FOREST MANAGEMENT PLAN

FOR THE

MIDLANDS FOREST MANAGEMENT AREA

Department of Natural Resources and Environment, Victoria
December 1996

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FOREWORD

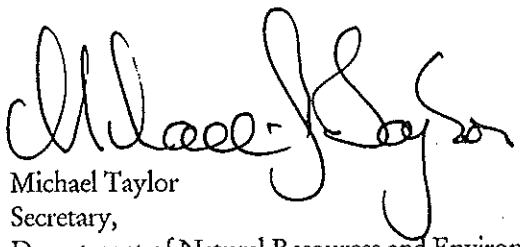
Extending from Kyneton to Ararat, the forests of the Midlands Forest Management Area are a major environmental and economic resource for central-western Victoria. As well as providing habitat for a diverse range of native flora and fauna, the forests are a major timber resource for the State. The quality of regional water supplies is assured by the protective forest cover maintained in the upper parts of most regional catchments. Tourism, a major industry in the region, is enhanced by the natural beauty of the surrounding forests and opportunities for forest recreation.

Publicly-owned native forests extend over about 174 000 hectares in the Midlands FMA. Nearly 30% of these forests are reserved in parks and other conservation reserves, arising largely from the recommendations of the Land Conservation Council. State forest comprises 114 300 hectares and has a major complementary role to play in conserving the region's natural values, as well as contributing to the region's economy.

This Plan provides for the balanced use and care of State forest in accordance with Victoria's commitment to the *National Forest Policy Statement*. It provides a framework in which the region's timber industry can continue to confidently invest, and maintain employment opportunities in this important sector of the State economy. The Plan also provides a framework for protection of the natural values of the forest. A network of protected areas complements the protection afforded by the region's conservation reserves. Special measures are put into place to add further security to the quality and yield of water used for urban supply, and a clear basis for State forest recreation and tourism is established.

This Plan is an example of integrated regional planning drawing on a wide range of expertise both within and outside the Department of Natural Resources and Environment. Public participation has been integral to the development of this Plan. A Forest Management Area Advisory Committee, drawn from the local community, provided valuable advice throughout the planning process.

A Proposed Plan, launched in January this year, provided the basis for further comment and subsequent refinement of the Plan. I am very grateful to the Advisory Committee, those who took time to make submissions, and all others who contributed to the planning process.



Michael Taylor
Secretary,
Department of Natural Resources and Environment

ACKNOWLEDGMENTS

This Plan was developed by a project team of Forests Service staff based in Ballarat and the Forest Planning and Assessment Section. The project team comprised:

Andrew Maclean
Peter Tange
Mal McKinty
Janet Leversha

The team was assisted by a large number of other NRE staff. Particular assistance was provided by Ballarat-based Geographic Information Systems specialists – Ashvin Bhikharidas and David Adams, and staff of the Natural Resources Systems Branch, in particular George Mifsud, Suzanne Thullin and Fiona Ferwerda. Vacation students Kerry Lang and Katherine Jewell from the University of Melbourne, and Simone Wilkinson and Peter Wilcock from the University of Ballarat made valuable contributions.

Senior Forests Service staff, Gerard O'Neill, Gary Morgan, Bob Graham, Peter Fagg, Ross Penny and David Holmes were valuable sources of guidance to the planning team.

The multi-disciplinary nature of forest management planning is emphasised by the active participation of flora and fauna planners – Rob Humphries and Lisa Morcom, pest plant and animal planner – Anne-Marie Tenni, National Parks Service Chief Ranger – David Nugent, and Ray Supple and David Bannear of the National Parks Service's Historic Places Section. Fiona Hamilton of Forest Planning and Assessment Section played a particularly valuable role in the development of forest growth models.

A large number of other NRE staff contributed to this Plan through the provision of information and advice or comment on drafts of the document. Their contributions are gratefully acknowledged.

Development of this Plan was overseen by the Midlands Forest Management Area Advisory Committee. This Committee comprises local community and industry representatives with a wide range of interests in forest management, and who have developed long-established networks in the Midlands FMA community. It made a particularly valuable contribution to the planning process by advising the planning team of community concerns and attitudes regarding forest management. The Committee was appointed in mid-1993 and comprises the following people:

Associate Professor Martin Westbrooke (chairperson)	University of Ballarat
Dr Frank Moulds (vice chairperson)	Macedon
Mr Michael Alston (resigned November 1994)	Bacchus Marsh
Mr Stephen Bulmer	Melton
Ms Joanne Cuthbert	Snake Valley
Mr David Endacott	Daylesford
Mr Ian Jamieson (resigned October 1994)	Ballarat
Mr John Knowles	Eganstown
Mr Ron Liversidge	Leonards Hill
Ms Pamela Manning	Daylesford
Ms Suzanne Mearns (resigned September 1995)	Romsey
Mr Frank O'Connor	Port Melbourne (formerly Beaufort)
Mr Pat O'Leary (appointed April 1995)	Bacchus Marsh
Mr Geoff Proctor	Woodend
Mr Leo Violini	Ballarat
Mr Frank Woodward	Ballarat

The Committee met more than 20 times, participated in several forest inspections and invited speakers from community groups with a particular interest in forest management. NRE gratefully acknowledges the contribution of the Committee.

Many interested individuals and organisations provided input during the planning process as well as detailed submissions. Their contributions are also gratefully acknowledged.

SUMMARY

The Midlands Forest Management Area (FMA) extends over 1.7 million hectares. Publicly owned native forest occurs mostly in large unconnected blocks straddling or lying near the Great Dividing Range between Kyneton and Ararat and south of Ballarat. State forest in the Midlands FMA comprises 114 300 ha. It supplies approximately 8% of Victoria's annual sawlog harvest and a similar proportion of the residual (including pulpwood) log harvest. State forest also has an important role in complementing the management of national parks and other reserves for conservation, recreation and a developing eco-tourism industry. Several cities and towns within and surrounding the FMA rely on the high quality surface water that comes from forested areas.

The major challenges addressed by this Forest Management Plan are to meet a number of conservation and resource use requirements, including the *Flora and Fauna Guarantee Act* 1988, the *Catchment and Land Protection Act* 1994, the commitments of the *National Forest Policy Statement*, current sawlog and residual log licence or legislated commitments to the timber industry and the sustainable yield requirements of the *Forest Act* 1958.

This Plan establishes a system of **Forest Management Zones** for State forest which sets priorities and permitted uses for different parts of the forest. The *Special Protection Zone* will be managed for the conservation of natural or cultural values and timber harvesting will be excluded. The *Special Management Zone* will be managed to maintain specified values while catering for timber production under certain conditions. The *General Management Zone* will cater for a range of uses with timber production a high priority.

The future management of all aspects of State forest is detailed in a series of Guidelines and Management Actions. These establish the framework for future management of the forest and commit the Department of Natural Resources and Environment to the completion of specific management actions which will enhance the conservation and production roles of State forest.

An orderly process for the review and refinement of forest management strategies and zones is established in the Plan. This ensures forest management programs remain responsive to new information, community expectations and other developments in natural resource management, while maintaining resource security for the regional timber industry.

Combined, these strategies provide a network of protected areas that complements the system of national parks and conservation reserves in the Midlands, a framework for sustainable use of the forest for timber production and other purposes, and a process for adapting to change in a systematic, orderly manner. In doing so, this Plan will fulfil some major requirements of the *National Forest Policy Statement*.

SPECIFIC INITIATIVES

Biodiversity conservation

- The 10 forest vegetation communities have been ranked according to their total area and rarity in the FMA, and minimum levels of between 30% and 90% set for their protection, depending on their extent in the FMA. Where existing conservation reserves do not meet these representation targets, areas of State forest have been protected to the required levels.

- Strategies for conserving rare and threatened flora have been developed. These include placing Special Protection Zones around all known populations of endangered species and vulnerable populations which are not well represented in existing conservation reserves, and protecting other rare or depleted flora from disturbance during forest management activities.
- A network of 200-metre linear reserves and other reserved habitat areas has been developed as part of the Special Protection Zone to maintain resident populations of forest wildlife across the landscape. Management strategies have also been developed to ensure retention of habitat trees in the General Management Zone and Special Management Zone.
- Conservation strategies have been developed for threatened and featured fauna species. Where critical habitat requirements for particular species are not adequately provided by existing conservation reserves, additional areas of forest have been protected through inclusion in the State forest Special Protection Zone. Population targets for a number of threatened species, such as the planned protection for 25 pairs of Powerful Owls, have been developed as a basis for conservation programs.

Forest production

- Clearfell, shelterwood and seed-tree will be retained as the main harvesting and regeneration systems. Guidelines for the application of these systems have been developed which account for forest stand characteristics and which incorporate other forest values.
- Strategies for timber production centre around the maintenance and improvement of the sawlog production capacity of the forest. This will be achieved through:
  - pre-commercial thinning of 400 ha per year of young regrowth
  - pre-commercial thinning of up to 300 ha per year of wildfire-affected stands
  - rehabilitation of degraded forest areas.
- The sustainable level for post and pole harvesting will be refined. Until then, interim limits based on the current silvicultural regimes have been set.

Stream and catchment protection

- Strategies for the protection of water quality and yield are developed for Designated Catchments. These catchments are those in which State forest comprises greater than about 25% of the catchment or where State forest abuts important water supply reservoirs. Twenty catchments are involved, covering 22 000 ha of State forest. In these areas protection measures additional to the *Code of Forest Practices for Timber Production* have been applied, namely:
  - a seasonal suspension of timber harvesting operations
  - limiting the proportion of regrowth younger than 20 years to 20% of the catchment
  - limiting to 5% the area of the catchment harvested over a three-year period, and the introduction of specific limits on coupe size.

Forest protection

- This Plan highlights issues to be addressed in the review of the Fire Protection Plan. The review of the Fire Protection Plan will take into account the zoning established under this Plan and the findings of research into the ecological effects of fuel-reduction burning.
- A system of rolling three-year pest animal and weed control programs will be developed. These will be based on guidelines detailed in this Plan to target and set priorities for works and monitor the effectiveness of the program.
- A Cinnamon Fungus Management Zone has been established where implementation of hygiene measures will minimise the risk of this plant disease spreading into uninfected areas.

