	1343
Wyatt	C.	1208
Yandala	Lindy	744
Young	Lucinda	596
Young	Margaret	1107
Young	Paul C.	569
Young	Wallace M.	780
Zadeh	Majeed	234
Zerafa	S.J.	118

Note: Submissions received with where the name was illegible are not included. Some submissions were in the form of signed petitions

* These submissions were received by email with no name actually provided.

Appendix 7

Members of the Box-Ironbark Investigation Advisory Group

Name	Expertise
Dr Andrew Bennett, Deakin University, Clayton	Landscape ecology and fauna conservation
Dr Andrew Brookes, Latrobe University, Bendigo	Recreation
Dr Malcolm Calder, University of Melbourne, Parkville	Conservation; author of ‘The Forgotten Forests’
Mr David Clark, formerly North Central Catchment Management Authority, Waubra	Landcare and catchment management
Mr Ian Fenselau, apiarist, White Hills	Apiculture
Mr Rod Gowans, Parks, Flora and Fauna (NRE)	Parks and biodiversity planning
Dr Steve Hamilton, University of Melbourne, Dookie College	Remnant vegetation protection
Mr Andrew Maclean, Forests Service (NRE)	Forest management
Mr Joseph McMahon, Timberline Log Homes, Heathcote	Timber industry
Mr Ian Miles, Forests Service (NRE)	Forest planning, regional forest agreements
Mr David Parkes, Parks, Flora and Fauna (NRE)	Biodiversity conservation management
Mr Phil Roberts, Minerals and Petroleum Victoria (NRE)	Exploration and mining
Ms Marilyn Sprague, Goldfields Revegetation, Bendigo	Exploration and mining restoration
Dr Barry Traill, Australian Woodlands Conservancy, Chiltern	Flora and fauna ecology and conservation
Mr Kevin Wareing, Kevin Wareing and Associates, Melbourne	Wood products
Mr David Watters, Trackline Detectors, Bendigo	Metal detecting and fossicking; recreational, and commercial sales and tourism

Appendix 8

Reserve system status of public land use categories and summary of JANIS biodiversity criteria

Appendix 8a: Reserve system status of public land use categories

Public land use category	Level of protection: constraints on major potentially threatening uses*	Management priority given to nature conservation	Reserve system status
National park	high: timber harvesting, grazing, mining, and hunting excluded	high: parks service; nature conservation a primary objective	4
State park	high: timber harvesting, grazing, mining, and hunting excluded	high: parks service; nature conservation a primary objective	4
National heritage park	high: timber harvesting, grazing, surface mining, and hunting excluded	high: parks service; nature conservation a primary objective	4
Reference area	high: timber harvesting, grazing, mining, and recreation excluded	high: parks service; nature conservation a primary objective	4
Nature conservation reserve	moderate: timber harvesting, grazing and hunting excluded; mining restricted	high: parks service; nature conservation a primary objective	4
Regional park	moderate: timber harvesting, grazing and hunting excluded; mining restricted	moderate: parks service; nature conservation a secondary objective	4
Natural features reserves			
Wildlife reserve	low: timber harvesting excluded	low: parks service; nature conservation a secondary objective	7
Public land water frontage	low: timber harvesting excluded	low: catchment management authorities; nature conservation an objective	7
Other natural features reserve	moderate: timber harvesting, grazing and hunting excluded	moderate: parks service; nature conservation a secondary objective	4
Historic and cultural features reserve	moderate: mining restricted	low: parks service; nature conservation a secondary objective	7
Community use area	low	low: various managers	7
Water production	moderate: timber harvesting and grazing excluded	low: water authorities; nature conservation a secondary objective	7
State forest	low	moderate: forests service; nature conservation a primary objective	7
Earth resources	low	low: various managers	7
Services and utilities	low	low: various managers	7
Commonwealth land	moderate	low: Department of Defence	7

* See Chapter 7 for a full explanation of the provisions operating with respect to mining and exploration.

4 = generally included in the reserve system; 7 = generally not included in the reserve system.

Reserve system status reflects the general situation in the Box-Ironbark study area for each public land use category. The recommendations in this report are included in these assessments, which has the effect of adding natural features reserves (other than wildlife reserves and public land water frontages) and regional parks to the reserve system through the general exclusion of grazing and timber harvesting and increasing the priority of management for nature conservation, and reducing the number of exceptions in other categories (such as some streamside reserves in which grazing is currently permitted).

Particularly at a statewide level, there are many exceptions to this general scheme. Significant exceptions within the study area are:

- Maldon Historic and Cultural Features Reserve (E1), where exclusion of timber harvesting is proposed;
- Eppalock Education Area (a community use area) where exclusion of timber harvesting is proposed;
- informal reserves in state forests where timber harvesting is excluded or restricted (Special Protection Zones and Special Management Zones to be designated after the completion of the Box-Ironbark investigation); and
- wildlife reserves where hunting and grazing are currently not permitted would also be exceptions, but all those in the study area are proposed as nature conservation reserves (see Recommendations D31, D52 and 54).

Appendix 8b: Summary of JANIS biodiversity criteria

Ecosystem status		Definition	Representation target
Rare	R1	total range less than 10 000 ha.	100% of remaining extent
	R2	total area generally less than 1000 ha.	
	R3	patch sizes generally less than 100	
Endangered	E1	distribution has contracted to less than 10% of original range.	100% of remaining extent
	E2	less than 10% of original area remaining.	
	E3	90% of extent is in small patches subject to threatening processes.	
Vulnerable	V1	approaching greater than 70% lost (depletion)	60% of remaining extent⁼
	V2	threatening processes have caused:	
	(a)	significant changes in species composition,	
	(b)	loss or decline in species that play a major role within the ecosystem, or	
(c)	significant alteration to ecosystem processes.		
V3	subject to continuing threatening processes		
'Other'	None of the above.	15% of pre-1750* extent	

⁼ This target generates an anomalous result: a less depleted vulnerable EVC has a lower representation target relative to its pre-1750 extent and in absolute terms, than a more depleted vulnerable EVC. For example, for an EVC with 30% of its pre-1750 extent remaining (depleted by 70%), the representation target of 60% of its remaining extent equates to 18% of its pre-1750 extent, whereas for a more depleted EVC with say 15% of its pre-1750 extent remaining, this target equates to 9% of its pre-1750 extent.

* Pre-1750 extent refers to the extent of each ecosystem prior to European settlement (see Appendix 2).

Appendix 9

Representation of key values in the current and recommended reserve system

Values	Unit	Total	Current reserve system	ECC reserve system additions	Proposed new reserve system	Proposed other public land	Freehold land
Selected threatened species — Fauna							
brush-tailed phascogale	records/blocks	74	17 (23% of total)	20	37 (50% of total)	14	23 ¹ (31% of total)
squirrel glider	records/blocks	79	22 (28% of total)	8	30 (38% of total)	2	47 ¹ (60% of total)
square-tailed kite	records/blocks	11	2 (18% of total)	2	4 (36% of total)	4	3 (27% of total)
swift parrot ²	key sites	65	7 (11% of total)	22	29 (45% of total)	36	0
turquoise parrot	records/blocks	136	103 (76% of total)	13	116 (85% of total)	3	17 (13% of total)
powerful owl ²	territories	38	9 (24% of total)	22	31 (82% of total)	7	0
barking owl	known sites	35	11 (31% of total)	8	19 (54% of total)	6	10 (29% of total)
painted honeyeater	records/blocks	45	26 (58% of total)	9	35 (78% of total)	4	6 (13% of total)
pink-tailed worm-lizard	records	14	9 (64% of total)	2	11 (79% of total)	1	2 (14% of total)
bandy bandy (snake)	records	7	3 (43% of total)	2	5 (71% of total)	2	0
woodland blind snake	records/blocks	40	11 (28% of total)	4	15 (38% of total)	4	21 (53% of total)
Selected threatened species — Flora							
Ausfeld's wattle	records	58	17 (29% of total)	12	29 (50% of total)	16	13 (22% of total)
bald-tip beard-orchid	populations	1	0	1	1 (100% of total)	0	0
bristly greenhood	records	11	2 (18% of total)	4	6 (55% of total)	4	1 (9% of total)
broom bitter-pea	records	17	4 (24% of total)	3	7 (41% of total)	3	7 (41% of total)
cane spear-grass	records	38	16 (42% of total)	3	19 (50% of total)	7	12 (32% of total)
crimson spider-orchid	records	13	2 (15% of total)	4	6 (46% of total)	1	6 (46% of total)
Dookie daisy	records	34	7 (21% of total)	13	20 (59% of total)	2	12 (35% of total)
hairy hop-bush	records	6	1 (17% of total)	2	3 (50% of total)	3	0
Kamarooka mallee	records	38	20 (53% of total)	3	23 (61% of total)	2	13 (34% of total)
long-tail greenhood	populations	1	0	1	1 (100% of total)	0	0
lowly greenhood	populations	1	0	1	1 (100% of total)	0	0
McIvor spider-orchid	records	4	3 (75% of total)	1	4 (100% of total)	0	0
narrow goodenia	records	41	8 (20% of total)	2	10 (24% of total)	1	30 (73% of total)
purple diuris	records	18	0	2	2 (12% of total)	1	15 (88% of total)
rising star guinea-flower	records	9	4 (44% of total)	4	8 (89% of total)	0	1 (11% of total)
sikh's whiskers	records	9	6 (67% of total)	2	8 (89% of total)	1	0

Values	Unit	Total	Current reserve system	ECC reserve system additions	Proposed new reserve system	Proposed other public land	Freehold land
small milkwort	records	17	11 (65% of total)	3	14 (82% of total)	1	2 (12% of total)
smooth darling-pea	records	6	4 (67% of total)	1	5 (83% of total)	0	1 (17% of total)
tawny spider-orchid	records	9	6 (67% of total)	1	7 (78% of total)	0	2 (22% of total)
tick indigo	records	2	1 (50% of total)	1	2 (100% of total)	0	0
Warby swamp gum	records	14	5 (36% of total)	5	10 (71% of total)	0	4 (29% of total)
weak daisy	records	9	4 (44% of total)	2	6 (67% of total)	0	3 (33% of total)
Whipstick westringia	records	12	3 (25% of total)	6	9 (75% of total)	0	3 (25% of total)
Williamson's wattle	records	69	25 (36% of total)	15	40 (58% of total)	11	18 (26% of total)
whorled zieria	populations	2	1 (50% of total)	1	2 (100% of total)	0	0
yellow hyacinth-orchid	records	5	2 (40% of total)	1	3 (60% of total)	0	2 (40% of total)
yellow-lip spider-orchid	records	2	1 (50% of total)	1	2 (100% of total)	0	0
Large old tree sites and fauna refuge sites							
large old tree sites	number	126	16 (13% of total)	70 ³	86 (68% of total) ³	47 ⁴	-
	total area (ha)	26 279	5 820 (22% of total)	16 351 ³	22 171 (84% of total) ³	4 108 ⁴	-
fauna refuge sites	number	255	49 (19% of total)	101 ³	150 (60% of total) ³	100 ⁵	41
	total area (ha)	10 048	3 043 (30% of total)	2 582 ³	5 625 (56% of total) ³	2 853 ⁵	1 529

¹ Includes records from road reserves.

² Territories/key sites counted twice where they extended over two land categories; actual totals were 29 swift parrot key sites and 28 powerful owl territories.

³ Number of large old tree sites and fauna refuge sites includes all sites partially within the proposed reserve system; area of large old tree sites and fauna refuge sites includes only that part of a site within the proposed reserve system.

⁴ Both number and area of large old tree sites includes 3 sites (totalling 231 ha) found on Commonwealth land within Puckapunyal Military Area.

⁵ Both number and area of fauna refuge sites includes 3 sites (totalling 637 ha) found on Commonwealth land within Puckapunyal Military Area.

Data sources:

- swift parrot key sites – Kennedy, S.J. and Tzaros, C.L. (2000). Foraging ecology of the swift parrot *Lathamus discolor* in the Box-Ironbark forests and woodlands of Victoria. Unpublished report for the Department of Natural Resources and Environment, Melbourne.
- powerful owl territories – Soderquist, T. (1999). Home range and habitat quality of the powerful owl *Ninox strenua* in the box-ironbark forest. Unpublished report for Arthur Rylah Institute, Melbourne.
- barking owl sites – Taylor, I. and Kirsten, I. (2000). Targeted Barking Owl survey for the West Region Comprehensive Regional Assessment. Unpublished report, Department of Natural Resources and Environment, Melbourne.
- other fauna – data provided by NRE from the Atlas of Victorian Wildlife
- plant species – data provided by NRE from the Flora Information System
- large old tree sites
 - Soderquist, T. and Rowley, L. (1996). Mature tree sites in the Bendigo Forest Management Area. Unpublished report, Department of Natural Resources and Environment, Bendigo.
 - Holland, G. and Cheers, G. (1999). Identification of large old tree sites and fauna refuges in the ECC's Box-Ironbark study area. Unpublished report, Environment Conservation Council, Melbourne.
- fauna refuges
 - Robinson, J. and Rowley, L. (1994). Drought refuge identification project for the Box-Ironbark ecosystem within the Campaspe, Goulburn and Loddon catchments. Unpublished report, Bendigo Field Naturalists Club, Bendigo.
 - Robinson, J. and Rowley, L. (1996). Drought refuge identification project for the West Loddon, Avoca and Avon-Richardson catchments within the Bendigo Forest Management Area. Unpublished report, Department of Natural Resources and Environment, Bendigo.
 - Holland, G. and Cheers, G. (1999). Identification of large old tree sites and fauna refuges in the ECC's Box-Ironbark study area. Unpublished report, Environment Conservation Council, Melbourne.

Appendix 10

Criteria for national and state parks

While the ECC has not adopted explicit criteria for the selection of national and state parks, the following criteria have been applied implicitly in formulating recommendations for public land use.

National parks

Definition

An extensive area of public land containing highly significance natural values, and land and vegetation types, set aside:

- primarily to protect biodiversity (within those ecosystems);
- to provide for public enjoyment, interpretation, education, inspiration, recreation and tourism in natural environments;
- to protect Aboriginal cultural sites and places; and
- to protect heritage values.

The conservation of biodiversity including flora, fauna, other biota and natural values would be an essential part of national park management. Interpretative and education services would be provided. Development of facilities would be confined to a very small portion of any national park. Visitor activities such as sightseeing, ecotourism, observation of flora and fauna and heritage features, and obtaining inspiration in natural environments, have low impact and would be encouraged.

Selection and design criteria

- national parks should generally be larger than 10 000 ha
- national parks should meet relevant comprehensive, adequate and representative reserve system criteria
- national parks should contain outstanding scenic landscapes and natural features that are suitable for recreation, and may contain significant cultural heritage
- national parks should, together with state parks, comprise a system which represents the range of land and vegetation types across Victoria
- each national park should represent several land systems or ecological vegetation classes
- boundaries should be set in a landscape context with strong ecological integrity such as along catchment boundaries, where possible
- boundary length to area ratios should be minimised and fragmented areas avoided to better provide for biodiversity conservation and reduce external impacts
- linear national parks should generally be avoided
- areas adjoining urban land, or intensive agricultural land, should generally be avoided
- national parks should be located so as to minimise the impact of threatening processes from adjoining areas

Reservation

National parks are dedicated reserves permanently reserved under Schedule 2 of the *National Parks Act 1975* and are equivalent to Category 2 of the *IUCN Commission for National Parks and Protected Areas (IUCN 1994a)*.

Balanced land use

In accordance with public land use principles, selected areas should be chosen taking into account possible social impacts on, and economic losses and benefits to:

- resource extraction industries
- landholders neighbouring potential park areas
- adjacent townships
- recreational users.

State parks

State parks have similar criteria to national parks, but are generally smaller in size. The differences are:

- state parks should generally be larger than 2 000 ha
- each state park should represent one or more land systems or ecological vegetation classes
- state parks are dedicated reserves permanently reserved under Schedule 2B of the *National Parks Act 1975*.