Recreation and cultural heritage

- New and upgraded forest drives will be established in the Mount Cole and Wombat State Forests.
- Development of nature-based tourism opportunities will be coordinated within NRE and in conjunction with the regional tourism industry.
- Targets for the numbers and types of recreation facilities to be provided across the FMA have been set. The recreational use of State forest will continue to be managed to complement parks and other conservation reserves, and in collaboration with regional tourism organisations.
- A system for protection of landscape values, beside high-sensitivity travel routes and around key lookouts, is established.
- All Aboriginal places will be protected and managed in accordance with State and Commonwealth legislation.
- Significant historic places will be protected and prescriptions for the appropriate management of all historic sites will be developed.

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Appendices

Maps

All located in back pocket

1 Geographic Representation Units
2 Designated Catchments
3 Phytophthora Management
4 Proposed Forest Management Zones - West Sheet
5 Proposed Forest Management Zones - East Sheet

Chapter 1
BACKGROUND

1.1 SCOPE AND AIM

The Midlands Forest Management Area (FMA) covers some 1.7 million hectares and occupies central-western Victoria. It is centred on Ballarat and includes Ararat, Macedon and Geelong. Public land makes up about 14% of its area. This Forest Management Plan applies to State forest which covers 7% (114 300 ha) of the FMA (see Table 1 in Chapter 2).

The key aim of forest management plans is to ensure that State forest is managed in an environmentally sensitive, sustainable and economically viable manner. They also seek to ensure that planning is a continuing process, responsive to changing community expectations and expanding knowledge of the forest ecosystem.

To achieve this aim, this Plan establishes strategies for integrating the use of State forest for wood production and other purposes with the conservation of natural, aesthetic and cultural values across the whole FMA. This Plan is to apply for ten years unless a substantial change of circumstances (such as a major wildfire) warrants a review before then. Flexible management strategies will, however, enable progressive refinement of this Plan in response to new information.

This Plan introduces several new approaches to forest management for the Midlands FMA. Where existing practices are to continue, they have been subject to careful scrutiny to ensure they contribute to current forest policy goals.

Management vision for forest of the Midlands

NRE aims to manage the forests of the Midlands for the benefit of all Victorians. The vision for the sustainable management of the Midlands forests has the following characteristics.

- Management will aim to ensure that all indigenous species and communities will survive and flourish across their natural range.
- Use of State forest resources will be according to world-best practice. Standards will be maintained and improved by implementation and review of codes of practice, management guidelines, prescriptions, licensing and regulation of commercial activities on public land, and by staff training.
- Forest management will be sensitive to the cultural significance of the Midlands forests to all segments of the community.
- Use of State forest will contribute to the economic development and employment opportunities of the regional community.
- Sustainable use of the forest for recreation and tourism will be encouraged and facilitated.
- Forest management will be flexible and responsive to new information. Change will be introduced in a pro-active but orderly fashion so as to maintain the confidence and stability of forest-based industries and the local economy.

1.2 LEGISLATIVE AND POLICY FRAMEWORK

This Plan is a "working plan" under the meaning of the *Forest Act* 1958. Government policy also requires that forest management must be:

- economically viable
- environmentally sensitive
- sustainable for all forest values
- assisted by public participation in planning.

It is developed in accordance with the requirements of three Acts of Parliament.

- The *Forests Act* 1958 specifies management for sustainable hardwood sawlog production from State forest
- The *Flora and Fauna Guarantee Act* 1988 and associated action statements seek to guarantee that all taxa of Victoria's flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild
- The *Catchment and Land Protection Act* 1994 establishes a framework for integrated management and protection for catchments and control of noxious weeds and pest animals.

This Plan complements the *Code of Forest Practices for Timber Production* (CFL 1989), which sets goals and guidelines for the conduct of all commercial timber production activities which occur in Victoria. This *Code* is currently under review and a *Proposed Code of Forest Practices for Timber Production* (CNR 1995a) was released for public comment in 1995.

This Plan also fulfils a number of the key requirements of the *National Forest Policy Statement* (Commonwealth of Australia 1992a) relating to the management of native forests:

- to provide for the current and future range of commercial and non-commercial uses
- for nature conservation and the maintenance of forest biological diversity
- to provide regional economic development and employment opportunities.

Other legislation, policies and plans of relevance are referred to as necessary through the text.

The land base to which this Plan applies is set by government land use decisions (LCC 1977, 1981, 1982a, 1982b, 1987, 1991) in accordance with the *Land Conservation Act* 1970.

This Plan establishes broad strategies for forest management. More detailed prescriptions are established at the local level and are reflected in Wood Utilisation Plans. Appendix A is an extract from the *Proposed Code of Forest Practices for Timber Production* and provides an outline of the relationship between the public land planning processes in the State and of the various levels of control of the environmental aspects of timber production.

1.3 MATTERS CONSIDERED DURING PLANNING

The major matters addressed by this Plan and other issues raised by the community are set out below.

Sawlog harvesting rates

The estimated rate at which sawlog harvesting can be maintained from each FMA in the State (sustainable yield) is set by the *Forests (Timber Harvesting) Act* 1990 by amendment to the *Forests Act* 1958.

In accordance with section 52D of the *Forests Act* 1958, sawlog sustainable yield rates are to be reviewed every five years (from 1991) to determine whether they are still appropriate. The first review for the Midlands FMA is due in 1996. Because much of the information gathered during the planning process is required for a review of sustainable yield, the review was undertaken concurrently with the forest management planning process. The review reflects the zoning scheme and relevant management strategies proposed in this Plan. A Forests Service Technical Report, *Review of Sustainable Sawlog Yield – Midlands Forest Management Area,* describes the review process and discusses the various factors which impact on sawlog production in the FMA. The results of the review will be used to amend the sustainable yield set out in the *Forests Act* 1958 and will be used to negotiate changes in the rate of sawlog harvesting with licensees. This process has ensured that the sustainable supply of sawlogs is coordinated with the environmental protection measures included in this Plan.

Biodiversity conservation

The Midlands forests are remnants of much more extensive tracts which formerly extended along the length of the Great Dividing Range. The diversity of flora and fauna in the FMA has already been reduced by clearing of the forests for agricultural and urban uses. The remaining forests support several hundred species of native flora and fauna within ten distinct vegetation communities. About 25 flora species and 19 wildlife species are considered to be rare or threatened in the FMA.

About one-third of public land in the FMA is included in conservation reserves. Appropriate management of flora and fauna and their communities in State forest, however, is an essential part of maintaining regional biodiversity. This Plan adopts a multi-tiered approach to biodiversity conservation. It analyses the representation of vegetation communities in existing conservation reserves and, where necessary, provides protection for additional areas in State forest. It addresses a series of processes which threaten flora and fauna populations and identifies measures to mitigate these threats. Further, this Plan establishes a framework of protection for rare and threatened species which require specific management action to ensure their continued survival in the forests of the FMA.

Harvesting and regeneration systems

Almost all of the forest extant in the 1970s was even-aged, having originated from intensive and largely uncontrolled utilisation during the late 1800s. From the 1930s to the early 1970s harvesting comprised mainly selection of individual trees with the silvicultural objective of improving the quality of stands for sawlog production. Studies in the 1960s indicated that the selection system resulted in poor regeneration and was altering the balance of *Eucalyptus* species in forest stands. Accordingly, harvesting and regeneration systems designed to ensure adequate regeneration, and which result in even-aged forests, were adopted in the mid-1970s; the main one being the shelterwood system. A review in 1994 of this system found that it has largely met its original objectives. Application of this and other even-aged systems, depending on the characteristics of the forest stand and relevant environmental, social and economic values, has been incorporated into this Plan.

Regrowth management

The majority of the forest which is available and suitable for timber production is currently either mature or regrowth younger than 20 years old. These younger forests cover about 10 000 ha across the FMA and originate from the even-aged harvesting and regeneration systems introduced in the 1970s, and large wildfires. Additionally, the Barkstead (1962) and East Trentham (1983) wildfires resulted in about 5700 ha of regrowth, much of which shows reduced growth due to very dense stocking and, possibly, nutrient loss from the intensity of the fires. This Plan recognises the need to maintain and improve sawlog supply from State forest and identifies a regrowth management program which will enhance the sawlog growth in the more productive forest and restore productivity in wildfire-affected areas.

Water quality and yield

Most areas of State forest in the FMA lie within catchments that provide water to surrounding cities and towns. Maintaining the quality and yield of water supplied from these catchments is a key aim of this Plan. Information gathered during the preparation of this Plan indicates that the quality of surface water from State forest is suitable for domestic use and that, at the catchment scale, yield has not been affected by forest management activities. This Plan identifies 20 urban water-supply catchments, covering a total of more than 22 000 ha of State forest, where measures will be taken to increase the security of water quality and yield. These measures include suspension of harvesting operations during winter, a limit on the area harvested over any three-year period, limits on coupe size and control over the proportion of regrowth forest in any one catchment.

Recreation and tourism

Recreation is an important use of the Midlands State forests. Their proximity to Melbourne, Ballarat, Geelong and Bendigo mean that they are popular choices for urban residents seeking recreation opportunities in a forest environment. This Plan establishes targets for the provision of recreation facilities and opportunities based on current and likely future demand. It also protects remaining opportunities for semi-remote recreation in the Pyrenees and Pyrete Ranges. Planning for recreation in State forests is coordinated with the facilities and opportunities available in parks and reserves in the FMA.

Daylesford, Ballarat, Avoca and Macedon are all major tourist destinations which rely, at least in part, on the recreation opportunities provided in these forests. This Plan recognises the role of forest recreation in the regional tourism industry and establishes a framework for communication and coordination with tourist and industry associations.