Appendix 11

Tables of area recommendations referred to in Chapters 16-18

16 Nature conservation reserves, and historic and cultural features reserves

D Nature conservation reserves

Rec No.	Nature conservation reserve name	Location	Area (ha)
Existing nature conservation reserves			
D1	Mt Bolangum Flora and Fauna Reserve	South-west of St Arnaud	2 930
D1	Mt Hope Flora and Fauna Reserve	North of Terrick Terrick	106
D1	Hard Hills Flora Reserve	North-east of St Arnaud	15
D1	Gowar Flora Reserve	North-east of St Arnaud	120
D1	Gowar South Flora Reserve	North-east of St Arnaud	23
D1	Dalyenong West Flora Reserve	West of Bealiba	16
D1	Alex Chisholm Flora Reserve	Maryborough	16
D1	Inglewood Flora Reserve	Three blocks – north, west and south-west of Inglewood	1 200
D1	Walmer South Flora Reserve	East of Maldon	15
D1	Walmer Flora Reserve	East of Maldon	13
D1	Metcalfe Flora Reserve	East of Taradale	300
D1	Dohertys Pine (Rochester West) Flora Reserve	North-east of Elmore	10
D1	Runnymede Flora Reserve	West of Colbinabbin	240
D1	Costerfield Flora Reserve	North-east of Heathcote	10
D1	Gobarup Flora Reserve	South-west of Rushworth	300
D1	Big Hill (Longwood) Flora Reserve	South-west of Euroa	62
D1	Upotipotpon Flora Reserve	North of Violet Town	5
Sub-total			5 381
Recommended new nature conservation reserves			
D2	Deep Lead	North-west of Stawell	1 823
D3	Wychitella	North of Wedderburn	6 300
D4	Whroo	South of Rushworth	2 298
D5	Lonsdale	North-west of Stawell	759
D6	Illawarra	South-west of Stawell	580
D7	Jallukar	South of Stawell	1 165
D8	Morrl Morrl	North-east of Stawell	1 991
D9	Joel Joel	East of Stawell	260
D10	Navarre	West of Navarre	4
D11	Big Tottington	South-west of St Arnaud	2 120
D12	Landsborough Hill	South of Navarre	1 044
D13	Landsborough	West of Avoca	3 314
D14	Stoney Creek	South of St Arnaud	605
D15	Stuart Mill	South of St Arnaud	2 480
D16	Redbank	North-west of Avoca	1 176
D17	Dalyenong	West of Bealiba	2 570
D18	Tunstalls	North of Bealiba	1 640
D19	Wehla	East of St Arnaud	312

Rec No.	Nature conservation reserve name	Location	Area (ha)
Recommended new nature conservation reserves (continued)			
D20	Moliagul	North-east of Bealiba	530
D21	Lexton	South-east of Avoca	243
D22	Bung Bong	East of Avoca	420
D23	Talbot	West of Talbot	174
D24	Caralulup	South of Talbot	1 400
D25	Dunach	South of Talbot	494
D26	Timor	North of Maryborough	735
D27	Havelock	North of Maryborough	1 779
D28	Waanyarra	North-east of Dunolly	2 927
D29	Mt Korong	South-east of Wedderburn	465
D30	Mysia	North-east of Wedderburn	4
D31	Bells Swamp	North-west of Maldon	10
D32	Leichardt	North-west of Bendigo	33
D33	Wilson's Hill	West of Bendigo	21
D34	Shelbourne	North of Maldon	840
D35	Muckleford	South of Maldon	543
D36	Kaweka	Castlemaine township	3
D37	Fryers Ridge	South-east of Castlemaine	2 149
D38	Taradale	East of Taradale	191
D39	Pilchers Bridge	South-east of Bendigo	2 274
D40	Salomon Gully	Bendigo township (south)	20
D41	Jackass Flat	Bendigo township (north)	71
D42	Whipstick	North of Bendigo	83
D43	Mt Sugarloaf	East of Bendigo	660
D44	Axedale	West of Axedale	3
D45	Crosbie	North of Heathcote	2 060
D46	Spring Plains	South of Heathcote	1 315
D47	Tooborac	South-east of Heathcote	330
D48	Spring Creek	West of Nagambie	401
D49	Murchison-Rushworth Disused Railway	Between Murchison and Rushworth	69
D50	Mangalore	North of Seymour	78
D51	Arcadia	East of Arcadia	8
D52	Gum Swamp	North of Euroa	16
D53	Tamleugh	North-west of Violet Town	22
D54	Shire Dam Swamp	North-west of Violet Town	25
D55	Gowangardie	North of Violet Town	3
D56	Caniambo	North of Violet Town	11
D57	Baddaginnie	North-east of Violet Town	15
D58	Nathalia	North of Nathalia	183
D59	Numurkah	East of Numurkah	638
D60	Yabba South	North-west of Dookie	31
D61	Wattville	North-east of Dookie	39
D62	Boxwood	East of Dookie	52
D63	Youarang	West of Tungamah	217
D64	Tungamah	East of Tungamah	883
D65	Mt Meg	North-east of Benalla	440
D66	Wangaratta Common	Wangaratta township	74
D67	Cookinburra	East of Chiltern	88
D68	Fell Timber Creek	East of Chiltern	144
Sub-total			53 648
TOTAL			59 036

E Historic and cultural features reserves

Rec No.	Historic and cultural features reserves name	Location	Area (ha)
Existing historic and cultural features reserves			
E1	Hand in Hand Cyanide Works	Deep Lead	8
E1	Leviathan Cyanide Works	Stawell	5
E1	North Magdala Co. Mine	Stawell	0.2
E1	Moonlight/Magdala Mine	Stawell	3
E1	Oriental Co. Mine	Stawell	1
E1	Three Jacks Co. Mine	Stawell	1
E1	Great Western Lead Mine	Great Western	5
E1	Long Gully Shallow Lead	Armstrongs	11
E1	Bell Rock Co. Mine	St Arnaud	3
E1	Lloyd's Whip Shaft and mud-brick structure	Stuart Mill	13
E1	Percydale Historic Area	West of Avoca	1 272
E1	Moliagul Historic Area	Northwest of Dunolly	1 010
E1	Maldon Historic Area	Surrounding the township of Maldon	2 520
E1	Whroo Historic Area	South of Rushworth	490
E1	Glendhu Historic Reserve	South of Navarre	40
E1	Landsborough Historic Reserve	South of Navarre	16
E1	Lower Homebush Historic Reserve	Northeast of Avoca	1
E1	Nine Mile Historic Reserve	West of Wedderburn	12
E1	Tipperary Hill Historic Reserve	Northwest of Maryborough	5
E1	Timor Historic Reserve	North of Maryborough	7
E1	Simson Historic Reserve	North of Maryborough	5
E1	Majorca Historic Reserve	Southeast of Maryborough	16
E1	Kong Meng Historic Reserve	Southeast of Maryborough	20
E1	Goldsborough Historic Reserve	Northwest of Dunolly	7
E1	McIntyre Historic Reserve	Northwest of Tarnagulla	38
E1	Rheola Hill Historic Reserve	Southwest of Inglewood	72
E1	Gooseberry Hill Historic Reserve	South of Dunolly	1
E1	Wild Dog Diggings Historic Reserve	East of Dunolly	24
E1	Wanalta Weir Historic Reserve	West of Rushworth	5
E1	Bailieston Historic Reserve Note: the northern parcel has been revoked	Northwest of Nagambie	111
E1	Murchison Waterworks Trust Historic Reserve	Southwest of Murchison	1
E1	Chiltern Valley Extended Mine Historic Reserve	West of Chiltern	10
Sub-total			5 733
Recommended new historic and cultural features reserves			
E2	Alma Lead Cyanide Works	Northwest of Maryborough	11
E3	Bristol Hill	Maryborough township	26
E4	Janevale Monier Bridge	Northeast of Dunolly	0.5
E5	Pickpocket Diggings	South of Newstead	5
E6	South Frederick the Great	Sebastian, north of Bendigo	13
E7	Deborah Company	Bendigo	0.5
E8	North Deborah	Bendigo	1
E9	Central Deborah Tourist Mine	Bendigo	0.5
E10	Victoria Hill	Ironbark, Bendigo	14
E11	Royal George Company	Golden Square – Long Gully Road, Bendigo	16
E12	Comet Shaft, KK Shaft and Comet Diggings	Bendigo – Eaglehawk Road, Bendigo	7
E13	Johnson's Nos. 1 & 2 Mines and Golden Age Mine	Garden Gully, Bendigo	13
E14	Chinese Diggings	White Hills, Bendigo	4
E15	Echuca and Waranga Trust Irrigation Pump and Channel	Adjoining Lake Nagambie	5
E16	Day's Mill	South of Murchison	5
Sub-total			121.5

Note: Historic and cultural features reserves E7–E14 are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. The ECC holds Crown descriptions for all the above blocks.

Rec No.	Historic and cultural features reserves name	Location	Area (ha)
Historic and cultural features in state forest			
E17	Wet Patch Lead	St Arnaud-Pyrenees State Forest west of Avoca	1.5
E18	Three Grain Gully	Dunolly-Inglewood State Forest north-west of Dunolly	1.5
E19	Bet Bet Lead	Dunolly-Inglewood State Forest south of Dunolly	1.5
E20	Almedia Reef	Dunolly-Inglewood State Forest east of Dunolly	1.5
E21	Wild Duck Lead Diggings	Dunolly-Inglewood State Forest east of Dunolly	1.5
E22	Possum Gully Cement Workings	Paddys Ranges State Forest southwest of Maryborough	2.5
E23	White Horse Gully	Maryborough State Forest south of Maryborough	2.5
E24	Battery Dam and Bull Gully Eucalyptus Distilling Site	Maryborough State Forest south of Maryborough	5.0
E25	North German Gully	Eglington State Forest southeast of Maryborough	2.5
E26	Gardners Gully	Muckleford State Forest south of Maldon	1.5
E27	Thornhill Reef	Muckleford State Forest south of Maldon	1.5
E28	Green Gully	Muckleford State Forest south of Maldon	1.5
E29	Welcome Reef Mine Site	Rushworth-Heathcote State Forest north-east of Heathcote	1.5
E30	Poverty Diggings	Rushworth-Heathcote State Forest north of Rushworth	1.5
Sub-total			27.5
Total			5 882

17 State forests and forest management

F State forests

Rec No.	State forest name	Location	Area (ha)
F1	North St Arnaud Range & Pyrenees State Forests	South of St Arnaud and west of Avoca	12 660
F1	Little Tottington	North of Navarre	480
F2	Dunolly-Inglewood State Forests	Around Dunolly and Inglewood	32 400
F3	Maryborough State Forests	Mainly south-east of Maryborough	15 630
F4	Bendigo-Castlemaine-Maldon State Forests		
F4	Bendigo	Mainly east and south-east of Bendigo	14 450
F4	Castlemaine	South of Castlemaine	9 410
F4	Maldon	South of Maldon	3 140
F5	Rushworth-Heathcote State Forests	Between Rushworth and Heathcote	23 650
F6	Glynwylln	North east of Stawell	750
F6	Illawarra	West of Stawell	830
F6	Glenmona	East of Avoca	1 720
F6	Wedderburn	Wedderburn	870
F6	Sandon	South-west of Newstead	2 700
F6	Knowsley	East of Bendigo	1 200
F6	Barambogic	South of Chiltern	1 060
Total			120 950

18 Other public land use categories

G Reference areas

Rec No.	Reference Area Name	Location	Area (ha)
G1	Mt Separation	West of Redbank	188
G2	Korong Vale	North of Wedderburn	460
G3	Kooyoora	Kooyoora State Park	325
G4	Kingower	Kooyoora State Park	345
G5	Terrick Terrick	Terrick Terrick National Park	100
G6	Sandhurst	South of Bendigo	425
G7	Kamarooka	Greater Bendigo National Park	225
G8	Mt Black	Heathcote-Graytown National Park	380
G9	Reef Hills	Reef Hills State Park	123
G10	Warby Ranges	Warby Ranges State Park	170
G11	Killawarra	Warby Ranges State Park	141
G12	White Box	Chiltern–Pilot National Park	90
G13	Pilot Range	Chiltern–Pilot National Park	518
Total			3490

Notes: 1. The areas in this table are from GIS measurements, and differ from the proclaimed areas for some reference areas.

2. Sandhurst Reference Area (G6) has not been proclaimed. It is recommended that it remain as a reference area within the Greater Bendigo National Park, with modified boundaries and reduced area.

H Natural features reserves

H1 Recommendations for wildlife areas

Rec. No.	Wildlife reserve name	Location	Area (ha)
H1	Greens Creek Swamp	North-east of Stawell	39
H1	Reedy Lake	North-west of Nagambie	1 400
H1	Doctors Swamp	West of Murchison	263
H1	Tabilk Lagoon	South-west of Nagambie	198
H1	Black Swamp (Nine Mile Creek)	Wungnu	34
H1	McBurney Swamp	North of Euroa	33
H1	Lehmann Swamp	North of Euroa	65
H1	Jubilee Swamp	North-east of Violet Town	147
H1	Moodies Swamp	Southwest of Tungamah	198
H1	Morphett Swamp	North-east of Violet Town	22
H1	Dowdle Swamp	North-east of Tungamah	291
H1	Black Swamp	North of Wangaratta	126
Total			2816

Note: Road reserves adjoining several of these areas, e.g. Reedy Lake, contain large old trees which should be protected.

H2 Recommendations for public land water frontage reserves

Notes: These reserves are not all shown on Map A. For details, refer to parish plans or contact NRE.

- Irishtown and Chinamans Creeks, Peechelba—these frontages should be managed to enhance their role as wildlife corridors between Killawarra Forest in the Warby Ranges State Park and the Ovens River forests.
- Pranjip Creek frontage reserve—this has a valuable remnant of Creeklane Grassy Woodland EVC which should be protected.
- Hughes Creek frontage reserve near Mangalore and upstream (outside the study area) has valuable riparian and in-stream habitat

H4-H7 Recommendations for streamside areas

H4 Existing streamside areas

Notes: Existing streamside areas are not listed. Not all are shown on Map A. For details, contact NRE.

- Coliban River, Metcalfe (North Central, K37) – the Crown description has been clarified and the area enlarged to 32.2 ha, including ‘The Cascades’. It now comprises CAs 4A, 18A, 18B, Sec 7 and CA 3B Sec E, Parish of Metcalfe and CA 4C Sec 7, Parish of Hawkestone,
- Coliban River at Taradale (North Central, K38) – this area should be managed in accordance with recommendations H and H4–H7

H5-H7 Recommended new streamside areas

Rec. No.	Parish	Description ¹	Parcel numbers ²	Area (ha)	Stream and location
H5	Sandhurst	CA 54B	P127069	15.5	Bendigo Creek, White Hills, Bendigo
		CA 54C	P127070		
		CA 54D	P127071		
		CA 54E	P127072		
		CA 54F	P127073		
		CA 54H	P127075		
		CA 60	P127076		
		CA 60A	P127077		
H6	Axedale	CA 8C Sec 7A	P131992	5.3	Campaspe River, north of Axedale
H7	Elmore	CA A29	P120605	14	Picaninny Creek, west of Elmore
			Total	34.8	

Notes: ¹ The Crown description of the public land included in these and later reserves comprises the Crown allotment (CA) and section (Sec) number and the relevant parish or township.

² The Crown parcel number (P number) is the unique identifier for each piece of Crown land.

H8-H131 Recommendations for bushland areas**H8 Existing bushland areas—notes**

- H8 at Muckleford South (previously North Central I135)—buloke trees are to be protected
- H8 areas near Tabilk (previously North Central I177 and I178) should be managed to protect important flora.

Rec No.	Crown description	Parcel numbers	Area (ha)
H9	CA 233A No Sec, Illawarra (unfenced)	P022228	5.1
H10	CA 189F No Sec, Illawarra	P022241	12.3
H11	CA 249C No Sec, Illawarra	P022243	4.1
H12	CA 249B No Sec, Illawarra (unfenced)	P022242	5.3
H13	CA 249A No Sec, Illawarra	P025520	7.1
H14	CA 87A Sec Y, Mokepillly	P022204	13
H15	CA 158A No Sec, Illawarra	P020346	7.8
H16	CA 1 Sec 273, CA 1 Sec 274, CA 1 Sec 275A, CA 1 Sec 275B, CA 1 Sec 281, CA 3 Sec 145, CA 146 No Sec, Stawell	P023819, P023821, P023822, P023823, P023824, P023825, P023826	17.6
H17	CA 1 Sec 137, CA 1 Sec 138A, CA 1 Sec 138B, CA 1 Sec 138C, CA 1 Sec 139A, CA 1 Sec 139B, CA 1 Sec 139C, CA 1 Sec 139D, Stawell	P023831, P023832, P023833, P023834, P023835, P023836, P023838, P023839	7.2
H18	CA 191B No Sec, Stawell	P023656	25
H19	CA 26, CA 28 Sec 49B, Illawarra	P023844, P023845	20
H20	CA 32E No Sec, Stawell	P023635	4.6
H21	2 ha addition to existing Watta Wella reserve (NC I17); CA 5F, CA 31D, CA 31E, No Sec Watta Wella	P108498, P105744, P105745	10
H22	CA 84A, CA 84B Sec 5, Concongella South	P106955, P106956	3.2
H23	CA 39A Sec A, Lexington	P105653	2.0
H24	CA 117A, CA 122 No Sec Concongella	P102438, P102437	2.3
H25	CA 13A Sec 6, Concongella	P106265	4.8
H26	CA 37A Sec 6, Concongella	P106284	1.7
H27	Includes part of existing Concongella reserve (NC I14); CA 30D1, CA 30F, CA 30M, CA 30P, CA 30Q, Part CA 30G Sec Y, Concongella	P106267, P106298, P106299, P106297, P106295, Part P106300	25
H28	28 ha addition to existing Garden Gully reserve (SW2 I80); CA 23B Sec 15A, Ararat, 36ha east of CA 98B Sec 15A, and unused government road east of CA 101 Sec 15, Ararat	inc. P103448	64
H29	CA 82A, 83A & 102C, No Sec, Glynwylln	P106968, P106975, P106976	43
H30	CA 1C Sec 4, Landsborough	P104200	4.9
H31	4.1 ha addition to existing Landsborough reserve (NC I37); CA 26A Sec 2, and 4 ha east of allotment 39 Sec 5, Landsborough	inc. P104207	8.1
H32	CA 279A No Sec, Navarre	P106228	7.6

Rec No.	Crown description	Parcel numbers	Area (ha)
H33	CA A6D, CA A6E No Sec (Part), Landsborough	P104220, P104219 (Part)	4.6
H34	CA 43A Sec BB, St Arnaud Note: Use by St Arnaud Pony Club may continue	P126988	20
H35	CA 44D, CA 44E Sec AA, St Arnaud	P126973, P126974	7.6
H36	CA 80G Sec A, Carapooee	P120929	8.1
H37	CA 54 G Sec 1, Moyreisk Note: Forms part of a habitat corridor	P107335	6.1
H38	17 ha addition to existing Glenmona reserve (NC I76); CA 1, CA 2, CA3, CA4, CA5, CA6, CA7, CA8, CA9, CA10 Sec 12B, CA 5, CA6, CA7, CA9, CA10 Sec 15A, CA 1 Sec 15B, CA2, CA3, CA4, CA5, CA6, CA7, CA 8, CA9 Sec 21A, CA 8 Sec 21B,	P107634, P107662, P107661, P107660, P107659, P107658, P107657, P107656, P107655, P107654, P107653, P107652, P107651, P107649, P107648, P107647, P107642, P107641, P107640, P107639, P107628, P180166, P107636, P107637	90
H39	CAs 9 – 12, CA 16A&C, CA 24A, Sec J, Glenmona	P104275, P104276, P104277, P104278, P104273, P104274, P104280	20
H40	CA 35B Sec M, Glenmona (unfenced)	P104261	4.9
H41	CA 17A Sec 3, Glenmona	P102482	2.3
H42	CA 1Z1 No Sec, Archdale	P120001	12.6
H43	CA 14B, CA 14C Sec 16, Bealiba	P128317, P128336	9.9
H44	CA 30J Sec B, Tchuterr	P124371	4
H45	CA 29G Sec B, Woosang	P125613	4
H46	Wedderburn Junction–Wedderburn disused railway line		33
H47	CA 174C No Sec, Mysia	P125377	3.5
H48	CA 95B, CA 95C No Sec, Powlett	P123867, P123868	10.2
H49	CA 10B, CA 10C Sec C Brenanah	P122059, P122060	7.9
H50	CA 7B Sec 12, Kingower	P129898	2
H51	CA 1A, CA 1B Sec 5, Moliagul	P130221, P130222	19.1
H52	CA 30B Sec 11, Moliagul	P124938	4.3
H53	CA 19G, CA 20C, CA 20D, CA 22A, CA 22B Sec F Dunolly	P128898, P128899, P128897, P128894, P128895	14
H54	4 ha addition to existing Dunolly reserve (NC I94) CA 19F, 29E, 29D, Sec 3, Dunolly	P121983, P121982, P121969	12.8
H55	CA 13B Sec 3, Wareek	P107030	3.6
H56	CA 15C Sec 112, Wareek	P107014	24
H57	CA 18 Sec 61, Maryborough	P107091	16
H58	CA 10B Sec 2, Maryborough	P104991	1
H59	CA 23C Sec 8, Amherst	P107408	3.3
H60	CA 1-3, 17,18 Sec 3, CA 6, Sec 7 Amherst	P100313, P100314, P100345, P100312, P100315, P100323	1.3
H61	CA 1 Sec 14, Amherst	P100348	3.4
H62	3.5 ha addition to existing Amherst reserve (NC I80); CA 47D, and 10ha (part) of allot 5C Sec 2 Amherst.	inc. P107399	13.5
H63	2.2 ha addition to existing Amherst reserve (NC I81); CA 37A, CA 41D Sec 7, Amherst	P107496, P107433	8.8
H64	CA 25, CA 26 Sec 11, Amherst	P107494, P107495	16.4
H65	CA 6 Sec 7A, Amherst	P134422	7.5
H66	CA 130 No Sec, Bridgewater	P120886	10
H67	CA 6 No Sec, Leichardt	P122816	5
H68	CA 2B Sec 7A, Woodstock	P125581	4.3
H69	CA 4E, CA 4F Sec 25, Shelbourne	P124084, P124083	17.4
H70	2 ha addition to existing reserve (NC I146); CA 51 Sec 22, Marong	P132423	10
H71	CA 13M, CA 18A Nerring Note: Ausfeld's wattle is present	P123943, P123949	219
H72	CA 9A Sec E, Nerring	P123919, P134217	3.8
H73	CA A4P No Sec, Neilborough	P123403	4

Rec No.	Crown description	Parcel numbers	Area (ha)
H74	CA 54A, CA 94A Sec G, Maldon	P126300, P126301	1.2
H75	CA 21B Sec N, Maldon Note: Historic graves in this reserve are to be preserved	P126321	1.6
H76	CA 7B Sec 5, Muckleford	P131066	1.6
H77	CA 6A, CA 10A Sec 1B, CA 3A Sec 1C Yandoit	P143952, P143695, P143969	118
H78	CA 14C Sec 12, Yandoit	P143986	9.8
H79	CA 44 Sec 14, Guildford	P122373	4
H80	CA 29 & 30 Sec D3, Castlemaine	P121124, P121135	5
H81	CA 64, CA111A, CA111B No Sec, Ravenswood Note: Includes the former Ravenswood Highway Park and Crown land in Ravenswood township. The ECC is aware it will be slightly affected by Calder Highway widening; land managers should consult closely with VicRoads regarding this site.	P132877, P130626, P130627	32.8
H82	CA 30D Sec 9, Walmer	P124624	3.3
H83	CA 46, CA 47 Sec 5C, Harcourt	P122529, P122512	33.3
H84	Part CA 22A Sec G4, Castlemaine	P121009	4.6
H85	CA 7K, CA 7L Sec 3B, Castlemaine	P121038, P121039	31
H86	CA 35A Sec D, Chewton	P121481	1.3
H87	CA 42Z1 Sec L, Sandhurst	P128116	16.7
H88	CA 88F Sec 7A, Sandhurst	P125789	2.2
H89	part CA 28 Sec K1 (21ha); part CA 300A Sec N (11ha); and Cas 115 – 119, CA 125B, CA 231E, CA 269J, CA 269H, CA 269M Sec N, Sandhurst	P126847, P126431, P126424, P126423, P126428, P133553, P126427, P126422, P126421, P126420, P126419, P126418	48
H90	CA 52J Sec N, Sandhurst	Part of P127983	2.3
H91	CA 13 Sec 13, Sandhurst	P132723	0.5
H92	CA 240Q Sec O, Sandhurst	P128259	0.9
H93	CA 248 J Sec O, Sandhurst CA 248H Sec O	P129368, P129367	3.6
H94	CA 91C, CA 91D, CA 91E No Sec, Sandhurst	P128189, P128190, P128191	2.5
H95	CA 81H, CA 81J No Sec, Sandhurst, and water frontage between these parcels	P128186, P128187	9.9
H96	CA 1 Sec 4, Strathfieldsaye	P124147	4
H97	CA 1 Sec 10, Strathfieldsaye	P131085	1.8
H98	CA 28C No Sec, Strathfieldsaye	P131088	1.3
H99	CA 18A, CA 18B Sec A, Kamarooka	P121111, P121164	8.2
H100	CA 23, CA 40, CA 40A Sec B, Kamarooka	P132630, P132631, P132632	15.3
H101	Elmore–Cohuna disused railway line Note: Significant flora occurring along this line should be protected		109
H102	CA 2 Sec 9, Goomong Note: Land managers should coordinate with landholders establishing habitat links along adjoining creeks.	P129568	4
H103	CA 7-14, 16, 17 Sec 1, CA 5, 7, 8 Sec 2, CA 4, 13, 15, 17 Sec 13, CA 4, 10, 12, 15, 16 Sec 14, CA 6-12 Sec 15, CA 1,2 Sec 18, CA 1-4, 9-12 Sec 19, Ellesmere	P129277-89, P129321-46, P133822	6.3
H104	CA 34P & 34Q No Sec, Redesdale	P123611, P123612	278
H105	CA F1A No Sec, Emberton	P120660	107
H106	CA 1, 14, 14, 25, 26 Sec 2, CA 1-20 Sec 3, CA 1, 7-10, 12 Sec 4, Runnymede	P130803, P130804, P130805, P130806, P130807, P130808, P130809, P130810, P130811, P130812, P130813, P130813, P130814, P130815, P130816, P130817, P130818, P130819, P130820, P130821, P130822, P130823, P130824, P130825, P130826, P130827, P130828, P130829, P130830, P130831, P130832	5.5
H107	CA 120B No Sec, Corop	P121708	3.4
H108	CA 62A No Sec, Gobarup	P122239	6
H109	CA 61C No Sec, Gobarup	P122240	2.0

Rec No.	Crown description	Parcel numbers	Area (ha)
H110	CA 38A No Sec, Gobarup	P122238	6
H111	CA 2J Sec 2, Heathcote (unfenced)	P122622	3
H112	CA AB3C, CA AB3D, CA AB3F, No Sec, Heathcote	P122613, P122616, P122615	6.7
H113	CA 48B, CA 48D No Sec, Wyuna Note: This area was identified as a Special Protection Zone in Mid Murray FMA's Proposed Forest Management Plan.	P162992, P162994	149
H114	Rushworth–Colbinabbin disused railway line Note: Significant community heritage values occur along this line and they should be protected.		71
H115	CA 66D No Sec, Waranga	P124832	10.5
H116	CA 74B, CA 99A, CA 103A, CA 103B, CA 103C, CA 103D, CA 105B No Sec, Waranga Note: This is the former Waranga Education Area	P124833, P124836, P124837, P124838, P124839, P124840, P125261	264
H117	Part CA 81A No Sec, Murchison	P125264 (Part)	7.2
H118	CA 31 Sec A, Northwood	P180132	6.3
H119	CA 22C Sec C (Part), Kaarimba	P160670 (Part)	20
H120	Numurkah – Picola disused railway line Notes: 1. Significant flora occurring along this line should be protected 2. Limited movement of stock through this reserve should be permitted where it does not damage flora values.		102
H121	Dookie-Katamatite disused railway line		65
H122	CA 5A Sec E, Shadforth	P160196	1.4
H123	CA 77B No Sec, Goomalibee	P161327	2.1
H124	CA 19C No Sec, Goorambat	P163487	1.9
H125	CA 27F No Sec, Bungeet	P160960	5.9
H126	CA 56F No Sec, Bungeet Note: Tennis courts on this block may continue to be used.	P160965	7.5
H127	CA 40D No Sec, Mokoan	P163490	1.5
H128	CA 140D No Sec, Samaria	P162223	5.5
H129	CA 10A No Sec, Lurg	P161804	1.6
H130	CA 23B No Sec, Tatong	P163872	4.1
H131	Peechelba–Wangaratta disused railway line Notes: 1. Important grasslands on this line should be protected. 2. This reserve incorporates an important link in the Murray to the Mountains Rail Trail		82
Total			2 689

Note: The bushland areas H87-H95 are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. For the Crown descriptions of these blocks, refer to the above table.

H132 Recommendations for natural and scenic features areas

Rec No.	Existing natural and scenic features area name	Location	Area (ha)
H132	Black Range Note: Several significant fauna species, including swift parrot, powerful owl and square tailed kite have been recorded here. Management should aim at protecting habitat for these and other fauna.	Great Western	418
H132	Mt Gowar	West of Wedderburn	62
H132	Howells Hill	East of Charlton	85
H132	Mt Buckra	North-west of Wychitella	33
H132	Murchison North	East of Waranga Basin	2
H132	Mt Ochertyre	North of Chiltern	26
H132	Barnawartha Hill	North-east of Chiltern	60
Total			686

H133-H136 Recommendations for geological and geomorphological features areas

Rec No.	Geological and geomorphological features name	Location	Area (ha)
Existing geological and geomorphological features			
H133	Yowang Hill	North-east of St Arnaud	70
H133	Amherst quartz reef	West of Talbot	8
H133	Coliban Falls	West of Redesdale	4
H133	Permian glacials, Moorabbee shoreline, Lake Eppalock	North-west of Heathcote	34
Recommended geological and geomorphological features			
H134	White Hills sediments	White Hills, Bendigo	15.4
H135	Barfold Gorge	Campaspe River, Redesdale	8
H136	Pink Cliffs	West of Heathcote	36
Total			175.4

H137 Recommendations for highway parks

Rec No.	Highway parks (HP) and roadside stops (RS)	Location	Area (ha)
H137	Adjacent CA 3 Parish of Runnymede (HP)	Northern Highway, Elmore	10
H137	Sections 19 & 20, Township of Toolleen (RS)	Northern Highway, Toolleen	3
H137	Casey Weir, CA 19A and adjacent water reserve, Parish of Goorambat (HP)	Midland Highway, Benalla	42
H137	CA 7A Sec 1 Parish of Barambogie (RS)	Rocky Creek Road, Springhurst	18
Total			73

I Water production**I₁, I₂ Recommended water production areas**

Rec. No.	Water production area name	Status	Area (ha)
I1	Lake Lonsdale	Within declared water catchment	2 950
I1	Picnic Road (Ararat)	Declared water catchment	15
I1	Malakoff Creek and Landsborough Reservoir (Landsborough)	Land use determination	25
I1	Teddington Reservoir (Stuart Mill) Note: Relevant land and water authorities should resolve the question of responsibility for maintenance of the No. 1 Dam wall.	Declared water catchment	20
I1	Redbank Reservoir (Redbank)	Declared water catchment	15
I1	Forest Creek Reservoir (Amphitheatre)	Declared water catchment	2
I1	Sugarloaf Reservoir and Lead Dam (Avoca)	Land use determination	15
I1	Bealiba Water Reserve (Bealiba)	Declared water catchment	1
I1	Laanecoorie Reservoir (Dunolly etc.)	Declared water catchment	320
I1	Doctors Creek Reservoir (Lexton)	Within declared water catchment	4
I1	Talbot Reservoir (Talbot)	Within declared water catchment	76
I1	Centenary Reservoir (Maryborough)	Within declared water catchment	25
I1	Tullaroop Reservoir (only part is in study area)	Declared water catchment	130
I1	Lake Cairn Curran (only part is in study area)	Declared water catchment	1 480
I1	Cairn Curran (lake environs)	Land use notice	5 500 ²
I1	McCay Reservoir – Coliban channel system (Castlemaine, Campbells Creek, Chewton, Fryerstown, Guildford, Harcourt, Maldon and Newstead) Note: native vegetation on this site should be protected	Within declared water catchment	16
I1	Spring Gully Reservoir (Bendigo)	Declared water catchment	55
I1	Lake Eppalock	Declared water catchment	2 950
I1	Eppalock (lake environs)	Land use determination	25 800 ²
I1	Coliban Main Channel (Taradale/Elphinstone)	Within declared water catchment	1
I1	Caledonia Reservoir (Heathcote)	Within declared water catchment	6
I1	McIvor Creek (Tooboora)	Within declared water catchment	2.5
I1	Fifteen Mile Creek (Glenrowan)	Declared water catchment	4
I1	Diddah Diddah Creek (Springhurst)	Declared water catchment	15

Rec. No.	Water production area name	Status	Area (ha)
I1	Ovens River (Wangaratta – offtake is outside study area boundary)	Declared water catchment	(5) ¹
I1	Barambogic Creek (Chiltern)	Declared water catchment	15
Towns whose water catchments are not declared			
I2	Charlton (Wimmera Mallee Water Channel)	Not declared	1
I2	St Arnaud (St Arnaud Reservoir)	Not declared	27
I2	Wychitella (Wimmera Mallee Channel)	Not declared	2.5
I2	Wedderburn area/Korong Vale area (Wimmera Mallee Channel)	Not declared	2.5
I2	Bridgewater /Inglewood (Loddon River)	Not declared	5
I2	Serpentine (Serpentine Creek)	Not declared	2.5
I2	Jarklin (Serpentine Creek)	Not declared	2.5
I2	Raywood (Raywood Reservoir)	Not declared	4
I2	Sebastian (Cockatoo Hill Reservoir)	Not declared	17
I2	Bendigo (Sandhurst Reservoir)	Not declared	77
I2	Bendigo (Specimen Hill Reservoir)	Not declared	5.5
I2	Bendigo (Jackass Flat Reservoir)	Not declared	1.5
I2	Bendigo (Ironstone Hill Reservoir)	Not declared	1.5
I2	Huntly (Huntly Channel)	Not declared	1
I2	Axedale (Campaspe River)	Not declared	5
I2	Goornong (Campaspe River)	Not declared	5
I2	Elmore (Bore – Calivil Aquifer)	Not declared	1
I2	Colbinabbin (Waranga Western Main Channel)	Not declared	2.5
I2	Rushworth (Waranga Western Main Channel)	Not declared	2.5
I2	Stanhope (No.9 Channel)	Not declared	1
I2	Girgarre (Goulburn Murray Channel)	Not declared	2.5
I2	Kyabram (Wyuna Main Channel)	Not declared	1
I2	Tongala (Goulburn Murray Channel)	Not declared	2.5
I2	Merrigum (Goulburn Murray Channel)	Not declared	2.5
I2	Tatura (Goulburn Murray Channel)	Not declared	2.5
I2	Shepparton/Mooroopna etc. (Goulburn River)	Not declared	5
I2	Katandra West (Katandra West Channel)	Not declared	1
I2	Toolamba (Goulburn Murray Channel)	Not declared	2.5
I2	Murchison (Goulburn River)	Not declared	5
I2	Goulburn Weir (Lake Nagambie)	Not declared	1 270
I2	Nagambie (Lake Nagambie)	Not declared	2.5
I2	Avenel (Goulburn River)	Not declared	5
I2	Seymour (Goulburn River)	Not declared	5
I2	Barmah (Murray River)	Not declared	5
I2	Picola (Goulburn Murray Channel)	Not declared	2.5
I2	Nathalia (Broken Creek)	Not declared	2.5
I2	Numurkah /Wunghnu (Broken Creek)	Not declared	2.5
I2	Katunga (Katunga Bore)	Not declared	1
I2	Strathmerton (Strathmerton Bores)	Not declared	2
I2	Cobram (Murray River)	Not declared	5
I2	Katamatite (Goulburn Murray Channel)	Not declared	2.5
I2	Dookie (East Goulburn Main Channel)	Not declared	2.5
I2	Yarrawonga (Murray River at Lake Mulwala)	Not declared	5
I2	Tungamah (Boosey Creek)	Not declared	2.5
I2	St James (St James Channel)	Not declared	1
I2	Devenish (Back Creek)	Not declared	2.5
I2	Goorambat (Broken Creek)	Not declared	2.5
I2	Bundalong (Ovens River – offtake is outside study area boundary)	Not declared	(5) ¹

Rec. No.	Water production area name	Status	Area (ha)
I2	Rutherglen/Wahgunyah (Murray River)	Not declared	5
I2	Barnawartha (Barnawartha Bore)	Not declared	1
Other major storages			
I3	Waranga Basin	Not declared	6 380
I3	Lake Mokoan	Not declared	7 540
Total			23 582

Notes: ¹ Areas of reservoirs listed are the measured or estimated area of the relevant water body. Minor channel offtakes and bores have a nominal area of 1ha; offtakes from creeks and major channels have a nominal area of 2.5ha; offtakes from rivers and lakes have a nominal area of 5ha. The areas (in brackets) for Wangaratta and Bundalong offtakes are omitted from the total as they are outside the study area.