Management of historic and cultural sites

The Midlands forests have been used for industrial purposes since the mid-19th Century. Gold mining and timber production have been the major uses and each industry has left relics and artefacts that are valuable for education and research, and for their cultural significance. This Plan draws on recent surveys of gold-mining history and information from local historians to identify sites of historical importance in the forests. Based on this information, this Plan establishes a framework for decisions about appropriate forms of protection for historic sites.

There is less physical evidence of Aboriginal occupation of the Midlands forests, but this Plan recognises the continuing special relationship between Aborigines and the land. It re-affirms NRE's commitment to protecting Aboriginal Places in accordance with the Victorian *Archaeological and Aboriginal Relics Preservation Act* 1972 and the Commonwealth's *Aboriginal and Torres Strait Islander Heritage Protection Act* 1984.

Plantations

The Midlands FMA supports extensive softwood plantations and an increasing area of hardwood plantations. This Plan acknowledges that these plantations, in combination with native forests, will continue as a source of timber for both the hardwood and softwood sawn timber industry.

1.4 PLANNING PROCESS

Proposed Plan

Work commenced on this Plan in late 1992 with the publication of a brochure, *The Midlands Forests: Planning Their Future*, which served to advise interested groups and individuals on the development of this Plan and invited contact with the planning team. The links between the planning processes for the management of State forest is shown in Appendix A.

The planning team undertook a detailed review of current management issues and gathered information from a wide variety of sources about the resources, uses and values of the FMA. Much of this information is contained in four background papers dealing with:

- biodiversity
- timber production
- recreation, tourism and cultural values
- catchments and soils.

These papers are available separately. Background information about other issues is provided in the introductions to the respective sections of this document.

This Plan was developed in consultation with experts in disciplines such as forestry, wildlife biology, catchment management, water resources and recreation planning.

A Forest Management Area Advisory Committee, comprising members of the community living within the Midlands FMA, was appointed early in the planning process to ensure that public involvement in the process was effective and that NRE is able to gauge community attitudes to the various forest planning options and decisions. Committee members represent a broad range of viewpoints on forest management and were appointed by the Minister for Natural Resources following public advertisement. Members have extensive community networks resulting from their involvement in local government, community groups or their professions, and several have specialist environmental planning skills.

The Committee met more than 20 times to discuss planning issues and to review management proposals. It has sought to ensure that the interests and opinions of a wide cross-section of the community have been considered by NRE in preparation of this Plan.

The Proposed Midlands Forest Management Plan was launched in January 1996. The Department also published and widely circulated a brochure entitled *The Midlands Forests – Striking a Balance*, calling for public comment on the Plan. The comment period ran until 31 March 1996, although some consultation occurred after that date. Fifty seven written submissions were received. Appendix O lists the individuals and organisations who provided submissions.

The Advisory Committee considered the submissions and reviewed proposed changes to the Plan.

Final Plan

The following is a summary of the main changes made to produce this, the Final Plan. The changes are a result of public consultation, new information, and additional input from departmental staff.

Legislative and Policy Framework

Reference is made to the *Catchment and Land Protection Act* 1995 and its impact on State forest management.

Zoning

The areas of the management zones (shown in Table 1) have changed from the Proposed Plan. The principal reasons for the changes to the zoning are:

- correction to the status of some small areas of public land
- revision of the Forest Management Area boundary
- additional areas included in the Special Protection Zone to provide further protection to values as described below.

Biodiversity conservation

The Action relating to the development of habitat tree prescriptions has been expanded to consider the retention of dead standing trees, to establish the deadline (June 1997) for their preparation, and to ensure that the implementation of the prescriptions is monitored.

Additional areas of Messmate/Peppermint/Gum Open Forest II/III vegetation community are reserved to replace areas incorrectly identified as that community in State forest north-west of Daylesford (in the Jim Crow Ranges).

Some of the conservation guidelines for fauna have been re-worded to make them easier to understand and to provide greater consistency with Forest Management Plans being prepared for other parts of Victoria.

A conservation guideline has been added for the Wedge-tailed Eagle, in recognition of its sensitivity to disturbance to its breeding sites.

Reference is made to Leadbeater's Possum fur which was found near Macedon during a survey for an Environment Impact Statement for the Black Forest section of the Calder Highway at Woodend.

Timber Production

The guidelines for harvesting and regeneration systems and regrowth management have been modified to highlight the importance of minimising damage to the retained trees during timber production operations.

NRE's active involvement in the management of production forest has been emphasised.

An additional action has been included to ensure that regeneration is protected from excessive browsing.

Streams and Catchments

The classification by the Land Conservation Council of the Lerderderg River as a Heritage River and the Moorabool River as a Representative River is recognised.

Recreation and Cultural Heritage

The development of preferred four-wheel driving routes, for novice to experienced drivers, is outlined.

Reference is made to the forthcoming recommendations of the LCC in its review of historic places in south-western Victoria, which covers part of the Midlands FMA.

Changes to the management, including the relocation, upgrading or closing, of some recreation facilities are outlined.

Other Uses

Clarification of the management of mineral exploration, mining and extractive material operations on State forest is provided.

Apiculture management is clarified including the potential for overlap between bee-farm ranges.

Plan Implementation

Increased emphasis on monitoring change as a result of forest use is included.

The requirement for and details of an annual plan implementation report are outlined.

Appendix

Results from the Review of Sawlog Sustainable Yield for the Midland FMA have been included to provide further explanation of the forecast of sawlog sustainable yield.

Glossary

A glossary has been included to assist in the interpretation of terms used in this Plan.

Chapter 2
FOREST MANAGEMENT ZONES

2.1 ZONING SCHEME

A principal strategy to achieve the aims of this Plan is to divide State forest into three management zones (see Table 1, Figure 1 and Maps 4 and 5).

- **Special Protection Zone** (SPZ) will be managed for conservation, and timber harvesting will be excluded. It forms a network designed to link and complement conservation reserves
- **Special Management Zone** (SMZ) will be managed to conserve specific features, while catering for timber production under certain conditions
- **General Management Zone** (GMZ) will be managed for a range of uses, with timber production the major use.

Table 2 indicates the activities permitted in each zone. Soil and water conservation, maintenance of native forest cover and wildfire suppression are high priorities in all zones.

Table 1. Extent of forest management zones and other land categories in the Midlands Forest Management Area

	Area (ha)	Proportion of all land (%)	Proportion of public land (%)	Proportion of State forest (%)
STATE FOREST				
Special Protection Zone	24 000	1	11	21
Special Management Zone	28 900	2	13	25
General Management Zone	61 400	4	27	54
Timber production[1]	(50 150)	(3)	(22)	(44)
Other uses[2]	(40 150)	(2)	(18)	(35)
STATE FOREST SUB-TOTAL	114 300	7	51	100
OTHER PUBLIC LAND				
Conservation reserves[3]	66 500	4	29	
Softwood plantations	11 500	1	5	
Other public land[4]	32 800	2	15	
ALL PUBLIC LAND SUB-TOTAL	225 100	14	100	
PRIVATE LAND	1 461 900	86		
TOTAL AREA OF THE FMA	1 687 000	100		

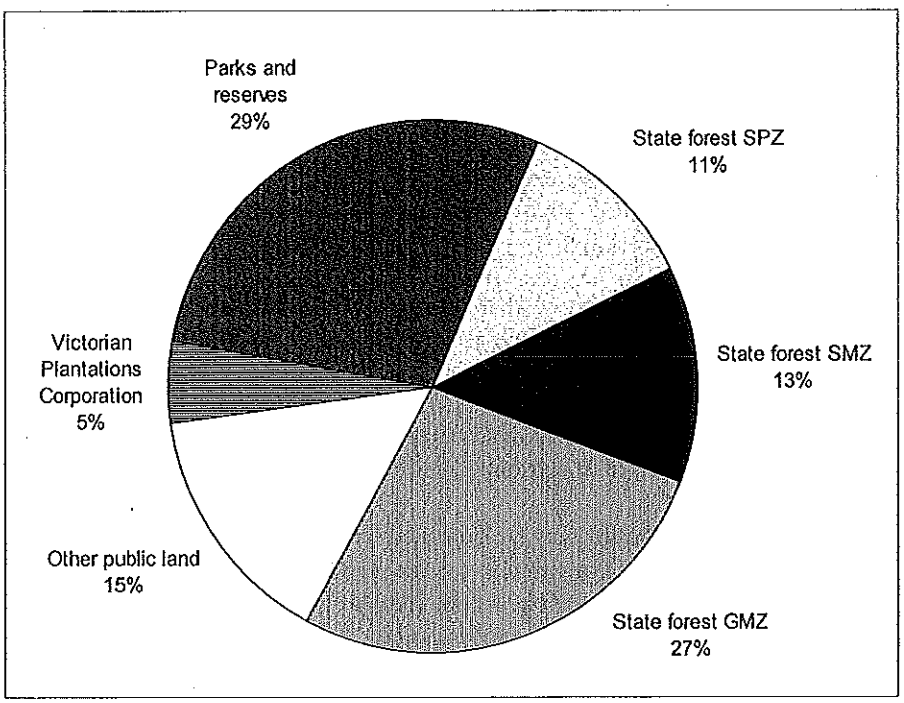
Sources: CNR (1995a) and GIS (1996)

Notes:

1. This is the estimated net productive area of forest both available and suitable for sawlog production, and is composed of portions of both the GMZ and SMZ. Streamside reserves are included in the SPZ. Steep slopes are included in the SMZ.
2. Unproductive areas and forests suitable only for the production of firewood are included in the 'Other uses' category, which is part of both the GMZ and SMZ.
3. A detailed breakdown of this land category is provided in the *Statement of Resources Uses and Values, Part 1 - Nature Conservation* (Maclean 1995a). Although not subject to this Plan, these areas, which include parks, were taken into account in formulating management strategies for State forest.
4. The extensive area of 'other' public land includes the Werribee sewage farm, the Anglesea coal lease area, and land managed by water-supply authorities.

Combined with parks and other conservation reserves, the forest management zones provide an integrated conservation system and a framework for sustainable forest use. The inset in Map 5 illustrates elements of the zoning system in detail. Maps 4 and 5 illustrate the zoning scheme across the whole FMA, and Appendix B lists the attributes of each component of the Special Protection and Special Management Zones (each defined by a specific code and identified on Maps 4 and 5).

Figure 1. Proportion of public land in forest management zones, plantations and conservation reserves



2.2 SPECIAL PROTECTION ZONE

Most of this zone has been generated by applying the conservation guidelines set out in the next chapter and reserve design principles. Larger components of the zone are based on:

- representative examples of vegetation communities
- localities of key threatened and sensitive fauna.

These are linked to each other and to conservation reserves by other parts of the SPZ, which include:

- the Lerderderg Heritage River corridor
- 200-metre wide linear reserves
- areas identified by the *Code of Forest Practices for Timber Production* (the *Code*) as requiring protection, including stream reserves (20 m and 40 m).

A number of smaller areas identified as sites of biological significance and some research sites are also included in the SPZ.

Each component of this zone will be managed to minimise disturbances or processes which threaten their respective values, and timber harvesting will be excluded.

2.3 SPECIAL MANAGEMENT ZONE

The areas included in this zone cover a range of natural or cultural values, the protection or enhancement of which require modification to timber harvesting or other land-use practices rather than their exclusion. The zone contributes substantially to the conservation of important species, particularly fauna.

The bulk of the zone is derived from two strategies.

- Each of the areas designated for the conservation of the habitat of Powerful Owls includes a core SPZ surrounded by a buffer of SMZ in which timber harvesting will be planned in accordance with specific guidelines (see Section 3.3).
- The quality or yield of water from domestic water-supply catchments may be sensitive to forest management operations where State forest comprises a substantial proportion of the total catchment area. These 'designated catchments' are included in the SMZ, and special guidelines for the conduct of timber-harvesting operations are applied (in addition to those set down under the *Code*) (see Section 5.3).

Some sites containing important features that require special management are too small to represent on Maps 4 and 5. These areas, recorded as Special Management sites, include historic sites and some research sites.

Management of the SMZ will be considered on a case-by-case basis within the constraints outlined in this Plan, but development of operational detail will be undertaken at the local level.

Timber and other forest produce may be harvested from this zone. As with the GMZ, this zone forms part of the area that contributes to the sustainable yield of sawlogs, provided that modifications to normal management practices adequately address the protection of the identified values, or positively contribute to their conservation. Also in common with the GMZ, this zone is sub-divided into a 'timber production' sub-zone and an 'other uses' sub-zone (see Section 2.4).

2.4 GENERAL MANAGEMENT ZONE

Forest in this zone will be managed for the sustainable production of timber and other forest products in accordance with the *Code* and more detailed local management prescriptions. Associated aims include protection of landscape, provision of recreation and educational opportunities, fire protection and conservation of natural values to complement adjacent zones. Together with the SMZ, this zone provides the net area available for timber production. The zone has two sub-zones, 'timber production' and 'other uses'.

Timber production sub-zone

This sub-zone will be used to produce sawlogs on a sustainable basis in accordance with the *Code*. It corresponds to the net area in both the GMZ and the SMZ that is both available and suitable of producing sawlogs after exclusions have been made for factors such as steep slopes and low productivity. It generally corresponds to sites where soil and rainfall conditions enable suitable tree species to grow to a height of about 24 m or greater. Harvested areas will be regenerated with local species, and the regrowth across the sub-zone will produce a mosaic of native forest of different ages.

Other uses sub-zone

A substantial proportion of the forest within the GMZ and the SMZ is unsuitable for sawlog production because either productivity is too low or slopes are too steep for timber harvesting under current arrangements and techniques. Nevertheless, this sub-zone contributes substantially to the conservation of drier forest types and their attendant fauna. While activities such as fuel-reduction burning, harvesting of other forest produce (such as firewood, poles and honey) and recreation are permitted, they will generally be localised, leaving much of the area relatively undisturbed.

Table 2. Activities permitted in forest management zones

Activity	See Chapter	Special Protection Zone	Special Management Zone	General Management Zone
Sawlog and residual log production	4	No	Cond.	Yes
Firewood, posts, poles	4	No	Cond.	Cond.
Regrowth thinning	4	No	Cond.	Yes
Fuel-reduction burning	6	Cond.	Cond.	Cond.
Recreation	7	Cond.	Yes	Yes
Apiculture, seed collection	8	Cond.	Cond.	Yes
Stock grazing	8	No	Cond.	Cond.
Extractive activities	8	No	Cond.	Yes
Road construction	10	Cond.	Cond.	Yes

Key:
Yes - Permitted under standard conditions
Cond. - Permitted with additional conditions specified in this Plan, or to the extent it does not conflict with the values identified for the respective areas
No - Not permitted.

2.5 GEOGRAPHIC REPRESENTATION UNITS

The Midlands FMA extends 150 km from east to west and more than 100 km from north to south, covering more than one million hectares of public and freehold land. Forests within the FMA range from dry Yellow Gum and box woodlands in the north and west to tall open forests dominated by Messmate Stringybark and Alpine Ash along the Great Dividing Range.

To ensure that the diversity of landforms and vegetation, and the range of land uses and management practices are adequately considered over the breadth of the FMA, it has been subdivided into five geographic units. These units have been used principally as a basis for analysis of the degree of representation of the various vegetation communities (hence, 'geographic representation units' – GRU), for establishing targets for featured species conservation and to establish targets for the provision of recreation opportunities and facilities. Their boundaries are shown on Map 1 and their characteristics described in Appendix C.

2.6 FOREST MANGEMENT AREA BOUNDARY

In early 1996, minor modifications for administrative purposes were made to forest management area boundaries across Victoria. No area of State forest was removed from or included into the Midlands FMA as a result of these changes.

Chapter 3
BIODIVERSITY CONSERVATION

Biodiversity conservation is a key aim of forest management. Biodiversity (or biological diversity) refers to the variety and variability among living organisms and the ecological processes on which they depend. The *Timber Industry Strategy* (Government of Victoria 1986); the *National Forest Policy Statement* (NFPS) (Commonwealth of Australia 1992a) and the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992b) all refer to the importance of ensuring that forest management maintains the diversity of forest flora and fauna, and that areas of special conservation significance are protected. Further, NRE is obliged under Victoria's *Flora and Fauna Guarantee Act* 1988 to guarantee that all taxa of Victoria's flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild.

In 1992, Australia became a signatory to the *Convention on Biological Diversity*, which was opened at the United Nations Conference on Environment and Development in Rio de Janeiro. The Convention addresses biological diversity at genetic, species and ecosystem levels in all global environments. It requires the development of national strategies, plans or programs for the implementation of its measures.

Maintenance of biodiversity depends on a large number of related ecosystem processes. Disturbance and recovery is one natural process to which many forest ecosystems are well adapted. The biodiversity strategies of this Plan are framed within the capacity of forest ecosystems to tolerate and respond to the disturbances created by fire, timber harvesting and other human activities.

Midlands Forest Management Area

Prior to European settlement, the vegetation of the Midlands area comprised extensive tall open forests in higher rainfall areas, woodlands and open forests in the drier hills and sedimentary plains, and extensive native grasslands and open woodlands on the basalt plains in the south. These communities have been largely cleared or modified for agricultural and urban uses. As most of the forest cover has been depleted from freehold land, the remaining native vegetation on public land in the FMA has important conservation significance.

The majority of remaining forests and woodlands are in the northern part of the FMA, with most of the large blocks lying near to or straddling the Great Dividing Range. These forests support several hundred species of native plants and vertebrate animals. Many of these depend on the retention and appropriate management of the forest for their continued survival.

Biodiversity conservation across the FMA is addressed in the context of all public land. National and State parks, other conservation reserves and State forest all contribute to the protection of biological values in the area. As a result of Land Conservation Council (LCC) studies, 29% of public land in the Midlands FMA is contained in various forms of conservation reserve. State forest (as defined in LCC 1988) occupies 51% of public land. The remaining 20% of public land is reserved for a wide variety of other purposes, or remains unreserved Crown land.

As well as the system of statutory reserves, biological values throughout the FMA are further protected by the Special Management and Special Protection Zones identified in State forest, and specific prescriptions governing forest operations.

Information for biodiversity conservation planning in the Midlands FMA has been obtained from a variety of sources, including scientific literature, NRE's *Victorian Wildlife Atlas* and *Flora Information System*, and a variety of small-scale surveys conducted by tertiary institutions, field naturalists' clubs and similar organisations, as well as the advice of NRE wildlife biologists and botanists. Combined, these sources of information have enabled the establishment of a comprehensive strategy for biodiversity conservation.

In summary, the biodiversity conservation strategies in this Plan include:

- protection of a significant proportion of all forest ecosystems in conservation reserves or the State forest Special Protection Zone
- management to minimise the adverse effects of processes which potentially threaten either ecosystem, species or genetic diversity
- specific conservation measures for threatened or management-sensitive flora and fauna to maintain species and genetic diversity.

Aim

Ensure that indigenous flora and fauna and communities survive and flourish throughout the Midlands Forest Management Area.

3.1 ECOSYSTEM DIVERSITY

Classification of ecosystems

An ecosystem is a community formed by living organisms together with their environment. This Plan uses an ecosystem classification based on existing structural vegetation descriptions and mapping provided by the LCC reports covering the FMA (LCC 1978, 1980, 1985, 1989). The vegetation community descriptions in these reports have been re-classified to ensure consistency across the FMA. Refer to the *Statement of Resources, Uses and Values: Part 1 – Nature Conservation* (Maclean 1995a) for descriptions of the vegetation communities.

For some areas of Victoria (eg. East Gippsland), NRE has described Ecological Vegetation Classes (EVCs), based on floristic, structural and ecological information. Similar studies of the floristic and ecological aspects of forests in the Midlands FMA would aid future management decisions.

ACTION

Identify and map the variety of forest ecosystems, as represented by Ecological Vegetation Classes, in the FMA. This work is to be completed prior to the review of this Plan.