² The areas shown for the land use notice at Cairn Curran and land use determination at Eppalock (both lake environs) include large areas of private land and are omitted from the total.

J Community use areas

J2 Recommendations for recreation areas—Notes

- J2 Lake Lonsdale—this area has large old trees and important cultural heritage features that should be protected.
- J2 Princes Park, Maryborough—significant historic features at this site include Illawarra flame trees, a grandstand, rotunda and stone lined drain. These should be preserved. They are also listed on the Victorian Heritage Register.
- J2 Timor Recreation Area, Bet Bet Creek Road has remnant native vegetation which should be protected.
- J2 Porcupine Flat, Maldon—the natural vegetation and large seasonal wetland depression within this reserve are to be conserved.
- J2 Specimen Hill mini bike track, Bendigo—historic mining relics on this reserve should be preserved.
- J2 Queen Elizabeth Oval, Bendigo—the grandstand is on the Victorian Heritage Register and should be preserved.
- J2 recreation area between Laurel and Maple Streets, Bendigo—the creek frontage adjoining this reserve has old stone work and timber slab retaining walls that should be retained.
- J2 Comet Hill recreation area—part of this area may be required for an air shaft/vent for underground mining.
- J2 Happy Jack water and recreation area (adjacent to the Calder Highway), Bendigo—access to water on this parcel is to be retained.
- J2 Albert Roy recreation area, Eaglehawk—native vegetation, including examples of Granitic Hills Herb-rich Woodland and Hillcrest Herb-rich Woodland EVCs, should be protected.

J3 Recommendations for recreation trails—Notes

- J3 O'Keefe Rail Trail Bendigo—the railway bridge at Strickland Road is a significant heritage structure and should be protected.
- J3 Wangaratta to Everton section of the Murray to the Mountains Rail Trail—remnant indigenous vegetation should be protected.

J4 Recommendations for rifle and other shooting ranges—Notes

- J4 Castlemaine Pistol Club—native vegetation at this site should be protected.

J5 Recommendations for parklands and gardens—Notes

- J5 Big Hill, Stawell should be managed to protect historical monuments to the district pioneers, gold discovery and water supply engineering, and diverse regionally significant flora.
- J5 Public park and recreation area east of Maryborough—large old trees providing habitat for swift parrots and painted honeyeaters, and indigenous vegetation should be protected
- J5 Rosalind Park, Bendigo—includes memorial statues that are on the Victorian Heritage Register and should be preserved.
- J5 reserve bound by Murphy, Ross, Dundas and Heywood Streets, Bendigo—vegetation at the northern end of this reserve includes Ausfeld's wattle and should be protected.
- J5 Lake Tom Thumb and adjoining reserve, Eaglehawk—contains rare plants that should be protected.
- J5 Former state school site, corner Langslow and Monaghan Streets, Castlemaine—the stand of Cunnacks Valonia oak trees is of historic significance and should be retained.

J6 Recommendations for buildings in public use—Notes

- J6 Moliagul Primary School—buildings on this site are of historical significance and should be protected.
- J6 Dunolly Primary School, Bridgewater—Dunolly Road—old weatherboard buildings on this site have heritage value and should be protected.
- J6 Old Court of Mines, Maryborough—sandstone building is of historic interest and should be protected.
- J6 Francis Street State School, Maldon—buildings on this site are on the Victorian Heritage Register and should be protected.
- J6 Muckleford South School is of state significance and should be protected. The site is on the Victorian Heritage Register.
- J6 Guildford Primary School—buildings on this site (excluding the toilet block and shed) are on the Victorian Heritage Register and should be protected.
- J6 Common School, Lockwood—historic features on this site should be protected.
- J6 Stanley Street State School, Eaglehawk—school buildings are of historic significance and should be protected.
- J6 Commonwealth School, between Church and Brazier Streets, Eaglehawk—buildings on this site are on the Victorian Heritage Register and should be protected.

- J6 Yundool Hall: management of the adjoining Yourang Nature Conservation Reserve should ensure continued access to and fire protection for this hall.

Note: Various J2, J5 and J6 areas are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. The ECC holds information on the Crown descriptions of these blocks.

L Earth resources

L1 Recommendations for mining sites

Rec. No.	Name	Location	Area (ha)
L1	Stawell Gold Mines	Stawell	122
L1	Reef Mining	Tarnagulla	10
L1	Bailieston	North-west of Nagambie	47
L1	Bendigo Mining	Kangaroo Flat and Eaglehawk	125
L1	Fosterville	North of Axedale	136
L1	Myers Flat	Bendigo	5
L1	Nagambie	East of Nagambie	72
Total			517

L2 Recommendations for stone reserves

Rec. No.	Material	Location	Area (ha)
Existing stone reserves			
Note: Some 1 880 ha of stone reserves were identified in earlier investigations. Approximately 80 ha have been recommended for other uses in this investigation. Numerous small gravel pits continue to operate in gravel reserves, state forest, or other land use categories.			
New stone reserves and other extractive industries sites			
The following extractive industries are operating under work authorities on public land. Those located on small isolated public land parcels are proposed to be L2 stone reserves.			
in E1	Sand/granite	Percydale, north-west of Avoca	29.2
L2	Hornfels	south-east of Charlton	38
in F3	Sand/gravel	south of Maryborough	35
in F2	Sand/gravel	west of Inglewood [0.4 ha on private land]	0.4
in E1	Hornfels	north-west of Maldon	11.6
L2	Sand/gravel [application]	south-west of Eaglehawk	3.6
in C1	Slate	west of Kangaroo Flat	5
L2	Sand/gravel	White Hills, Bendigo	24.3
in F4	Sand/gravel	Wellsford State Forest west	25
in C5	Granite	Mt Alexander Regional Park	6
in C5	Granite	Mt Alexander Regional Park	3.8
L2	Slate	east of Castlemaine	2.3
in NHP1	Sedimentary	south-east of Castlemaine	34.2
in NHP1	Slate	south-east of Castlemaine	1
in F4	Sedimentary	Wellsford State Forest east	19.9
L2	Sedimentary	north-east of Elmore [98 ha on private land]	22
L2	Sedimentary	south of Peechelba	8
L2	Granite	West of Glenrowan [19 ha on private land]	1
L2	Granite	Glenrowan	19
in A1	Hornfels	in Chiltern–Pilot National Park	12
in A1	Granite [application]	in Chiltern–Pilot National Park	na
Total of L2 areas			118.2

Note: Several L2 areas are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. The ECC holds the Crown descriptions of these blocks. Several applications for extractive industry licences are pending.

M Services and utilities—Notes

- M1 Talbot to Avoca Road, just north-west of Amherst on the gold route between Ballarat and Adelaide—bluestone arched culverts/bridges are of state significance from a historic point of view and have recorded social community heritage value. They should be protected.
- M1 Maryborough Fire Station—this building was constructed in 1861 and should be protected.
- M1 Stone lined drain, Maryborough—this drain is of historic value and should be retained.
- M1 Old Lead Reservoir channel, Dunolly—this site evokes the early and relatively crude means of carrying water to the new population centres formed after the gold rush. The channel is part of one of the pioneering domestic water supply schemes in Victoria and should be protected.
- M1 Dunolly to Inglewood railway—constructed in the late 1880s this line is locally important as a typical example of a light single track country line serving former mining and agricultural communities. The associated Inglewood and Dunolly stations are of individual architectural and historic merit and should be protected.
- M1 Stone bridge, former Tarnagulla Eddington Road—located across the Waanyarra Creek about 5km north of Eddington, this bluestone and timber bridge is an excellent example of the elaborate and high standard of engineering work carried out by local shires with the wealth generated by gold mining. It is of regional significance and should be protected.
- M1 Maldon Cemetery—this site contains important historical, social, architectural and aesthetic features that should be protected.
- M1 Mitiamo Cemetery—significant grassy vegetation in the eastern half of the cemetery block should be protected by continuing to exclude grazing.
- M1 Magistrates Court and lockup, Eaglehawk—these buildings are of historic significance and should be protected.
- M1 Bendigo Cemetery—this site has features of heritage value, including rotundas, a chapel, funerary, gates and fence. It is on the Victorian Heritage Register and should be protected.
- M1 Anne Caudle Centre, Barnard Street, Bendigo—this site, part of Bendigo hospital, is on the Victorian Heritage Register and should be protected.
- M1 Melbourne and River Murray Railway—opened in five stages from 1859-1864, this line which remains in use has numerous fine structures, particularly bridges including the Taradale viaduct, stone bridges near Harcourt and at Gaashs Road, and tunnels near Elphinstone and south of Bendigo, some of which are listed on the Victorian Heritage Register. They constitute parts of the most elaborate line in Victoria constructed to the highest engineering and aesthetic standards. It is also an expression of the importance of capturing the Murray River and Riverina trade for the Port of Melbourne, and recalls the significance of the Castlemaine and Bendigo goldfields during the 1860s. Features along this line are included on the Victorian Heritage Register; rail and road managers should continue to consult with Heritage Victoria.
- M1 Castlemaine Court House and cell block—these buildings have historic values and should be protected.
- M1 Campbell's Creek Cemetery, Castlemaine—this site contains trees, Chinese burning towers and a caretaker's building of historic significance. These features should be protected.
- M1 Chewton Cemetery and cemetery extension—historic features of this site should be protected.
- M1 Axedale Cemetery—native vegetation on this site should be protected.
- M1 Former tip site, Axedale—much of this site has been recently disturbed by mining. Remaining historical features should be protected.
- M1 Toolamba Cemetery—historic features of this site should be protected.
- M1 Graytown Cemetery—this cemetery reserve is surrounded by native forest. It is significant in the northeast as the only surviving built fabric emanating from the Graytown gold rush and should be protected.
- M1 Rushworth Court House—this building is the only major surviving 19th century building on the former Government Camp site which became the town of Rushworth, and should be protected.
- M1 Murchison Cemetery—historically, this site is linked to several important themes: gold via Chinese burials, the Aboriginal Protectorate, some early townspeople representation, and WWII internment. The cemetery has a valuable mature landscape in the form of Italian cypress which has been recognised for its aesthetic value. The largest and perhaps most significant memorial is the Ossario, the inspiration of Luigi Gigliotti of Kyabram, who proposed that all Italians buried in Australia, during WWII, should be placed in one burial place. Naturally it has high social significance to the Italian community across Australia. This site is of state significance and should be protected.
- M1 Cattanach Channel, Murchison—this channel represents one of the major phases of the extensive irrigation project centred around the Goulburn Weir and the Waranga Basin. It is of regional historic significance and should be protected.
- M1 Stuart Murray Canal—this irrigation channel, still in use, is of historic significance as a vital part of the ambitious 'national headworks scheme' and an ancillary to the construction of the important Goulburn Weir project, and should be protected.
- M1 Seymour-Tocumwal railway bridges, Toolamba—these 1880 bridge piers and railway (part of the Toolamba run) are regionally significant and should be protected.
- M1 Kirwans Goulburn River bridge, Nagambie— Constructed in 1890, this unusual timber trestle bridge with timber balustrade, crosses the Goulburn River on two angles, with two passing bays on the south side (rare). It is the longest timber bridge in Victoria, being a rare combination of type, materials and age. The east end has some mature gums around the entry, while the river itself has some indigenous vegetation along its banks and in the stream. The site is of state significance and should be protected.

Notes:

1. Various services and utilities (M1) areas are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. The ECC holds information on the Crown descriptions of these blocks.
2. Part of a services and utilities (M1) site in urban Bendigo may be required for an air shaft/vent for underground mining.

N Uncategorized public land**N1 Recommendations for uncategorised public land—Notes**

- N1 land east of Greenhill Lake, Ararat—this area should be considered as the site for a woodlot to contribute to future firewood requirements.
- N1 parcel adjoining and including the velodrome, Maryborough (P103052, P104818, P104821, P104822 and P108256)—this area is under consideration for the Maryborough Education Precinct. If it is not required for that purpose, the vegetated public land should be reserved as a natural features reserve—bushland area.
- N1 parcel opposite Specimen Hill School, Bendigo—native vegetation on this site should be protected.
- N1 parcel in Anderson Street, Bendigo—historic mine shafts should be protected.
- N1 Pearl, Pearl East and Stanfield Mine Workings—while most of this site is uncategorised public land, several historic, natural, recreation and water supply features should be retained as public land and protected, as follows: the six lines of the Pearl Shaft's mullock heap; machinery sites; a large battery site ; well preserved brick and concrete footings and mullock heaps at the Pearl East mine site; well preserved engine beds, boiler setting, chimney base, shaft collar, poppet-leg pads and mullock heaps at the Stanfield Mine site; Box-Ironbark vegetation in the west of the site; a recreation trail forming part of the Bendigo - Eaglehawk open space link; and a water race managed by Coliban Water
- N1 Windmill Hill Historic Interest Reserve, Bendigo—mine shafts and mullock heaps on this site are of historic interest and should be protected.
- N1 parcel near corner of Ross and Andrew Streets, Bendigo—native vegetation at this site includes Ausfeld's wattle and should be protected.
- N1 parcel adjacent to Maldon-Lockwood Road, Mount Alexander—native vegetation at this site should be protected.
- N1 old rail reserve, Tooborac—this corridor has vegetation and railway relics that should be protected.
- Part of the N1 parcel at Kaarimba, previously a 'revegetation area' (Part P160670, approximately 20 ha) could be considered as a site for a box-ironbark plantation.
- N1 parcel at Gowangardie, previously a 'revegetation area' (P160677, 20 ha)—any remnant indigenous vegetation should be retained; the modified part could be considered as a site for a box-ironbark plantation.
- N1 parcels at Molka and Micpoll, previously 'revegetation areas' (P160674, 5.3 ha, and P162029, 5ha)—any remnant indigenous vegetation should be retained.

Notes:

1. Numerous uncategorised public land (N1) areas are located in urban Bendigo. Due to their small size, they are not labelled on Map A or Map D. The ECC holds information on the Crown descriptions of these blocks.
2. Parts of several uncategorised public land (N1) sites in urban Bendigo may be required for ventilation shafts for underground mining.