Representative ecosystem conservation

One of the goals of the *National Forest Policy Statement* is to protect nature conservation values through a comprehensive, adequate and representative network of dedicated and secure reserve systems. Large areas of public land within the FMA, such as national parks, State parks, nature conservation reserves and reference areas, are reserved primarily for the protection of biological values. State forest Special Protection Zones identified in this Plan provide for similar protection.

Maintenance of biodiversity requires the reservation or protection of an adequate area of each ecosystem across the public land in the FMA. It is important that adequate reservation is considered at the FMA scale as well as within each Geographic Representation Unit (GRU), to ensure that representation is reasonably evenly distributed.

Ecosystems targeted for conservation in this FMA include:

- Threatened ecosystems. These include those which are endangered or vulnerable. An endangered ecosystem is one in danger of extinction unless circumstances and factors threatening its abundance, survival or evolutionary development cease to operate. A vulnerable ecosystem is one likely to move into the 'endangered' category, unless factors threatening its abundance, survival or evolutionary development cease to operate.

  Two communities listed as threatened in Victoria under Schedule 2 of the *Flora and Fauna Guarantee Act* 1988 occur in the FMA: the Western (Basalt) Plains Grassland Community and the Rocky Chenopod Open Scrub Community. The latter community is a component of woodland which is largely protected in the Long Forest Flora Reserve near Bacchus Marsh.

- Declining ecosystems. A declining ecosystem is one known to be undergoing a significant decline in range or condition, due to the effects of current or historical land uses. The Box/Ironbark Open Forests, which are more extensive to the north in the Bendigo FMA, have declined during the past 200 years due to extensive clearing for agricultural development and through poor management of timber resources during the gold rushes. The largest area of Box/Ironbark Open Forest in the FMA occurs on the lower slopes of the Pyrenees State Forest. In November, 1995, the State Government requested the LCC to undertake a study of Victoria's box–ironbark forests and woodlands. The study is expected to be complete in 1998 and will provide a set of recommendation on the future use of these forests on public land in northern Victoria.

- Ecosystems rare or uncommon in the FMA. A rare ecosystem is one which occurs within a restricted range in the FMA or is thinly scattered over a more extensive range. Alpine Ash/Mountain Ash Open Forest is considered to be rare in the context of the Midlands FMA. The community occurs in deep gullies on the slopes of Mount Macedon, where Alpine Ash is at the western extremity of its natural range. The community is entirely contained within the Macedon Regional Park. Manna Gum Open Forest on basalt-derived soils have been substantially depleted by clearing for agriculture. This ecosystem is now very rare on public land. Box/Ironbark Open Forest is relatively rare in the context of the Midlands FMA but this is largely an artefact of the definition of the Midlands FMA: the community is widespread in the adjacent Bendigo FMA.

- Representative ecosystems. Conservation of representative examples of ecosystems is an important contribution to biodiversity conservation. At the FMA scale, vegetation communities have been ranked according to their total area and rarity in the landscape, and minimum targets of between 30% and 90% set for their protection.

- Ecosystems important for research, monitoring and as benchmark sites. Eight areas in the Midlands FMA supporting a variety of ecosystems have been designated as Reference Areas as a consequence of LCC recommendations.

The guidelines for Conservation of Ecosystem Diversity were used to identify a forest reserve network across the FMA which complements the existing conservation reserve system. The proportion of vegetation communities within public land reserved for conservation purposes ranges from 100% of the Alpine Ash/Mountain Ash Open Forest community to 31% of the widespread Messmate/Peppermint/Gum Open Forest community. Table 3 shows the area and proportion of each community protected on public land in the FMA. A full analysis of the conservation status of vegetation communities is included in Appendix D.

GUIDELINES FOR CONSERVATION OF ECOSYSTEM DIVERSITY

The following proportion of each forest vegetation community should be included in protected areas (conservation reserves and State forest SPZ):

- at least 30% of vegetation communities that occupy more than 1% (approximately 10 000 ha) of the naturally-forested area of the FMA
- between 30% and 90% of vegetation communities that occupy between 0.1% and 1% (approximately 1000 ha and 10 000 ha), of the naturally-forested area of the FMA, depending on the distribution and extent of the particular community
- at least 90% of communities that occupy less than 0.1% (approximately 1000 ha) of the naturally-forested area of the FMA.

The relative proportion of the area occupied by each vegetation community in the FMA, is determined by dividing the area of the community *on public land* into the total naturally-forested area of the FMA (including freehold land). The naturally-forested area of the Midlands FMA is the area supporting forest prior to European settlement. This is estimated at one million hectares. It excludes areas of native grasslands, coastal scrubs, lakes and wetlands. This approach is intended to ensure consistency with other FMAs in Victoria. It deliberately takes no account of the current extent of forest vegetation on freehold land as NRE has no control over the maintenance of the conservation values of these areas.

The representation targets (30% and 90%) are to be applied at the FMA level but should have regard to the presence of the respective communities in adjacent FMAs. Consideration will also be given to the adequacy of representation at the Geographic Representation Unit level, although achieving these targets at the GRU level is not always possible.

To meet the targets set above, communities should, where possible, be selected from areas:

- known to contain or to have once contained, threatened flora or fauna
- identified as being good representative examples of the community
- covering a minimum of 100 ha
- defined by natural boundaries such as streams or ridgelines, or management boundaries such as roads
- that are not disturbed and fragmented (except where these are the only remaining examples of the community)
- of mature forest that has not been recently disturbed
- that support the requirements of other conservation strategies in this Plan (eg. Powerful Owl)
- that help to establish an inter-linked protected area network across the FMA
- that, where feasible in State forest, are unsuitable for timber production.

Table 3. Conservation status of Midlands FMA vegetation communities

Vegetation community[1]	Public land area (ha)	Proportion of naturally-forested land (%)	Protection target (%)	Representation		
				Conservation reserves (ha)	State forest SPZ (ha)	Total protected (%)
Snow Gum Open Forest I / Woodland I	33	0.003	90	11	22	100[2]
Alpine Ash/Mountain Ash Open Forest IV	136	0.014	90	136	-	100
Swamp Gum Open Forest I/II	391	0.039	90	201	190	100[2]
Box/Ironbark Open Forest I/II	674	0.07	30-90[3]	284	27	46
Gum/Peppermint Open Forest I/II	2 234	0.22	30-90	911	298	54
Scent Bark/Peppermint Open Forest I/II[4]	2 974	0.30	30-90	1 216	74	43
Gum/Box Woodland I / Open Forest I	4 574	0.46	30-90	1 641	672	51
Red Stringybark/Box Open Forest I/II[4]	23 866	2.4	30	5 774	4506	43
Stringybark/Peppermint Open Forest I/II	34 095	3.4	30	20 678	3556	71
Messmate/Peppermint/Gum Open Forest II/III[4]	93 738	9.4	30	15 033	14314	31

Notes:

1. Grasslands, cleared public land, softwood and hardwood plantations are not included in the analysis. Communities in the Geelong Geographic Representation Unit are also excluded from the analysis (see the Guidelines for Ecosystem Diversity).
2. The areas of Snow Gum Woodland and Swamp Gum Open Forest are too small to represent on zoning maps. All such areas in State forest will be protected *via* prescription.
3. The protection target for Box/Ironbark Open Forest has been established with consideration of the extensive areas of this community in the adjacent Bendigo FMA.
4. The areas of these communities have been corrected following the discovery of errors in representation analysis in the Proposed Plan

Management of vegetation communities

The inclusion of rare and representative vegetation communities within State forest SPZ makes a major contribution towards maintaining their integrity. Some communities may also require particular active management strategies to ensure their continued health.

ACTIONS

Establish management programs for reserved representative ecosystems (vegetation communities) aimed at maintaining their integrity and which address factors such as:

- *fire regime*
- *pest plant and animal invasion and control*
- *disease*
- *maintenance of ecological processes*
- *impact of human activities such as recreation.*

Establish these programs progressively, with priority given to ecosystems considered to be under the greatest threat.

*Include in the SPZ, vegetation communities dominated by Snow Gum (*Eucalyptus pauciflora*) on Mount Cole, and Swamp Gum (*E. ovata*) near Enfield.*

Structural diversity

The structural diversity of a forest can be considered in terms of growth stages and habitat components. As a forest stand grows its changing structure is reflected by:

- vertical diversity – the different tree, shrub and ground layer components
- increasing size of trees
- the presence of relatively large, dead, standing and fallen trees, which often contain hollows
- cover diversity created by small-scale disturbance and death of individual trees.

Each growth stage contributes to the maintenance of biodiversity through its particular floristic composition and by providing different habitat for different wildlife. Mature forests, for example, provide a range of habitat resources that are utilised by many species including large forest birds and arboreal fauna. Younger, regenerating forest provides various resources utilised by a different suite of species. Some fauna dependent on mature forest can also find suitable foraging resources within regrowth stands, although some of their requirements (eg. nesting sites) may have to be provided by structural attributes of old forest stands (Scotts 1994).

The structure of a forest stand is altered by the type of harvesting and regeneration system applied. The choice and application of these systems in the FMA is detailed in the Guidelines for the Application of Harvesting and Regeneration Systems in Chapter 4.

Old-growth forest

Victoria has agreed to a NFPS strategy for old-growth forest conservation. Old-growth forest is defined as "Forest which contains significant amounts of its oldest growth stage in the upper stratum – usually senescing trees – and has been subjected to any disturbance, the effect of which is now negligible" (Woodgate *et al* 1994). The values of old-growth forests include opportunities for scientific reference, flora and fauna conservation, and aesthetic and spiritual values. They are characterised by the occurrence of large live trees, large stags, and large fallen logs.

As the forests of the Midlands have a long history of disturbance and comprise mostly regrowth, areas which might support old-growth forest are limited. The deeper, more inaccessible valleys of the Pyrenees State Forest, the Pyretes Block of the Wombat State Forest, Langi Ghiran and Lerderderg State Parks, and possibly Mount Cole, may support small pockets of forest which meet the definition of old-growth forest. The reservation of mature forest in a network of linear reserves and retained

habitat throughout the State forests of the FMA will enable the redevelopment of old-growth characteristics in these areas.

No evaluation of old-growth forest has been completed for the FMA. However, the Statewide Forest Resource Inventory (SFRI), a program of forest mapping and timber assessment, will identify growth stages and degree of disturbance for forests throughout Victoria. The mapping of State forest within the FMA is complete, with the exception of the Wombat State Forest which is expected to be available by the end 1998. This information, when combined with information about disturbances caused by activities such as grazing or mining, can be used to define old-growth forest. In the context of the Midlands FMA, any old-growth stand identified will be of particular conservation significance because of its rarity.

ACTIONS

Use the SFRI assessment to identify areas of State forest with old-growth structural characteristics and provide these areas with interim protection in advance of a full old-growth assessment.

Conduct an old-growth assessment of the Midlands FMA forests, taking into account disturbance history.

Include in the SPZ all significant old-growth areas identified during the assessment.

3.2 MANAGEMENT OF THREATENING PROCESSES

Many processes operating in forests may threaten the survival, abundance or evolutionary development of flora and fauna species or ecosystems. Several of these potentially threatening processes, relevant to forest management, are listed in Schedule 3 of the *Flora and Fauna Guarantee Act* 1988.

Management of potentially threatening processes plays a key role in maintaining biodiversity by assisting protection of the integrity of reserved ecosystems and reducing the direct threat to flora and fauna populations. This section addresses the main processes in the forests which threaten ecosystem or flora and fauna populations in the FMA.

Loss of hollow-bearing trees from Victorian native forests (listed under the *Flora and Fauna Guarantee Act* 1988)

Although trees of all growth stages may be utilised by wildlife, live, hollow-bearing eucalypts are especially important as nesting and roosting sites for birds and arboreal mammals. Dead trees, whether standing (stags) or fallen, are also valuable habitat, providing hollows, denning sites, basking sites and foraging substrates for a range of wildlife species.

Tree hollows tend to occur in mature, senescent and dead trees. For the majority of eucalypts in the FMA, hollows suitable for nesting and roosting begin to form in trees over 100 years old. As the forests of the Midlands have been utilised for timber harvesting for more than 150 years, the remaining hollow-bearing trees are fewer than would be found in undisturbed forest. For this reason, the larger trees should generally be favoured for retention as habitat trees.

Timber harvesting and timber stand management operations, fire and road construction or maintenance can remove or damage trees with hollows, and leave insufficient younger trees to replace losses and ensure continuing supply. In some instances, limited tree damage may promote hollow development but excessive damage may lead to tree death. However, the establishment of conservation

reserves identified through the LCC process, and Special Protection Zones identified in forest management planning processes, will allow extensive areas of regrowth forest to age sufficiently so that they approach the level of hollow abundance found in mature undisturbed forest.

The *Code of Forest Practices for Timber Production* (the *Code*) specifies the need to retain as many habitat trees as practicable, with preference given to those located in situations most easily protected from damage during harvesting and subsequent management. An Action Statement under the *Flora and Fauna Guarantee Act* 1988 is in preparation.

ACTIONS

Develop and implement a habitat tree prescription for State forest in the Midlands FMA, by June 1997, which considers:

- *the density of trees that should be retained in the GMZ, with regard to the proportion of forest reserved as SPZ or SMZ*
- *the basal area of retained habitat trees as a proportion of the basal area of a fully-stocked stand*
- *the need for recruitment of habitat trees of varying age, species and form characteristics*
- *the retention of dead standing trees*
- *the location and distribution of habitat trees within logging areas*
- *the requirements and sensitivity of hollow-using wildlife populations to the loss of tree hollows*
- *planning processes for the retention and recruitment of hollow-bearing trees*
- *the particular need to protect veteran hollow-bearing trees.*

Train supervising forest staff in the application of the habitat tree prescriptions.

Monitor harvested areas to determine the success of the prescriptions, through the Code of Forest Practices for Timber Production *audit procedures.*

Fragmentation of mature forest (nominated for listing under the *Flora and Fauna Guarantee Act* 1988)

Mature forests provide a range of habitat resources, particularly for arboreal fauna. Fragmentation of these optimal habitats through clearing, burning and timber harvesting, contributes to a decline in certain sensitive forest species. Management of timber harvesting activities will ensure that patches of mature forest existing in conservation reserves, SPZs and areas unavailable or unsuitable for harvesting, are not isolated.

Linking habitat areas with a network of suitable mature forest corridors is important for conservation of flora and fauna, as it facilitates:

- the maintenance of resident populations of species across the region
- the provision of alternative refuge from broad-scale disturbances (eg. wildfire) and subsequent species dispersal
- the provision of some of the habitat requirements of wide-ranging species (such as forest owls)
- maintenance of gene-flow, thus preventing genetic isolation of forest species dependent on mature habitat.

A network of linear reserves has been developed according to the guidelines below, and incorporated into the SPZ for State forests in the FMA (see Maps 4 and 5).

GUIDELINES FOR ESTABLISHMENT OF LINEAR RESERVES

Linear reserves should:

- provide alternative links between conservation reserves and larger parts of the SPZ and SMZ
- provide links between gully, mid-slope and ridge habitats
- be sufficiently wide to enable large arboreal mammals to forage efficiently (eg. Greater Glider) – in general, 200 m is deemed to be an appropriate width
- comprise mature forest, wherever possible
- build on and complement parks and reserves, heritage river corridors, and stream buffers retained in accordance with the *Code.*

Fire

The structure and floristic composition of many vegetation communities is strongly influenced by local fire regimes. During the past 150 years, the timing, frequency and intensity of forest fires has altered. In some areas, frequency has been reduced as a result of active suppression of naturally-occurring fires. In other areas, fire frequency has increased as a result of fuel-reduction burning initiated to protect settlements and forest resources from wildfire.

Shrub layers and ground habitat such as litter and logs can be depleted through repeated burning. Regular burning can also promote weed invasion which may reduce ecosystem diversity and lead to an increase in fire hazard. Prescribed burning practices need to take into account the fire responses of different ecosystems, natural patterns of succession, and the role of fire in the maintenance of biodiversity.

A major continuing research program being conducted by NRE in the Wombat State Forest (Tolhurst and Flinn 1992), addresses the impact of fuel-reduction burning on forest ecology. The results of this research provide a valuable basis for the development of fire management prescriptions which meet the requirements of both fire protection and ecosystem conservation. The findings of the report are discussed further in Chapter 6 (Forest Protection) of this Plan.

ACTIONS

Support further research into the role of fire in the conservation and management of forest vegetation communities.

Incorporate research findings on the impact of burning on ecosystem diversity into Fire Protection Plans, and in burning programs.

Other potentially threatening processes

Other potentially threatening processes, and management actions taken to address them, are shown in Table 4. Processes listed in the *Flora and Fauna Guarantee Act* 1988 (FFG Listed) will also be subject to an Action Statement or Management Plan prepared under the Act.

Table 4. Management actions for other potentially threatening processes

Process	Management Action
Alterations to the Natural Temperature of Rivers and Streams (FFG Listed). Temperature affects the breeding success of a wide range of aquatic fauna.	Addressed by the *Code* requirement for the retention of a minimum 20 metre streamside reserves on all permanent streams. The shade this provides serves to minimise temperature variations that might otherwise result from additional exposure to the sun.
Increase in Sediment Input into Rivers and Streams due to Human Activities (FFG Listed). Excessive sedimentation interferes with many aquatic ecosystem processes.	Measures aimed at minimising sediment input to rivers and streams are described in Chapter 5 – Catchments and Streams.
Input of Toxic Substances into Victorian Rivers and Streams (FFG Listed)	Addressed by the *Code* requirements for safe handling of fuel and lubricants which restricts the location and conduct of refuelling operations.
Predation of Native Wildlife by the Introduced Red Fox (FFG Listed). Predation may be a particular threat to wildlife such as the Brush-tailed Phascogale.	See Chapter 6 - Forest Protection. Ensure biodiversity aims are considered in pest control programs. An Action Statement has been prepared.
Predation of Native Wildlife by Cats (recommended for FFG listing)	See Chapter 6 - Forest Protection. Ensure biodiversity aims are considered in pest control programs.
Use of *Phytophthora*-infected Gravel in the Construction of Roads, Bridges and Reservoirs (FFG Listed). This is of particular relevance in the Brisbane Ranges National Park and surrounding areas, due to the presence of *Phytophthora* in the park.	See Chapter 6 - Forest Protection.
Competition and Land Degradation caused by Feral Goats	See Chapter 6 - Forest Protection.
Competition and Land Degradation by Feral Rabbits	See Chapter 6 - Forest Protection.

3.3 SPECIES AND GENETIC DIVERSITY

The long-term protection of all forest flora and fauna populations is best achieved by protecting representative examples of all ecosystems, and by taking steps to minimise the impact of threatening processes. These strategies provide a base level of security for populations of most native flora and fauna. Some species, however, occur in very low or isolated populations or may be particularly sensitive to forest management practices. These require specific targeted actions aimed at ensuring the survival of populations and, therefore, the maintenance of biodiversity.

Species known or suspected to be at risk of extinction require greatest attention in the development of management actions and prescriptions. Effective management of such species requires prediction of and control over the types of environmental changes that threaten populations. These, in turn, require detailed knowledge of the ecology of individuals and populations and an understanding of the nature of threatening processes. An integral part of the species management guidelines is to protect a defined

number of individuals by providing habitat for their requirements. Depending on the species, these are used in one of two ways:

- **Minimum population level** – establishes a target number of protected records around which key habitat is maintained to ensure the maintenance of viable populations of the species in the FMA.

- **Review level** – establishes a pre-determined number of protected records which, once reached, will trigger a review of the species' forest conservation requirements to ensure their relevance and effectiveness.

The *Flora and Fauna Guarantee Act* 1988 aims to ensure that Victoria's native flora and fauna survive, flourish and retain their potential for evolutionary development. Schedule 2 of the Act comprises a list of species and communities which are threatened. Species and communities are added to the schedule by the Minister for Natural Resources on the advice of a Scientific Advisory Committee. The Department has obligations under the Act to manage listed species and communities according to individual action statements that are prepared after species or processes are listed as threatened.