O Land not required for public purposes

Rec No.	Parish	Parcel	Allotment/Lot	Section/Plan	Size (ha)
O1	Navarre	P106232	CA 254	No Sec	10.9
O1	Landsborough	P104216	CA A75A	No Sec	0.5
O1	Landsborough	P104219	CA A6E	No Sec	2
O1	Yalong	P105529	CA 46B	No Sec	1.8
O1	Teddywaddy	P120460	CA 4B	No Sec	5.7
O1	St Arnaud	P126970	CA 50G	Sec AA	0.6
O1	St Arnaud	P129499	CA 6C	Sec A1	0.3
O1	Carapooee	P120953	CA 10F	Sec C	3
O1	Gowar	P132267	CA 44F	Sec B	6.0
O1	Yeungroon	P125747	CA 28A	Sec 5	4
O1	Woosang	P125628	CA 8A	Sec E	4
O1	Dalyenong	P121754	CA 81A	No Sec	2
O1	Ellesmere	P129318-9	CA 6,7	Sec 12	0.2
O1	Lilliput	P366305, P202009-11	CA 3A, 9A, 9B, 9C	Sec 12	16.5
O1	Salisbury West	P124024	CA 9J	Sec C	1.7
O1	Avoca	P107615, P107621	CA 6-7	Sec 12 A	0.2
O1	Avoca	P103489	CA 14A	Sec A	4.1
O1	Glenmona	P102480	CA 6C	Sec 3	0.3
O1	Glenmona	P104284	CA 22A	Sec J	0.6
O1	Glenmona	P104287	CA 6B	Sec F	0.8
O1	Wedderburne	P125021	CA18	Sec 8	2.7
O1	Dunolly	P121972	CA 9C	Sec 3B	0.4
O1	Dunolly	P128862	CA 12B	Sec 46	0.2
O1	Tarnagulla	P131236-9	CA 1, 2, 16-18	Sec 6	0.5

Rec No.	Parish	Parcel	Allotment/Lot	Section/Plan	Size (ha)
O1	Bet Bet	P133793	CA 22A	Sec 3	0.9
O1	Bet Bet	P133909	CA 4D	Sec 6	0.8
O1	Bet Bet	P133930	CA 21D	Sec 1A	0.6
O1	Tchuterr	P124369	CA 47H	Sec B	2
O1	Maryborough	P104842	CA 5	Sec 2A	0.1
O1	Sandon	P132166	CA 59F	Sec 5	1.8
O1	Tarrengower	P134656	CA 62A	Sec C	0.4
O1	Muckleford	P125237	CA 18	Sec 9	5.7
O1	Guildford	P122367	CA 13C	Sec 16	1.3
O1	Castlemaine	P121263	CA 1B	Sec 7C	0.25
O1	Castlemaine	P121287	CA 1G	Sec 2A	2.4
O1	Shelbourne	P367056	CA 11A	Sec 2	1.1
O1	Sandhurst	P126051, P126052	CA 536D, 536E	Sec M	4.4
O1	Sandhurst	P129369	CA 262B	Sec O	0.3
O1	Ravenswood	P123550	CA 1R	Sec 16	2.4
O1	Ravenswood	P123563	CA 2J	Sec 29	1.4
O1	Ravenswood	P123560	CA 4D	Sec 29	0.45
O1	Harcourt	P122509	CA 7A	Sec 7A	0.6
O1	Faraday	P120291	CA 10	Sec A1	0.3
O1	Elphinstone	P120618	CA 11C	Sec 10 C	0.2
O1	Elphinstone	P129163	CA 17	Sec 23	0.3
O1	Elphinstone	P129164	CA 14	Sec 24	0.9
O1	Elphinstone	P131141	CA 6B	Sec 11A	0.6
O1	Elphinstone	P129151	CA 14B	Sec 14	0.8
O1	Fryers	P129398	CA 8A	Sec 7	0.1
O1	Fryers	P131178	CA 5	Sec 1A	0.8
O1	Fryers	P120448	CA 10B	Sec 8A	0.2
O1	Hawkestone	P122541	CA 23B	Sec 6	0.4
O1	Fosterville (Tp.)	P128318, 129319	CA 6,7	Sec 12	0.2
O1	Campaspe	P120922	CA 24A2	No Sec	11.7
O1	Langwornor	P122769	CA 13	Sec 6	2
O1	Heathcote	P129679	Part CA 8A	Sec 28	7.2
O1	Colbinabbin	P128636	CA 4	Sec 1	0.9
O1	Moora	P125137	CA 59A	No Sec	1.6
O1	Costerfield	P128740-50	CA 1-12	Sec2	2.3
O1	Costerfield	P128737-39	CA 6-8	Sec 4	0.6
O1	Costerfield	P128736	CA 5	Sec 4	0.2
O1	Waranga	P124793	CA 7	Sec 1	0.4
Total					127.4

- Note:
1. The small size of many of these parcels prevents many of them from being visible on Map A.
 2. In Appendix 10 of the Draft Report, several allotments totalling 1 398 ha in the Parishes of Belvoir West and Wodonga were listed as land not required for public purposes. These areas were freehold land held by the Albury Wodonga Development Corporation (AWDC), which were included as public land in an earlier LCC investigation. As part of an arrangement that saw substantial areas of AWDC land handed over to NRE, including recommended Fell Timber Creek Nature Conservation Reserve D68, the Belvoir West and Wodonga lands were identified for private sale by the AWDC, subject to land management co-operative agreements to protect remnant vegetation. There was no specific comment on these areas in responses to the Draft Report.

Appendix 12

Suggested format for Conservation Management Networks

Since publication of the ECC's Draft Report, many people working for biodiversity conservation in fragmented landscapes around Australia have been considering the benefits of strengthening the identity of their various regional networks, using the title 'Conservation Management Networks' (CMNs). A stronger identity would help to make this innovative approach more readily understood and accepted by land managers, potential financial supporters, government conservation planners, researchers, and others whose support will be necessary to adequately conserve the biodiversity of the numerous highly fragmented landscapes across Australia's agricultural zones. At the same time it is essential, in clarifying and strengthening the CMN concept, that it is not so tightly defined or formally applied as to preclude a wide range of approaches—tailored for specific regional circumstances—from coming under the banner.

Broadly a CMN is a network of remnants, their managers and other interested parties. A key to the CMN model is a single administrative umbrella that coordinates the protection and management of a suite of dispersed, ecologically or geographically related remnants under different land tenures. A CMN is one of a number of tools needed to improve the conservation status of many fragmented ecological communities. The essential elements of the CMN concept are that it includes people and sites, and is working for protection and management of the sites.

In the context of the social, natural and administrative environments which exist in the Box-Ironbark study area, the following points provide a sketch of the ECC's vision for Box-Ironbark CMNs, without intending to limit the form or operation which any actual CMNs may find most appropriate for their particular circumstances.

Purpose:

- coordinate and prioritise resourcing for the management of important patches of remnant vegetation for biodiversity conservation in severely depleted Box-Ironbark ecosystems;
- focus attention and hence funding and works on the importance of remnant vegetation, and especially the most significant remnants, for biodiversity conservation;
- seek broad community support, and ultimately, a process driven and run by local groups;
- with biodiversity conservation as an aim, improve communication between, and the knowledge base of, local land managers; and
- identify new sites to add to the network and enhance their management for biodiversity conservation.

Proposed operational parameters include:

- completely voluntary for freehold land owners;
- initially, the main focus for each network would be on key sites which have already been identified and could be easily added to the network, such as larger or more significant public land sites and freehold sites already managed for nature conservation—at present there is no framework to systematically advance biodiversity conservation in these areas
- expand as new remnants are added to the network;
- maintain a register of sites in the network, with at least annual visits to update the management condition and objectives for each site;
- regular Steering Committee meetings;
- regular newsletters to members;
- workshops and discussion to assist land managers to maximise the efficiency of their management for biodiversity conservation; and
- part-time coordinator with office; and
- timeframe of five to ten years minimum, ideally ongoing.

Timing:

- establishment of effective and self-sustaining Conservation Management Networks will require consistent support (including adequate resources) for at least five to ten years for each network, preferably longer subject to review; and
- the need for improved management for nature conservation in the most fragmented landscapes is urgent; ideally, the pilot networks would be initiated as soon as possible.

Lead agencies:

- NRE Parks, Flora and Fauna; Parks Victoria;
- Catchment Management Authority, specifically the Biodiversity Implementation Committee; and
- possibly Landcare groups and Trust for Nature if appropriate.

Likely members:

- Catchment Management Authority;
- land holders/licensees with important remnants;
- land holders adjacent to important public land remnants;
- local Aboriginal communities;
- local branch of the Victorian Farmers' Federation;
- local field naturalists/environment group(s);
- local Trust for Nature officer;
- Landcare groups;
- local government;
- NRE Parks, Flora and Fauna; Parks Victoria where appropriate; other public land managers with important remnants; and
- relevant local biologists.

Steering committee:

- Catchment Management Authority;
- NRE Parks, Flora and Fauna or Parks Victoria;
- key landholders;
- Landcare representative;
- local Aboriginal representative;
- local Trust for Nature officer;
- local government representative; and
- local field naturalists/environment group.

Suggested trial area:

- Broken–Boosey Creeks system, based around the proposed Broken–Boosey State Park (see Recommendation B2) and nearby nature conservation reserves (D58—D64). This is a highly significant area for remnant vegetation, with a higher than usual proportion of significant remnants on public land; already well-documented; there is keen local interest; Trust for Nature have recently commenced initiatives in the Tungamah area; Goulburn Broken Catchment Management Authority (Biodiversity Implementation Committee, in particular) and managers of Broken–Boosey State Park would be specific lead agencies.

Other potentially suitable areas include:

- the recommended Wychitella Nature Conservation Reserve (see Recommendation D3);
- the Newstead area, south of Maldon;
- roadsides and other small remnants in the Picola district;
- clusters of significant roadsides and streamsides in the area broadly between Dookie and Euroa;
- the Chesney Vale Hills around the recommended Mt Meg Nature Conservation Reserve (see Recommendation D65);
- the Lurg Hills south of Wangaratta; and
- the Boorhaman Plains between Rutherglen and Wangaratta.

Appendix 13

Details of the Box-Ironbark Timber Model developed by NRE Forests Service

Changes since the Draft Report

A key feature of the ECC's Draft Report was the use of the NRE Forests Service model to predict timber availability from the area proposed to remain as state forest, as part of the overall social and economic assessment. In public consultation, this model attracted comment from a variety of perspectives. In addition, NRE commissioned independent consultants to review a number of issues associated with the model (Ryan & Leech, 2000).

As a result, the ECC and NRE re-examined the major elements of the timber availability analysis, and made several significant changes, including those associated with local variations in availability and short to medium-term scheduling of harvesting operations (as detailed in Chapter 17).

In terms of the model itself, Ryan & Leech (2000) concluded that it was essentially sound and appropriate for a strategic level analysis of the type for which it has been used. However, NRE field staff provided evidence that large tree retention in current forest management would result in improved forest structure (more large trees in the long term), as opposed to assumption No. 5 in the model, that forest structure was constant.

Consequently, this assumption has been modified in the following description and the model itself adjusted accordingly. In all other respects, the model used for the Final Report is the same as that used in the Draft Report—except, of course, that it is applied to a new land base reflecting the changes which the ECC has made to the areas recommended as state forest.

Background

NRE prepared the model described below, using data from the Box-Ironbark Timber Assessment (BITA). The BITA study area included the southern Pyrenees forests, which are outside the Box-Ironbark study area. The original analyses were made for the whole BITA study area, on the basis that the data were collected and modelled for this area. Adjustments have been made to the modelled

estimate for working circle 3, to exclude the southern Pyrenees.

The BITA study area also included the Fryers Ridge and Upper Loddon forests, but they (and other small forest areas) were excluded from the timber modelling as they contain only a low level of durable species, or are unproductive for timber. These forests are however within the Box-Ironbark study area, and contribute to the gross state forest area.

The outcome of the application of the model to the Box-Ironbark study area is shown in Table 17.7 on page 211, which compares the modelled volume of durable species from the current available forest with the volume available after allowing for the ECC's recommendations.

In determining land use, the recommendations were developed for a comprehensive, adequate and representative reserve system as required by the terms of reference. Every effort was made to minimise the impact on present and future activities such as timber harvesting.

The following information, on model structure and assumptions of the model, was provided by NRE Forests Service.

Model structure

An uneven age forest management model (Excel-based) was developed for the Box-Ironbark forests of central Victoria. This model has been applied to each of the six working circles identified in the Box-Ironbark Timber Assessment (BITA) project. The model utilises area and tree-based data for each working circle, including diameter distributions for total, merchantable and retained stems, diameter growth rates, and product outputs (sawlogs, sleepers, firewood, fencing timber) by diameter class. Data exclude plots in historic areas and include corrections derived from felling plots.

The model has been developed on the assumption that the current diameter class distribution based on total stocking, as determined by the BITA assessment for each working circle, is an indication of site capacity. The structure of an

uneven aged forest can be described by a ‘reverse J’ function of number of stems by diameter class. The application of this relationship to uneven aged forests is well documented in the literature (Meyer *et al.* 1952, Smith *et al.* 1997).

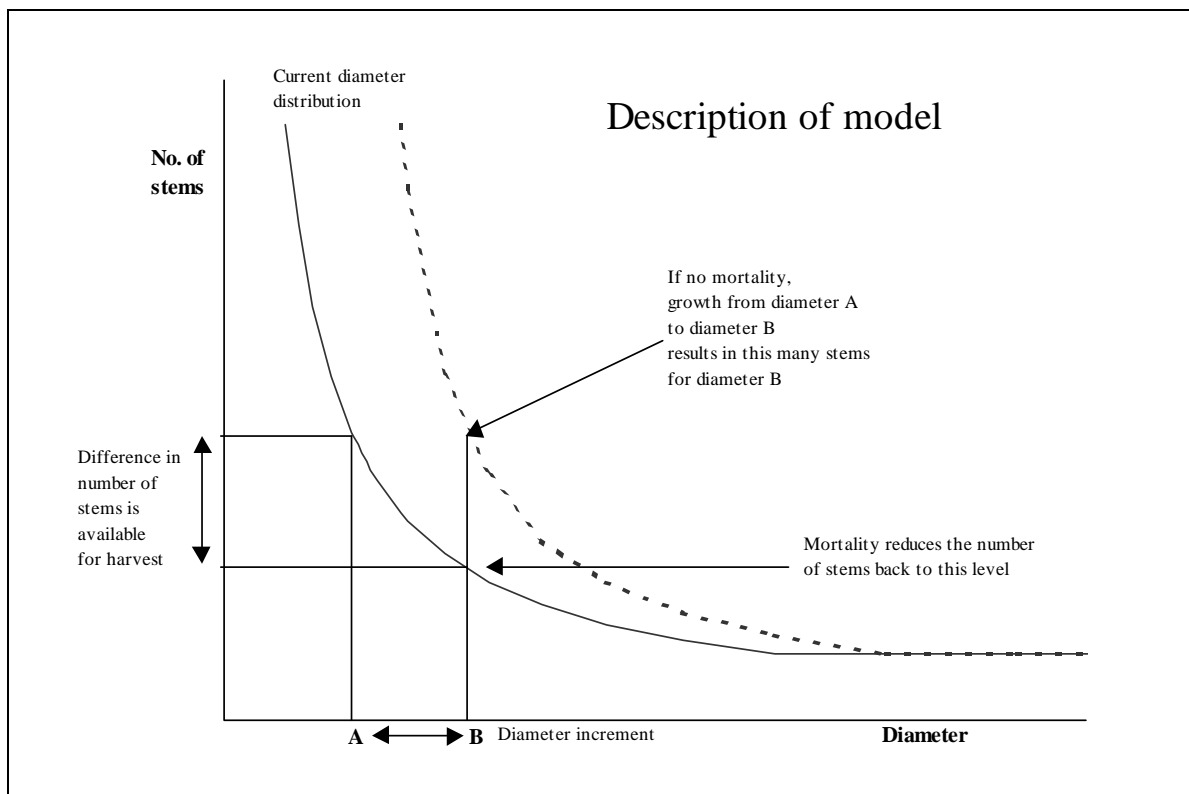
To incorporate this relationship in the model, an exponential function was developed for the total stocking and retained stems in each working circle. When fitting the function, stems less than 20 cm were excluded. A comparison of total basal area for actual and predicted diameters (including stems <20 cm) was used to test the ‘goodness of fit’ of the functions. It was found that the best fit for each of the functions was obtained when some of the larger diameter classes were excluded. This is most likely due to the small number of stems (<1 per hectare) in these size classes giving disproportionate weight to the curve. Given the small numbers of stems in these size classes, fitting the curves in this way was not considered to be a problem.

Given that the total stocking, as defined by the fitted function, is indicative of the capacity of the site, the model has been developed on the assumption that as trees increase in size, the number of trees that the site can support will diminish, following the ‘reverse J’ curve. It is assumed that stocking will diminish at a constant

rate, as a result of mortality, with increasing diameter. It is also assumed that the plots measured for the BITA inventory cover the range of stand conditions from the start to the end of a cutting cycle.

The diameter distributions used in the model therefore represent the average distribution half way through the cutting cycle, and the average of the range to which the model can be expected to apply. Harvesting within this range can be expected to result in minimal losses due to mortality, as the stocking is within the capacity of the site. Growth rates used in the model can only be expected to apply within this range.

Retaining a stand structure beyond the upper limit of the diameter class range will result in increasing site occupancy, with increasing competition between trees and declining growth rates. In the absence of harvesting, growth rates of individual trees will be influenced by the mortality of neighbouring trees. In dry forest types, this mortality is typically slow relative to other forest types.



In the model, harvesting and mortality are assumed to follow the average curve. In effect, growth and harvesting occurs within the limits represented by this curve. The forecast of timber resource availability incorporates increases in the average diameter distribution. Using this approach, it is possible to calculate the theoretical number of stems available for harvesting, based on tree growth rates and changes in tree numbers between successive diameter classes.

The theoretical stocking for a particular diameter class is the number of trees in that diameter class as determined by the derived stocking function. The theoretically available stems are calculated as the difference between the stems remaining in the previous period and theoretical stocking for the diameter classes in the current period, less the number of unmerchantable stems remaining after mortality. If more stems are harvested than recommended in any period, the stocking will fall below the curve, so fewer stems will be available in the following period. The objective of the suggested harvesting regime is to adjust the shape of the curve (which is based on the data from the BITA plots) to improve stand structure towards that of working circle 1. The model is driven by the shape of the curve (for each working circle) and is scaled so that the function passes through the actual stocking remaining after mortality and/or harvesting which occurred in the previous period.

This relationship can be summarised as follows:

$$TAS = MSR_{(p-1)} - TS_m$$

where

TAS = Theoretically available stems

$MSR_{(p-1)}$ = Merchantable stems remaining after harvest/mortality in previous period

TS_m = Theoretical stocking (merchantable stems) site can support for current period

and

$$TS_m = TS_t - TS_r$$

where

TS_t = Theoretical stocking (total stems) determined by fitted function

TS_r = Theoretical stocking (retained stems)

The benefits of this approach are:

- site capacity can be described by the total stocking diameter distribution
- the concept of sustainability for uneven aged forest can be expressed in terms of maintaining or, in this case, improving stand structure, as defined by the diameter class distribution
- the impact of the number of unmerchantable stems on the availability of merchantable stems can be modelled.

Assumptions of the model

There are a number of assumptions included or implied in the model.

1. Stocking from the BITA plots is the best available information on the current condition of the forest.
2. The per hectare diameter distributions from the BITA assessment plots are assumed to apply equally across the net available area of each respective working circle and diameter increment is assumed to apply equally to all size classes for each working circle. Average values for diameter increment were used, based on plots within the available area, after additional reserve areas recommended by the ECC have been excluded. Note that analyses demonstrate the model is very sensitive to small changes in diameter increment.
3. The combined merchantable/retained stems stocking is taken as being indicative of site capacity.
4. Predicted stocking is modelled by applying an exponential function to actual total and retained (non-merchantable) stocking for each working circle. Stocking per diameter class is obtained from the BITA data, and is assumed to apply to the mid-point of the 5 cm diameter classes. Stocking figures loaded into the model are assigned to the start of the 5 cm class i.e. 10 cm diameter class contains stems from 10–15 cm. When extracted from BITA these figures appear as 12.5 cm diameter (midpoint of the 10–15 cm class).

5. The model is based on a function which is defined by the diameter distribution exhibited in working circle 1 (St Arnaud Range). Working circle 1 has a higher proportion of larger trees than other working circles. It is assumed that current marking practices to promote the retention and growth of larger diameter trees will have the effect of moving existing diameter distributions of stands to that given by working circle 1.
6. The stocking present (in number and distribution by diameter class) at the time of assessment is the basis for modelling. It is assumed that natural mortality will result in the current diameter distribution being maintained. It is assumed that if an area is not treated or harvested in a cutting cycle, the volume that would have been available is lost through mortality, and is not available in the future.
7. The model does not allow for in-growth of small diameter sizes. Stocking <20 cm is obtained from BITA. This only allows for an estimate of the contribution of these stems to sawlog availability at the end of the model. The availability of minor forest products cannot be satisfactorily predicted for the latter part of the model.
8. As the amount of timber harvested is determined by theoretical stocking, balancing of sawlog volume cannot be undertaken in the same manner as can be done for an even aged forest. Harvesting at more than the theoretical rate reduces future availability. Harvesting at less than the theoretical rate results in unharvested stems being lost due to mortality. Timber availability is determined by the stocking and diameter distribution at the time of assessment, and will fluctuate accordingly.
9. Model comparisons are based on predicted rather than actual diameter class distributions due to variability in the actual stocking between successive diameter classes. This is to provide smoother outputs from the model. Use of predicted values from the exponential function also enabled model inputs to be generated up to 150 cm. However, due to the very low number of stems in these size classes, the impact on retained stems was insignificant.
10. The model assumes all areas will be treated at the same intensity. As this is not likely to be reflected in practice, per hectare stocking from the BITA plots are assumed to apply only to medium and high productivity strata.
11. The period lengths for the model are defined so that the increment between successive periods is exactly 5 cm (Period length = 5 cm/diameter increment). This is necessary to overcome fluctuations in output volumes which occur due to the boundary between 5 cm classes in the product profile. The period length is approximately 13.2 years for northern working circles and 15.6 years for southern working circles.
12. Sawlog volumes obtained from the BITA plots are gross volumes only. These have been reduced by 20%, comprising 10% for internal defect (obtained from log sales data) and a further 10% allowance for scaling factors and utilisation losses. This is consistent with allowances applied in similar assessments.
13. All models included an upper diameter limit of 60 cm for harvesting as this is the effective limit that results from implementation of existing habitat tree prescriptions, which are applied on a per coupe basis.
14. It was assumed that stems in the smallest (15 cm) diameter class were not harvested, as this distorts the number of stems harvested per year. This has minimal impact on product volume.
15. A 10% contingency allowance has been applied to cater for errors and uncertainties not specifically identified as part of the modelling process.

Appendix 14

Tree hollows in the Box-Ironbark study area

Mean number of hollows per tree by canopy hollow size, and the presence of base hollows, for the eight main tree species

Species	Tree size class dbhob	Canopy hollows per tree			Base hollows per tree
		Small and medium	Large and very large	Total	Total
Grey box	1-20	0.0	0.0	0.0	0.1
	20-40	0.0	0.0	0.0	0.1
	40-60	0.2	0.1	0.4	0.2
	60-80	0.8	0.7	1.5	0.2
	80-100	1.3	1.3	2.6	0.4
	> 100	2.4	3.7	6.0	0.5
Red ironbark	1-20	0.0	0.0	0.0	0.0
	20-40	0.0	0.0	0.0	0.0
	40-60	0.0	0.0	0.0	0.1
	60-80	0.2	0.3	0.4	0.2
	80-100	1.6	1.1	2.7	0.2
	> 100	3.4	4.1	7.4	0.0
Yellow box	1-20	0.0	0.0	0.0	0.1
	20-40	0.0	0.0	0.1	0.1
	40-60	0.3	0.1	0.3	0.1
	60-80	0.6	0.4	1.0	0.2
	80-100	2.3	1.7	3.9	0.2
	> 100	3.3	2.5	5.7	0.1
Yellow gum	1-20	0.0	0.0	0.0	0.0
	20-40	0.0	0.0	0.0	0.0
	40-60	0.1	0.0	0.1	0.1
	60-80	0.7	0.3	0.9	0.1
	80-100	1.4	0.7	2.0	0.3
	> 100	0.3	2.0	2.3	0.1
Long-leaf box	1-20	0.0	0.0	0.0	0.0
	20-40	0.0	0.1	0.1	0.0
	40-60	0.2	0.5	0.7	0.1
	60-80	0.1	0.9	1.0	0.0
	80-100	0.6	1.8	2.4	0.1
	> 100	0.8	2.4	3.2	0.2
Red box	1-20	0.0	0.0	0.0	0.0
	20-40	0.1	0.0	0.1	0.1
	40-60	0.7	0.3	1.0	0.2
	60-80	1.8	1.3	3.1	0.5
	80-100	1.1	0.8	1.9	0.4
	> 100	1.3	2.6	3.8	1.3
Red stringybark	1-20	0.0	0.0	0.0	0.0
	20-40	0.0	0.0	0.1	0.0
	40-60	0.3	0.1	0.4	0.1
	60-80	0.5	0.6	1.2	0.2
	80-100	0.4	1.0	1.4	0.1
	> 100	0.3	1.6	1.8	1.8
Blue gum	1-20	0.0	0.0	0.0	0.0
	20-40	0.0	0.0	0.0	0.0
	40-60	0.0	0.0	0.0	0.0
	60-80	0.1	0.1	0.3	0.1
	80-100	1.2	0.6	1.8	0.1
	> 100	1.6	0.6	2.3	0.3

Source: Soderquist, T. (1999b). Numbers are rounded.

Appendix 15

Extractive Industry Interest Areas in the Bendigo Supply Area showing percentage public and treed land for each area and recommended parks or reserves included

AREA	NAME	RESOURCE/S	% TREED ¹ (% Treed Public Land) ²	% PUBLIC LAND ¹	AREA (km ²)	PARKS OR RESERVES INCLUDED
1	North-east of Goomong	basalt	0	0	11	No recommendations affected
2	Mt Camel	hardrock (for blasting)	10	0	17	Part of Crosbie Nature Conservation Reserve
3	Toolleen	gravel, sand, clay, potential for kaolinite	50 (50)	50	16	Part of Crosbie Nature Conservation Reserve
4	Campaspe River Valley	gravel, sand, basalt, ball clay (not widely distributed)	10 (9)	10	105	Part of Knowsley State Forest; north-east part of C5 Heathcote Regional Park; H3 stream bed and banks.
5	Drummartin	sand and gravel suitable for concrete, brickmaking and roadbase.	5	1	70	No recommendations affected
6	Northwest of Marong	sand, gravel	10 (5)	5	37	Small part of Bendigo Regional Park.
7	West of Marong	sand, gravel	2	1	16	No recommendations affected
8	West of Fosterville	'reef'	90 (70)	80	7	No recommendations affected
9	Harcourt and Baringhup Granodiorites	dimension stone, hard rock aggregate, granitic sand, possibly decorative slate, graniodorite and hornfels	10(5)	5	147	Part of D35 Shelbourne Nature Conservation Reserve; part of Lockwood State Forest.
10	Mayreef	sand, gravel, 'reef'	0	2	24	H7 Picanniny Creek Streamside Area
11	Bendigo and Whipstick	sand, gravel, 'reef'	55 (5)	50	17	Part of D43 (Whipstick Nature Conservation Reserve); part of Greater Bendigo National Park.
12	East and northeast of Marong	plastic clay for bricks	0	1	8	No recommendations affected
13	Southwest of Woodstock	plastic clay for bricks	10 (5)	5	20	Part of D35 Shelbourne Nature Conservation Reserve.
14	East of Bendigo	plastic clay for bricks	100 (100)	100	1	Part of Bendigo Regional Park
15	Diggora West	sand, gravel	0	0	26	Eastern half inside study area; no recommendations affected
16	Lake Cooper Quarry	hard rock	0	0	2	No recommendations affected
17	Harcourt	dimension stone	45 (40)	60	31	Mt. Alexander Regional Park and Mt. Alexander Plantation
18	Derrinal	dimension stone	0	0	5	No recommendations affected
Total³					560 km²	

- Percentages are estimated
- The public land component of the % Treed is shown in brackets in the fourth column. For example, for 17. Harcourt, 40% is treed public land, 20% cleared public (total 60% public); 5% is treed private land (total 45% treed); 35% is cleared private.
- Of the total area, about 64 km² is public land, 468 km² is cleared private land, and 28 km² is treed private land.

Appendix 16 Roadsides of conservation significance

Note: Road reserves included in this table are those that have vegetation of high conservation value that extends for a distance of at least 3 km. Many other road reserves have vegetation of high conservation value that does not exceed 3 km in length. It is impractical to include all such road reserves within this table. However, these smaller lengths of high conservation value roadsides should be afforded the same degree of protection as those listed here. Refer to the information sources cited for the location of such roadsides.

Shire name	Road name	Location	Description/Values	Source
Mt Alexander	Eddington-Maldon Rd	6 km between Bendigo-Maryborough Rd and Bridgewater-Maldon Rd	Wide, major sealed road. Good tree cover of grey box and yellow gum with occasional buloke. Wattle understorey with native grass groundlayer. Good regeneration of native species. Some peppercorn trees.	Perkins (1992)
Mt Alexander	Bridgewater-Maldon Rd	13.4 km between Eddington-Maldon Rd and Baringhup Rd	Wide, major sealed road. Good tree cover of river red gum, grey box and yellow gum with shrubs including varnish wattle, golden wattle, hedge wattle, lightwood and drooping cassinia. Small area of buloke. Good sections of native grasses. Excellent regeneration of native species, including buloke.	Perkins (1992)
Mt Alexander	Hayes Rd	3.1 km between Baringhup Rd and Simmons Rd	Winding gravel road with mostly dense vegetation cover. Some large yellow box, also grey box, yellow gum and river red gum. Shrubs include lightwood and hedge wattle, while the groundlayer consists of both native and exotic grasses.	Perkins (1992)
Mt Alexander	Three Chain Rd	9.7 km between Bradford Rd and Fogartys Gap Rd	Wide gravel road. Good tree cover of river red gum, grey box, yellow box and yellow gum with shrubs including lightwood, spreading wattle, sweet bursaria and drooping cassinia. Kangaroo grass is also present, as are various introduced species.	Perkins (1992)
Mt Alexander	Bows Cottage Rd (or Spring Gully Rd or Bells Reef Rd)	3.7 km between the township of Maldon and the Maldon-Lockwood Rd	Winding gravel road with long-leaf box, grey box, lightwood, dense patches of hedge wattle and sweet bursaria. Ground litter is also present.	Perkins (1992)
Mt Alexander	Lewis Rd	4.2 km from intersection with Maldon-Lockwood Rd	Sealed for first kilometre, then gravel. Grey box, yellow box, red box and red stringybark with a diversity of understorey species including cat's claws grevillea, acacia species, grey everlasting and native grasses.	Perkins (1992)
Mt Alexander	Sinclair's Lane/ McGregors Rd	Sinclair's Lane: 4.2 km from Carpenters Lane to Fogartys Gap Rd; McGregor's Rd. 2.7 km from Fogartys Gap Rd to Maldon-Lockwood Rd	Gravel road with tree cover of red box, grey box, river red gum, yellow gum and red stringybark. Shrubs include cherry ballart, golden wattle, hedge wattle, rough wattle, spreading wattle, sweet bursaria, cat's claws grevillea and daphne heath. Ground cover includes black-anther flax-lily, honey pots and native grasses. Introduced species include gorse and blackberry.	Perkins (1992)
Mt Alexander	Fogartys Gap Rd	Approximately 12 km from the Maldon-Lockwood Rd to the Calder Hwy	Major sealed road with variable tree cover of river red gum, grey box, yellow box, long-leaf box and yellow gum. Shrubs include lightwood, black wattle, silver wattle, gold-dust wattle, drooping cassinia and daphne heath. Native grasses are also found. Excellent regeneration of native species in sections. Road cutting near the Calder Hwy. forms a major geological feature.	Perkins (1992)
Northern Grampians	Morril Morrill Forest Rd	Approximately 9 km between Morrill Morrill Wallaloo East Rd and Kanya-Navarre Rd	Gravel road that runs along the north west boundary of the proposed Morrill Morrill NCR (D8). Tree cover includes yellow gum and a variety of box species, with occasional red ironbark. Beneath this can be found drooping she-oak, gold-dust wattle, rough wattle, sweet bursaria, common correa, cat's claw grevillea and black-anther flax-lily.	Start (1991)
Northern Grampians	Glynwylln-Morrill Morrill Rd	Approximately 13 km between Greens Creek-Morrill Morrill Rd and Stawell-Avoca Rd	Gravel road with an overstorey of yellow gum and a variety of box species, and an almost pure stand of red ironbark along one ridge. Buloke, rough wattle, spreading wattle and cat's claws grevillea are also found, along with some introduced species (e.g. horehound).	Start (1991)
Northern Grampians	Callawadda-Navarre Rd	Approximately 26 km between Donald-Stawell Rd and Stawell-Avoca Rd	Mostly gravel road with a variable overstorey including mixed box species, yellow gum and red ironbark. Buloke occurs along with cherry ballart, gold-dust wattle, spreading wattle, lightwood, golden wattle, sweet bursaria, common correa and cat's claws grevillea. This road reserve is mostly in excellent condition, although gravel stripping and quarrying has reduced its quality in areas.	Start (1991)