Genetic diversity refers to the variety of genetic information contained in all of the individual plants, animals and micro-organisms that inhabit our planet. Genetic diversity occurs within and between the populations of organisms that comprise individual species as well as among species (Commonwealth of Australia undated).

Genetic diversity can be conserved by protecting multiple populations across a species' range. This may also guard against the risk of isolated populations being destroyed by natural disasters or other factors. In the context of this Plan, genetic diversity is best achieved through the maintenance of populations of all native flora and fauna across their natural range, and through the measures identified to avoid forest fragmentation.

Aims

Maintain populations of all indigenous native forest flora and fauna across the FMA.

Maintain genetic variation within populations of all indigenous native forest flora and fauna across the FMA.

Management of rare or threatened flora

Threatened flora are those species listed in Schedule 2 of the *Flora and Fauna Guarantee Act* 1988, or which are recorded by the Flora Section of NRE as either *Endangered* or *Vulnerable* at a Victorian or national level. Species considered as *Rare, Poorly Known* or *Depleted* at either a Victorian or national level have also been specifically considered in developing this Plan.

Forty-five vascular plant species recorded within the FMA are regarded as rare or threatened in Victoria or Australia. Twenty-one of these species are considered to be forest or woodlands species. The remainder occur in grasslands, wetlands and other non-forest ecosystems. Further details of these species are outlined in the *Statement of Resources, Uses and Values: Part 1 – Nature Conservation* (Maclean 1995a). Management of these species is based on an assessment of the threat status of the species and the presence of populations in conservation reserves.

Additional threatened flora species may be identified in the Midlands FMA as a consequence of additional flora surveys, or reviews of the conservation status of species and subsequent listing under the *Flora and Fauna Guarantee Act* 1988. Management of these species will be determined following consultation with botanists, but will follow the general approach outlined in the Guidelines for Threatened Flora Conservation.

GUIDELINES FOR THREATENED FLORA CONSERVATION

Include all known populations of species regarded as 'Endangered' at a Victorian or Australian level in the SPZ. The protection zone needs to be of sufficient size to include all of the local population, and should include a buffer large enough to protect the population from external impacts.

Include populations of 'Vulnerable' species in the SPZ or SMZ after consideration of their level of representation in the existing conservation reserve system. Any populations in State forest not included in the SPZ or SMZ should be protected from disturbance wherever practicable.

Species classified as 'Rare', 'Depleted' or 'Insufficiently Known' should be protected from disturbance as far as possible. Measures for protection of these species should be included in operational plans, such as coupe plans.

Where prepared, Action Statements for species listed under the *Flora and Fauna Guarantee Act* 1988 will be implemented. If no Action Statement is available, species listed under the Act will be managed in accordance with their conservation status.

Populations of endangered or vulnerable plants included in the SPZ or SMZ should be managed with regard to:

- fire regime
- pest plant and animal management
- disease control
- hydrological factors
- the effect of various forms of disturbance
- any other requirements necessary for the maintenance of a viable population.

Manage threatened forest flora in accordance with the Guidelines for Threatened Flora Conservation, relevant legislation and policies, and Table 5.

Conduct flora surveys aimed at increasing the knowledge of the distribution and abundance of rare and threatened species in State forests of the FMA. This work is to be substantially advanced prior to the review of this Plan.

Train forest operations staff in the identification of Midlands FMA rare and threatened flora as a basis for measures to protect these plants during forest operations.

Management of threatened and featured fauna

Threatened fauna are those species listed in either Schedule 2 of the *Flora and Fauna Guarantee Act* 1988, or are listed as threatened in *Threatened Fauna in Victoria* (CNR 1995b). A further group of fauna species are not formally assessed as threatened, but are particularly sensitive to forest management and utilisation activities, or are at the limit of their natural range in the FMA. These featured species are also subject to targeted management actions to ensure the maintenance of populations in the Midlands FMA.

Populations of most of the 350 species of vertebrate wildlife recorded in the FMA will be maintained by implementing the ecosystem conservation and threatening process management actions outlined above. Some wildlife, however, are less capable of tolerating the disturbances caused by human use and

management of forests. Species most vulnerable to forest management and utilisation activities are those that:

- forage over large areas of forest (forest owls, Spot-tailed Quoll)
- are at or near the top of the food chain (forest owls, Spot-tailed Quoll, diurnal forest raptors)
- require combinations of varied specialised habitat resources for nesting, roosting, foraging, perching or basking (forest owls, parrots and cockatoos, possums and gliders, many insectivorous bats)
- naturally occur at low densities (higher order predators such as Brush-tailed Phascogale and the Spot-tailed Quoll)
- are colonial or social in population structure (several forest bats and some birds).

During the conduct of a survey for an Environmental Effects Statement, undertaken because of proposals to improve the Calder Highway near Woodend (Vic Roads 1995), a tuft of hair belonging to the endangered Leadbeater's Possum (*Gymnobelideus leadbeateri*) was found along one of the freeway route options. This species is primarily confined to the tall wet montane forests of the Central Highlands. Follow-up survey work in the forest around Woodend was undertaken but did not find any further evidence of the possum. Forest fauna surveys in the Woodend area will incorporate techniques for the detection of Leadbeater's Possum. For any site recorded in the FMA, management will be in accordance with the FFG Action Statement.

ACTIONS

Implement specific management actions for threatened or featured wildlife species as detailed in the Conservation Guidelines for Threatened and Featured Wildlife.

Conduct surveys to improve knowledge of the location and distribution of threatened fauna populations and to improve understanding of habitat requirements. These surveys are to be substantially advanced prior to the review of this Plan.

Evaluate the effectiveness of management strategies through systematic monitoring of threatened or featured forest wildlife populations, or of those species which are considered to be useful indicators of overall forest habitat conditions.

Table 5. Management actions for rare or threatened flora

Scientific name	Common name	Status	FFG status	Management actions
Allocasuarina luehmannii	Buloke	d	FFG Listed	Ensure that 30% of Gum/Box Woodland/Open Forest is included in the SPZ and conservation reserves.
Amyema linophyllum	Buloke Mistletoe	v		Control rabbit populations to reduce grazing pressure.
Caladenia patersonii	Common Spider-orchid	r		Determine and implement appropriate fire regimes in sites identified as having large populations. Avoid disturbance to known populations within the SMZ and GMZ.
Daviesia genistifolia	Broom Bitter-pea	r		Avoid disturbance to known populations within the SMZ and GMZ.
Diuris punctata	Purple Diuris	v	FFG Listed	Place any State forest populations into the SPZ. Review this action when 10 sites and 1000 individuals have been catered for. (Currently, the only known population within the FMA lies within a conservation reserve). An Action Statement is in preparation.
Eucalyptus yarraensis	Yarra Gum	Rr		Retain all individual trees. Include 90% of Swamp Gum community in SPZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Eutaxia diffusa	Spreading Eutaxia	r		Include 30% of Gum/Box Woodland/Open Forest in the SPZ and conservation reserves. Avoid disturbance to known populations within the SMZ and GMZ.
Glycine latrobeana	Clover Glycine	Vv	FFG Listed	Include State forest populations in the SPZ. Review this action when 10 sites and 1000 individuals have been catered for.
Grevillia bedgoodiana	Enfield Grevillea	Rv		Avoid disturbance to known populations within the SMZ and GMZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Grevillea floripendula	Drooping Grevillea	Rv		Avoid disturbance to known populations within the SMZ and GMZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Grevillea montis-cole	Mount Cole Grevillea	Rr		Protect a minimum of 5 known sites in the SPZ and conservation reserves. Avoid disturbance to known populations within the SMZ and GMZ.
Grevillea repens	Creeping Grevillea	Rr		Protect a minimum of 5 known sites in the SPZ and conservation reserves. Avoid disturbance to known populations within the SMZ and GMZ.
Lepidium hyssopifolium	Small Pepper-cress	Ee	FFG Listed	Include all known State forest populations in the SPZ. Survey in the vicinity of Bolworrah and Trentham for the species prior to carrying out any logging or other forest operation in the area.
Leucopogon neurophyllus	Mt William Beard-heath	Vr		Include any State forest populations in the SPZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Picris squarrosa	Squat Picris	r		Avoid disturbance to known populations within the SMZ and GMZ.
Platylobium alternifolium	Victorian Flat-pea	Rr		Avoid disturbance to known populations within the SMZ and GMZ.
Pultenaea graveolens	Scented Bush -pea	v	FFG Listed	Avoid disturbance to any populations found within the SMZ and GMZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA. The species appears particularly susceptible to Phytophthora.
Pultenaea weindorferi	Swamp Bush-pea	Rr		Avoid disturbance to any populations found within the SMZ and GMZ. Tends to occur in swampy areas which are protected through application of the *Code*.
Rhagodia parabolica	Fragrant Saltbush	r		Avoid disturbance to any populations found within the SMZ and GMZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Stipa breviglumis	Cane Spear-grass	Rr		Avoid disturbance to any populations found within the SMZ and GMZ. The species and its regeneration is well catered for in legislated conservation reserves within the FMA.
Templetonia stenophylla	Leafy Templetonia	d		Avoid disturbance to known populations within the SMZ and GMZ.

Australian status: E = Endangered, V = Vulnerable, R = Rare
Victorian status: e = endangered, v = vulnerable, r = rare, d = depleted
Status is as defined by Gullan, Cheal and Walsh (1990) and Briggs and Leigh (1988) and subsequent revisions recorded in the NRE Flora Information System
FFG Listed = listed under schedule 2 of the *Flora and Fauna Guarantee Act* 1988.