Shire name	Road name	Location	Description/Values	Source
Northern Grampians	Unnamed track	Approximately 3 km between Glynwylln-Morril Morrill Rd and Greens Creek-Morrill Morrill Rd	Informal dirt track with an overstorey of yellow gum and mixed box species. Buloke is present, as is gold-dust wattle, spreading wattle, sweet bursaria and a grassy understorey.	Start (1991)
Northern Grampians	Doctors Creek-Kirkella Rd	Approximately 8.5 km heading north from intersection with Stawell-Avoca Rd	Gravel road with a mature stand of almost pure yellow gum with yellow box and grey box also found. The shrub layer includes gold-dust wattle and golden wattle, while the ground layer is dominated by introduced grasses.	Start (1991)
Northern Grampians	Walshs Rd	Approximately 3.5 km between Bulgana Rd and Stawell-Salt Creek Rd	Gravel road with a mixed box community including grey box, long-leaf box and yellow gum. Drooping she-oak, cherry ballart, gold-dust wattle, hedge wattle, spreading wattle, leafy templetonia, common correa, cat's claws grevillea and variable prickly grevillea are also found. High levels of regeneration. Spiny rush occurs where the road runs into Concongella Creek.	Start (1991)
Northern Grampians	Kathmaur Hills Rd	Approximately 3.5 km between Bulgana Rd and Landsborough Rd	Gravel road supporting a yellow gum/box community with high levels of regeneration. Drooping she-oak and cherry ballart occur above a diverse and dense understorey. Gravel stripping has caused disturbance in some areas.	Start (1991)
Northern Grampians	Great Western-Bulgana Rd	Approximately 5.5 km north-east from intersection with Great Western-Salt Creek Rd	Mostly gravel road supporting a mixed box community of long-leaf box and yellow box. Buloke and a number of wattle species form part of a diverse and relatively undisturbed understorey.	Start (1991)
Northern Grampians	Great Western-Salt Creek Rd	Approximately 3.5 km between Western View Rd and Stawell-Salt Creek Rd	Partially sealed road with an overstorey of long-leaf box, yellow box and river red gum. It has a relatively diverse understorey including gold-dust wattle, blackwood and kangaroo grass. There is a small infestation of stinkwort.	Start (1991)
Northern Grampians	Sisters Rocks-Black Range Rd	Approximately 7.5 km between the Western Hwy. and Panrock Reservoir Rd	Sealed road supporting a red gum/box community with brown stringybark found on the ridges. Drooping she-oak and cherry ballart are found, as are several wattle species, silver banksia, sweet bursaria, cat's claws grevillea and kangaroo grass. There is significant regeneration of native species.	Start (1991)
Northern Grampians	Hyde Park-St Georges Rd	Approximately 3 km between the Western Hwy and Great Western-Moyston Rd	Gravel road with a mixed box community dominated by long-leaf box. Drooping she-oak and cherry ballart occur. The understorey is quite diverse. There is a small infestation of gorse.	Start (1991)
Northern Grampians	Stawell Town Pipeline Rd	Approximately 4.5 km south-west from intersection with Lake Fyans Rd (to edge of study area)	Gravel road supporting a yellow gum/box community. Slaty she-oak, drooping she-oak, cherry ballart, various wattle species, black-anther flax-lily, cat's claws grevillea and beaked hakea also occur. Good regeneration of native species. Pipeline maintenance represents a threat to native vegetation.	Start (1991)
Pyrenees	Rifle Range Rd	Approximately 4 km south-west from intersection with Lexton-Ararat Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Lexton-Ararat Rd	Approximately 3 km between Anderson St (Lexton) and Yalong Rd	Sealed road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Leys Rd	Approximately 6.5 km between Lexton-Talbot Rd and Burrabri Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Burrabri Rd	Approximately 3 km between Leys Rd and the Sunraysia Hwy	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Breadys Lane	Approximately 5 km north from intersection with Greenhill Creek Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Caralulup Rd	Approximately 3 km between Lillicur Rd and Box Flat Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Box Flat Rd	Approximately 3 km between Caralulup Rd and the Sunraysia Hwy	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)

Shire name	Road name	Location	Description/Values	Source
Pyrenees	Sims Lane	Approximately 9 km between Box Flat Rd and Homebush-Maryborough Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Pyrenees Hwy	Approximately 5 km between the Sunraysia Hwy (Avoca) and Sims Lane	Major sealed road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Old Number Two Creek Rd	Approximately 7 km west from intersection with Fields Back Lane	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Susans Lane	Approximately 5.5 km between Vinoca Rd and the Sunraysia Hwy	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Sunraysia Hwy	Approximately 19 km between Avoca-Bealiba Rd and the northern shire boundary	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Avoca-Bealiba Rd	Approximately 4.5 km north from intersection with Sunraysia Hwy	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Huddersfield Rd	Approximately 3.5 km between Harbours Rd and Rathscar West Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Three Chain Rd	Approximately 10 km south from the northern Shire boundary	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Maryborough-St Arnaud Rd	Approximately 9 km between Avoca-Bealiba Rd and the eastern shire boundary	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Gaylards Rd	Approximately 3 km between Long Gully Rd and Three Chain Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Moyreisk Rd	Approximately 3.5 km between the Sunraysia Hwy and Redbank-Natte Yallock Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Redbank-Natte Yallock Rd	Approximately 3 km between the Sunraysia Hwy and Moonambel-Natte Yallock Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Stawell-Avoca Rd	Approximately 9 km north-west from intersection with Frenchmans-Navarre Rd	Gravel road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Pyrenees	Landsborough-Barkly Rd	Approximately 9 km between Frenchmans-Navarre Rd and Ararat-St Arnaud Rd	Sealed road. Substantially intact native vegetation with few weeds.	Brown-Kenyon & Jaschenko (1999)
Indigo	Beechworth-Chiltern Rd	Approximately 8 km north from the edge of Beechworth township	Sealed road. No other details given.	Willinck (1995)
Mitchell	Browns Rd	4.1 km north-east from intersection with Seymour-Avenel Rd	Gravel road. Very high flora/fauna values. No other details given.	Laurie (undated)
Mitchell	Daisyburn Rd	3 km west from intersection with Pyalong-Seymour Rd	Gravel road. No details given.	Laurie (undated)
Strathbogie / Mitchell	Seymour-Avenel Rd	13.4 km south-west from edge of Avenel township	Sealed road. Very high flora/fauna values. No other details given.	Laurie (undated)
Strathbogie	Avenel-Longwood Rd	7.1 km north-east from Avenel	Sealed road. Very high flora/fauna values. No other details given.	Laurie (undated)
Strathbogie	Mangalore Rd	3.4 km from intersection with Grant St	Gravel road. No details given.	Laurie (undated)

Shire name	Road name	Location	Description/Values	Source
Strathbogie	Wilbrahams Rd	Approximately 5.8 km between the Hume Fwy and Old Euroa Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Old Euroa Rd	Approximately 5.8 km between Wilbrahams Rd and Murchison-Violet Town Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Murchison-Violet Town Rd	Approximately 9.8 km between Old Euroa Rd and Violet Town Boundary Rd	Major sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Cooper Lane	Approximately 4.5 km between Murchison-Violet Town Rd and Strathaird Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Wallis Rd	Approximately 4.5 km between Richards Rd and Miepoll Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Icks Rd/Fishers Lane	Approximately 6 km between Pine Lodge Rd and Tubbs Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Shepparton Rd	Approximately 6.8 km south-east from intersection with Keallys Rd	Sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Fishers Lane	Approximately 10 km between Shepparton Rd and Dookie-Violet Town Rd	Mostly gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Harrisons Rd	Approximately 7 km between Dookie-Violet Town Rd and Robinson Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Robinson Rd	Approximately 4 km between Harrisons Rd and Fishers Lane	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Walls Rd	Approximately 8 km north from intersection with Fishers Lane	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Gellibrand-Tonks Rd/Panters Rd	Approximately 3.8 km between Walls Rd and Dookie-Violet Town Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Downs Rd	Approximately 3 km north from intersection with Paynters Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Paynters Rd/Sloans Rd	Approximately 14 km between Feltrim Rd and Griffens Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Koonda Rd	Approximately 5 km between Sloans Rd and Cemetery Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Lamonts Rd	Approximately 8 km between Dookie-Violet Town Rd and Griffens Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Bells Rd	Approximately 3 km between Keallys Rd and Bridge Rd	Sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Moglonemby Rd	Approximately 14 km between Euroa-Shepparton Rd and Murchison-Violet Town Rd	Sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Riggs Creek Rd	Approximately 10 km between Moglonemby Rd and Murchison-Violet Town Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)

Shire name	Road name	Location	Description/Values	Source
Strathbogie	O'Sheas Rd/Walkers Rd	Approximately 6.5 km between Pine Lodge Rd and Moglonemby Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Ben Kell Rd	Approximately 4 km north from intersection with Walkers Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	McBurneys Rd	Approximately 5 km between Pine Lodge Rd and Moglonemby Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Moglonemby Hall Rd	Approximately 5 km west from intersection with Riggs Creek Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Euroa-Shepparton Rd	Approximately 22.5 km between Moglonemby Rd and Geodetic Rd	Major sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Arcadia Two Chain Rd	Approximately 21 km between Euroa Shepparton Rd and the Goulburn Valley Hwy	Sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Miepoll School Rd	Approximately 7 km between Murchison-Violet Town Rd and Arcadia Two Chain Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Keadys Rd.	Approximately 3 km between Dodsons Rd and Pine Lodge Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Murchison-Violet Town Rd	Approximately 16 km between Pine Lodge Rd and the Goulburn Valley Hwy	Major sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Hanneberrys Rd	Approximately 3.8 km between Arcadia Two Chain Rd and Geodetic Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Geodetic Rd	Approximately 25 km south from intersection with Euroa-Shepparton Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Daldys Rd	Approximately 6 km between Murchison-Violet Town Rd and Arcadia-Tamleugh Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Zocks Rd./Kennedy Rd	Approximately 10 km between the Goulburn Valley Hwy and Seven Creeks	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Arcadia-Tamleugh Rd	Approximately 9 km between Kennedys Rd and Euroa-Shepparton Rd	Sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Goulburn Valley Hwy	Approximately 10.5 km between Murchison-Violet Town Rd and Karramomus Rd	Major sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Carters Rd	Approximately 11.5 km west from intersection with Euroa-Shepparton Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Teazes Rd	Approximately 3 km west from intersection with Arcadia Two Chain Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Cullens Rd	Approximately 16 km between Arcadia Two Chain Rd and Longwood-Shepparton Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Curries Rd	Approximately 13 km west from intersection with Euroa-Shepparton Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)

Shire name	Road name	Location	Description/Values	Source
Strathbogie	Pranjip Rd	Approximately 17 km between Euroa-Shepparton Rd and Murchison-Longwood Rd	Sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Murchison-Longwood Rd	Approximately 5 km between Pranjip Rd and Pranjip Creek	Sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Slaughteryard Rd	Approximately 5 km west from intersection with Euroa-Shepparton Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Drysdale Rd	Approximately 8.5 km between Angle Rd and Longwood-Pranjip Rd	Mostly gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Creighton Siding Rd/ Nelsons Rd	Approximately 7 km between the Hume Fwy and Geodetic Rd	Part gravel, part sealed road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Angle Rd	Approximately 22 km north-west from intersection with Hume Fwy	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Longwood-Pranjip Rd	Approximately 7 km between Pranjip Rd and Kirwans Bridge-Longwood Rd	Sealed road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Unnamed Rd	Approximately 13.5 km between Carters Rd and Longwood-Shepparton Rd	Gravel road. Provides habitat for the grey-crowned babbler.	Strathbogie Shire (1996)
Strathbogie	Longwood-Shepparton Rd	Approximately 4.3 km between Murchison-Longwood Rd and Kirwans Bridge-Longwood Rd	Gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Williams Rd/Longwood-Shepparton Rd	Approximately 7.3 km between Cullens Rd and Kirwans Bridge-Longwood Rd	Mostly gravel road. No other details given.	Strathbogie Shire (1996)
Strathbogie	Nagambie-Rushworth Rd	Approximately 6 km between Rushworth-Graytown Rd and Pettiffers Lane	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Rushworth-Heathcote State Forest/Whroo NCR.	GVEG (1998)
Strathbogie	Days Rd	Approximately 8 km between Reedy Lake Rd and Pettiffers Lane	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Rushworth-Heathcote State Forest.	GVEG (1998)
Strathbogie	Reedy Lake Rd	Approximately 13 km between Weir Rd and the edge of Whroo NCR	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Whroo NCR.	GVEG (1998)
Strathbogie	Unnamed Rd	Approximately 3.5 km between Reedy Lake Rd and Whroo NCR (passing through Angustown)	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Whroo NCR.	GVEG (1998)
Strathbogie	Bailieston East Rd	Approximately 8 km between Reedy Lake Rd and the edge of Rushworth-Heathcote State Forest	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Rushworth-Heathcote State Forest.	GVEG (1998)
Strathbogie	Pettiffers Lane	Approximately 6.5 km between Rushworth-Graytown Rd and Bailieston East Rd	Gravel road. Forms part of a habitat link between the isolated Reedy Lake Wildlife Reserve and Rushworth-Heathcote State Forest.	GVEG (1998)
Central Goldfields	Rodborough Rd	Approximately 6 km between the Tullaroop Reservoir wall and Carisbrook-Talbot Rd	Sealed road. Buloke. No other details given.	Colville (1995)
Central Goldfields	Mosquito Rd	Approximately 4 km between Carisbrook-Talbot Rd and Maryborough township	Gravel road. No other details given.	Colville (1995)

Shire name	Road name	Location	Description/Values	Source
Central Goldfields	Ballarat-Maryborough Rd	Approximately 4.5 km south from Maryborough township boundary	Major sealed road. Overstorey dominated by grey box and red ironbark. A scattered understorey and sparse ground layer occurs. Vegetation in excellent condition in some sections, with very little weed cover and some regeneration of native species.	Colville (1995)
Central Goldfields	Old Avoca Rd	Approximately 7.5 km between the Pyrenees Hwy and Moores Flat Rd	Mostly gravel road. Overstorey dominated by grey box and yellow gum, with one buloke identified. A scattered understorey and sparse ground cover occurs. Few weeds and moderate regeneration of native species.	Colville (1995)
Central Goldfields	Walkley Rd	Approximately 3 km between the Pyrenees Hwy and Dunira Creek	Gravel road. No other details given.	Colville (1995)
Central Goldfields	Pyrenees Hwy	Approximately 14 km between the Maryborough township boundary and Glenmona Rd	Major sealed road. Overstorey of grey box and yellow gum with one buloke identified. The roadside has scattered shrubs, a sparse ground layer and slight regeneration of native species. Weed cover is relatively high.	Colville (1995)
Central Goldfields	Longs Rd	Approximately 5.5 km between Porteous Rd and Wareek Rd	Gravel road. No other details given.	Colville (1995)
Central Goldfields	Porteous Rd	Approximately 3 km west from intersection with Maryborough-St Arnaud Rd	Sealed road. No other details given.	Colville (1995)
Central Goldfields	Timor Rd	Approximately 3 km north from Maryborough township boundary	Sealed road. Overstorey of grey box and yellow gum with a sparse shrub and ground layer. Slight regeneration of native species, with relatively high weed cover. Installation of overhead powerlines has degraded the roadside in one section.	Colville (1995)
Central Goldfields	Old Tullaroop Rd	Approximately 3 km between the Maryborough township boundary and Chaplins Rd	Sealed road. No other details given.	Colville (1995)
Central Goldfields	Carisbrook-Havelock Rd	Approximately 7 km between Carisbrook-Eddington Rd and Bendigo-Maryborough Rd	Sealed road. Overstorey of grey box and yellow gum with scattered shrubs and a sparse ground layer. Buloke is present. Moderate regeneration of native species although weed cover is also relatively high.	Colville (1995)
Central Goldfields	Havelock-Baringhup Rd	Approximately 3.5 km east from intersection with Carisbrook-Havelock Rd	Gravel road. Overstorey of grey box and yellow gum with one buloke also identified. Scattered understorey with a sparse ground layer and moderate regeneration of native species. Little weed cover.	Colville (1995)
Central Goldfields	Maryborough-Dunolly Rd	Approximately 4.5 km between Bendigo-Maryborough Rd and Bet Bet-Bromley Rd	Major sealed road. Overstorey of grey box and yellow gum, including mature trees with hollows. Scattered shrub layer and sparse ground layer of native grasses. Plover daisy and spreading eutaxia, both locally threatened species, are found along this roadside. Regeneration of native species is occurring.	Colville (1995)
Central Goldfields	Bendigo-Maryborough Rd	Approximately 3 km north-east from intersection with Old Eddington Rd	Major sealed road. Overstorey is dominated by grey box while golden wattle and drooping cassinia are the most common species in the shrub layer.	Colville (1995)
Central Goldfields	Carisbrook-Eddington Rd	Approximately 17.5 km between Chaplins Rd and Dunolly-Eddington Rd	Major sealed road. Grey box and yellow gum are the dominant overstorey species, including mature trees with hollows. A shrub layer is found, as are native forbs and grasses. Fallen logs and timber provide wildlife habitat. Regenerating buloke is found in several areas. Few weeds are present.	Colville (1995)
Campaspe	Old Heathcote Rd	Approximately 7 km between Tait and Hamilton Rd and Heathcote-Rochester Rd	Gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider. Forms part of a habitat link between a small state forest isolate and Rushworth-Heathcote State Forest.	LCC (1981); GVEG (1998)

Shire name	Road name	Location	Description/Values	Source
Campaspe	Heathcote-Rochester Rd	Approximately 6 km between Old Heathcote Rd and Toolleen-Mt Camel Rd	Major sealed road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider. Forms part of a habitat link between a small state forest isolate and Rushworth-Heathcote State Forest.	LCC (1981); GVEG (1998); Pearson (2000a)
Campaspe	Tait and Hamilton Rd/Toolleen-Mt Camel Rd	Approximately 18 km between Pook Rd and Geodetic Rd. South	Mostly gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider. Forms part of a habitat link between a small state forest isolate and Rushworth-Heathcote State Forest.	LCC (1981); GVEG (1998); Pearson (2000a)
Campaspe	Plain Rd	Approximately 7 km between Tait and Hamilton Rd and Cornella Church Rd	Gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider.	LCC (1981); Pearson (2000a)
Campaspe	Andersons Rd/Woolshed Rd/Scrubby Rd	Approximately 5 km between Moora-Heathcote Rd and the edge of Rushworth-Heathcote State Forest	Gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider.	LCC (1981); Pearson (2000a)
Campaspe	Davey Rd	Approximately 12 km between Heathcote-Rochester Rd and Moora-Heathcote Rd	Gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider.	LCC (1981); Pearson (2000a)
Campaspe	Cornella Church Rd	Approximately 12.5 km between Heathcote-Rochester Rd and Moora-Heathcote Rd	Gravel road. Supports a mature stand of box-ironbark vegetation and provides habitat for the squirrel glider.	LCC (1981); Pearson (2000a)
Campaspe	Northern Hwy	Approximately 4.5 km south from intersection with Toolleen-Axedale Rd	Major sealed road. No other details given.	Pearson (2000a)
Campaspe	Geodetic Rd South	Approximately 3.5 km north from intersection with Tait and Hamilton Rd	Gravel road. No other details given.	Pearson (2000a)
Campaspe	Sayers Lane	Approximately 4 km between Murchison-Whroo Rd and Bendigo-Murchison Rd	Gravel road. No other details given.	Pearson (2000a)
Campaspe	Myola East Rd	Approximately 4 km between Pat Tuohey Rd and Rigby Rd	Gravel road. No other details given.	Pearson (2000a)
Campaspe	Tavistock Rd	Approximately 4 km between Bendigo-Murchison Rd and Lamperd Rd	Gravel road. No other details given.	Pearson (2000a)
Campaspe	Cracknell Rd.	Approximately 5.5 km between Hay Rd and Steigenberger Rd	Gravel road. Forms part of a habitat link between an isolated bushland reserve (H96) and Rushworth-Heathcote State Forest.	Pearson (2000a)
Campaspe	River Rd/Burnewang Rd	Approximately 19 km between Trewin Rd and Barnadown-Myola Rd	Part gravel, part sealed. No other details given.	Pearson (2000a)
Campaspe	Elmore-Colbinabbin Rd	Approximately 3.5 km between Bendigo-Murchison Rd and Runnymede School Road North	Sealed road. No other details given.	Pearson (2000a)
Campaspe	Two Chain Rd	Approximately 7.5 km between Vickers Rd and Trewin Rd	Gravel road. No other details given.	Pearson (2000a)
Campaspe	Three Chain Rd	Approximately 5 km between the Midland Hwy and Collins Rd	Gravel road. No other details given.	Pearson (2000a)
Greater Shepparton	Manley Rd	Approximately 9 km between McEwan Rd and Byneside-Kyabram Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Andrews Rd	Approximately 3 km between McEwan Rd and Kyabram-Cooma Rd	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)

Shire name	Road name	Location	Description/Values	Source
Greater Shepparton	Brewer Rd	Approximately 9 km between McEwan Rd and Ryan Rd	Part sealed main road, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Craddock Rd	Approximately 3 km between McEwan Rd and Kyabram-Cooma Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Midland Hwy	Approximately 12 km between McEwan Rd and Davies Rd intersection	Sealed major road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Heath Rd	Approximately 5.5 km between McEwan Rd and Kilmartin Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Kyabram-Cooma Rd	Approximately 9 km between Manley Rd and Midland Hwy	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Kilmartin Rd	Approximately 3 km between Brewer Rd and Midland Hwy	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Rushworth-Tatura Rd	Approximately 9 km between Waranga Basin and Baldwin Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Bitcon Rd	Approximately 5 km between Rushworth-Tatura Rd and Stewart Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Murchison-Whroo Rd	Approximately 4.5 km between Bendigo-Murchison Rd and East Boundary Rd	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	Old Whroo Rd	Approximately 5 km between Murchison-Whroo Rd and the Stuart Murray Canal	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	Smith Rd	Approximately 3 km between Willow Rd and East Boundary Rd	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	Bayle Rd	Approximately 3 km between Willow Rd and East Boundary Rd	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998);
Greater Shepparton	Buffalo Swamp Rd	Approximately 3 km between Willow Rd and East Boundary Rd	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	Sleeth Rd	Approximately 16 km between Weller Rd and Shepparton-Barmah Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Graham Rd	Approximately 3 km between Ryan Rd and Gillieston Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Baulch Rd	Approximately 3 km between Basin Rd and Stewart Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Punt Rd	Approximately 6 km between Basin Rd and Murchison-Tatura Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)

Shire name	Road name	Location	Description/Values	Source
Greater Shepparton	Angle Rd	Approximately 5 km between Basin Rd and Stewart Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Orr Rd	Approximately 3 km between Chanel Inlet Rd and Rushworth-Murchison Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Wet Rd	Approximately 6 km between Basin Rd and Murchison-Tatura Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Woolshed Rd	Approximately 3 km between Murchison-Whroo Rd and Bayle Rd	Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	McIlroy Rd	Approximately 9.75 km between Echuca-Mooroopna Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Davies Rd	Approximately 3 km between Sleeth Rd and O'Brien Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	O'Brien Rd	Approximately 8.25 km between Dawes Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Crawford Rd/ Camp Rd/ Willow Rd	Approximately 15 km between Baulch Rd and Murchison-Goulburn Weir Rd	Unsealed road. Gravel road. Forms part of a habitat link between the isolated Doctors Swamp Wildlife Reserve and Rushworth-Heathcote State Forest. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	GVEG (1998); City of G.S. & DNRE (2000)
Greater Shepparton	Hutchison Rd	Approximately 3.25 km between Sleeth Rd and O'Brien Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Byrneside-Gillieston Rd	Approximately 14.75 km between Sellwood Rd and Midland Hwy.	Part sealed and part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Cassidy Rd	Approximately 4.5 km between Old Whroo Rd and Bayle Rd.	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Fidge Rd	Approximately 10.5 km between State Forest Boundary and Echuca-Mooroopna Rd	Part sealed, part unsealed. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Tonkin Rd	Approximately 8.75 km between Fidge Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Hogan Rd	Approximately 8.75 km between Echuca-Mooroopna Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Madill Rd	Approximately 9.75 km between State Forest Boundary and Hogan Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Neal Rd	Approximately 6 km between Sleeth Rd and Tonkin Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Coomboona Rd	Approximately 7.5 km between Neal Rd and State Forest Boundary	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Koenig Rd	Approximately 8 km between Echuca-Mooroopna Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)

Shire name	Road name	Location	Description/Values	Source
Greater Shepparton	Norton Rd	Approximately 5.75 km between O'Brien Rd and Coomboona Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Murton Rd	Approximately 3 km between Toolamba-Tatura Railway and Downer Rd	Sealed. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Ross Rd/ Minchin Rd/ Craven Rd	Approximately 16.75 km between Tonkin Rd and Pyke Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Murchison-Mooroopna Rd	Approximately 5 km Punt Rd and Kiota Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	River Rd	Approximately 6 km between intersections Murchison-Mooroopna Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Dougan Rd	Approximately 7 km between State Forest Boundary and Meaklim Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Meaklim Rd	Approximately 4.6 km between Dougan Rd and State Forest Boundary	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Waugh Rd	Approximately 3 km between Downer Rd and Goulburn Valley Railway Line	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Trotter Rd	Approximately 3.75 km between Koenig Rd and Echuca-Mooroopna Rd	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Murchison-Mooroopna Rd	Approximately 3 km between Toolamba-Rushworth Rd and Waugh Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Alexander Rd	Approximately 5.25 km between Koenig Rd and Echuca-Mooroopna Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Bowey Rd/ Bunbartha Rd	Approximately 6.8 km between Moore's Rd and Goulburn Valley Hwy	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Barmah-Shepparton Rd	Approximately 10.25 km between Wisely Rd and Katamatite-Shepparton Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Arcadia Rd	Approximately 5 km between Goulburn Valley Hwy and Wilsons Rd	Sealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Rafferty Rd	Approximately 3 km extending from intersection with Goulburn Valley Hwy	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Goulburn Valley Hwy	Approximately 4 km between Numurkah Boundary Rd and St Aughterhouse Rd	Sealed major road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	McKenzie Rd	Approximately 3 km between Goulburn Valley Hwy and Edwards Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Thompson's Rd	Approximately 3 km between Goulburn Valley Hwy and Edwards Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Trewins Rd	Approximately 3.5 km between Goulburn Valley Hwy and Katamatite-Shepparton Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)

Shire name	Road name	Location	Description/Values	Source
Greater Shepparton	Katamatite-Shepparton Rd	Approximately 7 km between Goulburn Valley Hwy and Thompson's Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Union Rd	Approximately 3 km between Euroa-Shepparton Rd and Kerrs Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Trevaskis Rd	Approximately 6.5 km between River Rd and Union Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Lemnos-Cosgrove Rd and adjoining Woolshed Rd	Approximately 6.25 km between Boundary Rd and Pine Lodge North Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Angle Church Rd	Approximately 3 km between Armstrong Rd and Shepparton-Violet Town Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Arcadia-Tamleugh Rd	Approximately 6 km between Shepparton-Euroa Rd and Noonan St	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Preston Rd and Katandra Rd	Approximately 3.75 km incorporating Katandra Rd between Preston Rd and Labuan Rd and the adjoining section of Preston Rd to McCarten Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Two Chain Rd/ Shepparton-Violet Town Rd	Approximately 4.75 km between Shepparton-Violet Town Rd and Thorns Rd	Part sealed main road, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Cemetery Rd	Approximately 7.2 km between Shepparton-Violet Town Rd and Lowes Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	O'Keefe Rd/ Moylan Rd	Approximately 4.75 km between Sidebottoms Rd and Harmer Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Moss Rd	Approximately 3.3 km extending north from Miepoll Rd intersection	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Lemnos-Cosgrove Rd	Approximately 4 km between Cochrans Lane and Shepparton-Dookie Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Shepparton-Violet Town Rd	Approximately 6 km between Houlihans Rd and Fishers Lane	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Harmer Rd	Approximately 5.4 km between Tungamah Boundary Rd and Lemnos-Cosgrove Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Lowes Rd/ Fothergills Rd	Approximately 5.25 km between State Forest Boundary and Cemetery Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Polan Rd/ Hoopers Rd	Approximately 5.5 km Cosgrove-Katandra Rd and Dookie Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Shepparton-Dookie College Rd and Mt Major T.V. Rd	Approximately 10.5 km incorporating Shepparton-Dookie College Rd section between Cosgrove-Caniambo Rd and Dookie-Nalinga Rd and adjoining Mt Major T.V. Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)

Shire name	Road name	Location	Description/Values	Source
Greater Shepparton	Bridge Rd and Cameron Rd	Approximately 8.75 km incorporating Bridge Rd section between Cameron Rd and Fishers Lane, and adjoining Cameron Rd section to Feltrim Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Cashel Rd	Approximately 8 km between Dookie-Shepparton Rd and Dookie-Nalinga Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Dookie-Gowangardie Rd/ Chateau Rd	Approximately 5.3 km between Tungamah Boundary Rd and Cashel Rd	Part sealed, part unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Cemetery Rd	Approximately 3.25 km between Wallis Rd and Violet Town-Dookie Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Croxfords Rd	Approximately 3.3 km between Wallis Rd and Violet Town-Dookie Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Dookie-Devonish Rd	Approximately 7 km between Quarry Rd and Benalla Boundary Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Walters Rd/ Boxwood Rd	Approximately 6.9 km between Gawne Rd and Benalla Boundary Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Violet Town-Dookie Rd	Approximately 7.25 km between Downs Rd and Croxfords Rd	Sealed main road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Duggans Rd	Approximately 3 km between Thomas Rd and Feldtmans Lane	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Greater Shepparton	Benalla Boundary Rd	Approximately 6.9 km between Tungamah Boundary Rd and Cains Rd	Unsealed road. Roadsides are of high conservation value*, providing high quality examples of natural vegetation types.	City of G.S. & DNRE (2000)
Moira	Three Chain Rd (proposed D61)	Approximately 11 km between Pelluebla Rd and Telford-Tungamah Rd	Gravel road. Supports excellent examples of remnant northern plains vegetation. A number of significant flora and fauna species occur. The road reserve forms an important habitat corridor, linking other patches of nearby remnant vegetation.	GVEG (1998)
Moira	Kreeck Rd. (proposed D61)	Approximately 4 km west from intersection with Benalla-Yarrowonga Rd	Gravel road. Supports excellent examples of remnant northern plains vegetation. A number of significant flora and fauna species occur. The road reserve forms an important habitat corridor, linking other patches of nearby remnant vegetation.	GVEG (1998)
Moira	Angle Rd	Approximately 4 km between Benalla-Yarrowonga Rd and Tungamah-Peechelba Rd	Gravel road. Supports excellent examples of remnant northern plains vegetation. A number of significant flora and fauna species occur. The road reserve forms an important habitat corridor, linking other patches of nearby remnant vegetation.	GVEG (1998)
Greater Bendigo	Cails Rd	Approximately 3 km between Bendigo-Tennyson Rd and Kamarooka West Boundary Rd	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Bendigo-Tennyson Rd	Approximately 5 km between Hunter-Drummartin Rd and Elmore-Raywood Rd	Major sealed road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	East Kamarooka Rd	Approximately 5.5 km between Willmans Rd and Rasmussens Rd	Mostly gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)

Shire name	Road name	Location	Description/Values	Source
Greater Bendigo	Pethericks Rd/Tyson's Rd	Approximately 3 km along Pethericks Rd between the Midland Hwy and Tyson's Rd; Tyson's Rd between the Midland Hwy and Pethericks Rd	Pethericks Rd. – sealed; Tyson's Rd. – gravel. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Old Murray Rd	Approximately 3 km between Bendigo-Tennyson Rd and Pitt St	Mostly sealed road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Knowsley-Barnadown Rd	Approximately 5 km north from intersection with the McIvor Hwy	Sealed road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	McIvor Hwy	Approximately 5 km between Knowsley-Barnadown Rd and Toolleen-Axedale Rd	Major sealed road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Murphys Lane	Approximately 10.5 km between Dwyer Lane and Sheridans Lane	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Derrinal-Crosbie Rd	Approximately 11 km between Drummonds Lane and Axedale-Crosbie Rd	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat. Part of this road reserve is within the proposed Crosbie NCR (D46).	CGB (undated)
Greater Bendigo	Coppermine Rd	Approximately 4.5 km between the Northern Hwy. and Drummonds Lane	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Mt Camel-Graytown Rd	Approximately 4.5 km between Heathcote-Rochester Rd and Eickerts Lane	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Eickerts Lane	Approximately 3 km north of intersection with Mt Camel-Graytown Rd	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Heathcote-North Costerfield Rd	Approximately 5 km between Heathcote-Nagambie Rd and Bradleys Lane	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Greater Bendigo	Eppalock Airfield Rd	Approximately 3 km north-east of intersection with Patons Rd	Gravel road. Native vegetation in good condition with few introduced species. All naturally occurring structural layers are present, providing good wildlife habitat.	CGB (undated)
Loddon	Rheola-Llanelly Rd	Approximately 8 km south-east from intersection with McIntyre-Inglewood Rd	Sealed road. No other details given.	Pearson (2000b)
Loddon	Bealiba-Rheola Rd	Approximately 4 km south-west from intersection with Wedderburn-Dunolly Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Calder Hwy	Approximately 9 km south-east from intersection with Bridgewater North Derby Rd	Major sealed road. No other details given.	Pearson (2000b)
Loddon	Calder Hwy	Approximately 4 km south-east from edge of Bridgewater township	Major sealed road. No other details given.	Pearson (2000b)
Loddon	Calder Hwy	Approximately 8.5 km north-west from intersection with Kingower-Kurting Rd	Major sealed road. No other details given.	Pearson (2000b)
Loddon	Calder Hwy	Approximately 8 km south-east from intersection with Inglewood-Korong Vale Rd	Major sealed road. No other details given.	Pearson (2000b)
Loddon	Logan-Wedderburn Rd/ Gowar-Wedderburn Rd	Approximately 24 km between Wedderburn-Brenanah Rd and Coonoer-Gowar-Logan Rd	Mostly sealed, part gravel road. No other details given.	Pearson (2000b)

Shire name	Road name	Location	Description/Values	Source
Loddon	Unnamed Rd	Approximately 6 km between Gowar-Wedderburn Rd and Nine Mile South-Wedderburn Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Hendry Rd	Approximately 4 km between Logan-Wedderburn Rd and McHughes Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	McHughes Rd	Approximately 3.5 km between Aughderry Rd and Nine Mile South-Wedderburn Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Unnamed Rd	Approximately 4 km between Wedderburn Junction Rd and Inglewood-Korong Vale Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Wedderburn-Boort Rd	Approximately 17 km between the Calder Hwy and Charlton-Borong Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Korong Vale-Kinypanial Rd	Approximately 9.5 km between Boort-Wedderburn Rd and Kurting-Boort Rd	Sealed road. No other details given.	Pearson (2000b)
Loddon	Old Boort Rd	Approximately 5 km south from intersection with Dalziels Rd	Sealed road. No other details given.	Pearson (2000b)
Loddon	Whites Pit Rd	Approximately 4.5 km between Dalrymples Rd and Nixons Rd	Gravel road. No other details given.	Pearson (2000b)
Loddon	Wychitella-Boort Rd	Approximately 5 km south from intersection with Wychitella-Borong Rd	Gravel road. No other details given.	Pearson (2000b)

* City of Greater Shepparton High conservation value = Vegetation near natural. Few Introduced species (0-20%) are present. All storeys of naturally occurring vegetation are well represented including ground litter, grasses and other ground cover, shrub layer and tree canopy. Some sites may have high cultural heritage values that contribute to a high conservation value.

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