CONSERVATION GUIDELINES Mammals

Spot-tailed Quoll *Dasyurus maculatus*
Vulnerable, *Flora and Fauna Guarantee Act* Listed
Spot-tailed Quolls are a high-order predator occupying large home ranges (possibly up to 1000 ha). They establish dens in rocky outcrops and in fallen timber. The impact of forest management operations on Spot-tailed Quolls is poorly known - this strategy adopts a precautionary approach, providing areas of undisturbed forest as foraging habitat until further work on habitat requirements and threats is completed. Pest control activities using 1080 poison is believed to be a factor in their decline. An Action Statement has been published.

- *Establish or identify a 500 ha SPZ within an area of approximately 1500 ha centred on Spot-tailed Quoll records. Review this strategy when 10 sites have been established.*
- *In accordance with the Action Statement, establish a 200 m radius SPZ around latrine and den sites, where these are not otherwise reserved.*
- *Exclude the use of poisons such as 1080 within 2 km of Quoll records unless conducted as part of a planned predator control program, and following pre-baiting surveys for the presence of Quolls.*

Squirrel Glider *Petaurus norfolcensis*
Vulnerable, *Flora and Fauna Guarantee Act* Listed
Squirrel Gliders prefer open forest and woodland supporting a mixture of *Eucalyptus* species, including gum-barked species, and *Acacia* species in the understorey. They nest and roost in tree hollows, depletion of which is regarded as a major threat to populations. They have been recorded at the Joel Bushland Reserve in the extreme west of the Midlands FMA. Other populations exist near Stawell, just outside the FMA. Areas of the Pyrenees State Forest may provide suitable habitat for the species.

- *Survey the Pyrenees State Forest to determine if Squirrel Gliders are present.*
- *Establish a SMZ of up to 500 ha in the vicinity of confirmed populations containing a core area of approximately 100 ha which will be excluded from timber harvesting.*
- *Establish management prescriptions for Squirrel Glider SMZs which will includes measures aimed at maintaining key habitat elements such as nesting hollows, large trees, and suitable understorey species, in particular Silver Wattle (Acacia dealbata).*

Brush-tailed Phascogale *Phascogale tapoatafa*
Rare, *Flora and Fauna Guarantee Act* Listed
Brush-tailed Phascogales prefer dry, open sclerophyll forests with rough-barked trees where they occupy a large home range. They feed mainly on insects and other arthropods. Nests are constructed in tree hollows, stumps and fallen logs. Males die after mating so conservation of the species rests largely on the maintenance of populations of breeding females. Threats include habitat fragmentation, depletion of tree hollows, predation by foxes and cats, and removal of fallen timber in firewood harvesting operations or frequent fire. Much of the Victorian range of the species overlaps the Midlands FMA but the distribution and abundance of the species within the FMA is not well known.

- *Include 30% of Red Stringybark/Box and Stringybark/Peppermint Open Forest in the State forest SPZ and conservation reserves.*
- *Undertake surveys to establish the location of preferred Phascogale habitat within the FMA.*
- *Establish sufficient areas of SMZ to maintain a Midlands FMA target population of 100 breeding females. Develop prescriptions for the SMZ which aim to ensure maintenance of key Phascogale habitat elements, including prohibiting the removal of naturally-fallen timber for firewood.*
- *Undertake fox and cat control programs in any established SMZs.*

CONSERVATION GUIDELINES Mammals (continued)

Common Dunnart *Sminthopsis murina*
Rare
Common Dunnarts have been recorded at Mount Erip area near Linton and in the south-eastern part of the Wombat State Forest. They are believed to prefer dry forest and woodland with an open, heathy understorey. Fire regime may be an important factor in maintaining a suitable structure and floristic composition in the understorey.

- *Establish SPZs of approximately 20 ha in the vicinity of known sites. Establish and manage these zones to protect the integrity of heathy understorey areas, with particular attention to the intensity, frequency and distribution of fuel-reduction burning.*
- *Review this prescription when 50 zones have been established in State forest.*

Common Bent-wing Bat *Miniopterus schreibersii*
Restricted/Colonial, *Flora and Fauna Guarantee Act* Listed
Common Bent-wing Bats breed in only a few localities in Victoria; all of these are outside of the Midlands FMA. Following breeding, the bats disperse and occupy caves and abandoned mine shafts for roosting and over-wintering at a number of sites within the FMA, principally in the Wombat State Forest. Disturbance of over-wintering sites is believed to be a principal threat to the species. An Action Statement is in preparation.

- *Identify and record roosting and over-wintering sites.*
- *Establish a 100 m radius SMZ around roosting and over-wintering sites.*
- *Exclude logging, road construction and other activities likely to disturb over-wintering bats between May to October.*

Greater Glider *Petauroides volans*
Greater Gliders nest in tree hollows and feed on *Eucalyptus* leaves. They are found more frequently at sites with high soil fertility where the dietary value of foliage is greater. In the Midlands FMA, the population of Greater Gliders is at the western limit of the species' range. Although not classified as threatened, Greater Gliders are sensitive to timber harvesting through the loss of hollow-bearing trees and their preferred feed trees. Maintaining the Midlands FMA population is important to achieve forest biodiversity goals. The major population is believed to be in the vicinity of Spargo Creek in the south-western part of the Wombat State Forest.

- *Establish a SPZ in the vicinity of the Spargo Creek Education Area along the Blakeville–Bunding Road and McGees Track – this will protect the major Midlands FMA population.*
- *Establish a SMZ of approximately 1000 ha between the Daylesford–Ballan Road and Blakeville, south of the Spargo–Blakeville Road, in which:*
  - *Greater Glider nesting and feeding sites will be surveyed and protected*
  - *coupe size will be restricted to 20 ha*
  - *coupes will be separated by 50-metre wide corridors (forming part of the SPZ)*
  - *habitat trees within coupes will be retained in accordance with GMZ prescriptions.*

CONSERVATION GUIDELINES Mammals (continued)

Mountain Brushtail Possum *Trichosurus caninus*
Mountain Brushtail Possums nest and feed in gullies in high-elevation damp forests. Tree hollows are used for nesting and denning but the species is apparently capable of using a wide range of hollow types and locations. A recent record near Victoria Mill in the Mount Cole State Forest comprises the western limit of the species' range. It is also present in the Wombat State Forest. Mountain Brushtail Possums are not considered to be rare or threatened but maintenance of the Mount Cole population is important to achieve biodiversity aims.

- *Conduct surveys to determine the distribution, size and habitat preferences of the Mount Cole Mountain Brushtail Possum population.*
- *Establish a SMZ of approximately 300 ha centred on the population currently known to exist on Mount Cole.*
- *Defer timber harvesting from the SMZ until the completion of the population survey and the development of management prescriptions aimed at maintaining key habitat attributes of the Possum.*

CONSERVATION GUIDELINES Birds

Regent Honeyeater *Xanthomyza phrygia*
Endangered (Victoria and Australia). *Flora and Fauna Guarantee Act* Listed.
Regent Honeyeaters feed on nectar in box–ironbark woodland and other dry forest types. Recent Midlands FMA records are from the lower slopes of Mount Cole. The birds are highly migratory and appear to favour forests and woodlands in north-east Victoria, the Midlands forests appear to be at the extreme margin of the species' range. A FFG Action Statement has been prepared. No sites within the Midlands FMA are known to meet the 'regularly used' criteria defined in the FFG Action Statement.

- *In accordance with the FFG Action Statement:*
  - include regularly used sites in SPZ with an adequate buffer (generally about 100 m around the site)
  - exclude timber harvesting from newly-discovered sites until their status can be assessed
  - promote the development of large-crowned spreading trees.

Swift Parrot *Lathamus discolor*
Endangered (Victoria), Vulnerable (Australia). *Flora and Fauna Guarantee Act* Listed
Swift Parrots breed in Tasmania and migrate to Victoria during winter where they feed on nectar and pollen in the box–ironbark forests, principally north of the Midlands FMA. Records from the Midlands FMA are likely to be birds moving between Tasmania and their preferred Victorian habitat. They may spend a few days foraging in Midlands forest areas before moving on.

- *Protect a minimum of 30% of dry forest and woodland in SPZ and conservation reserves.*
- *Avoid disturbance of Swift Parrot flocks by postponing forest management activities (that may affect them) in their vicinity.*
- *Protect large spreading trees as part of the implementation of habitat tree prescriptions.*

CONSERVATION GUIDELINES Birds (continued)

Diurnal Raptors

Square-tailed Kite *Lophoictinia isura*
Vulnerable
Grey Goshawk *Accipiter novaehollandiae*
Rare
Wedge-tailed Eagle *Aquila audax*

These species hunt over extensive areas of forest, preying on small mammals, bird and reptiles. They nest in tall trees and generally use the one nest over a number of years. Grey Goshawks have not been recorded as breeding in Midlands FMA State forests. Permanent clearing of forest habitat and disturbance of breeding sites are likely to be the major threats.

- *Establish a 250 metre radius SMZ around nesting sites as they are discovered, within which:*
  - nest trees and all trees within a radius of 150 metres from the nest tree will be protected
  - logging operations, road construction and other activities likely to disturb breeding activity will be excluded during the breeding season (July to November).
- *Review this strategy for a species when 10 SMZs have been established in State forest for that species.*

Forest Owls

Barking Owl *Ninox connivens*
Rare, Recommended for *Flora and Fauna Guarantee Act* Listing
Masked Owl *Tyto novaehollandiae*
Rare, *Flora and Fauna Guarantee Act* Listed

Barking Owls exhibit a preference for dry open forests and River Red Gum forests. Masked Owls have been recorded in dense forests but have been recorded on only few occasions in the FMA. Both species breed in tree hollows and hunt for prey on the forest floor and amongst the canopy. They appear to be less dependent on arboreal prey than the Powerful Owl. Because current knowledge of their habitat requirements and resource use is limited, it is premature to reserve large areas of forest as the basis of a conservation strategy for these species. NRE will develop a *Flora and Fauna Guarantee Act* Action Statement for the Masked Owl, and for the Barking Owl if it is accepted for listing. These statements will review the conservation requirements of the owls and determine an appropriate management regime which will be implemented during the life of this Forest Management Plan. As an interim conservation measure:

- *Use Wildlife Atlas information and surveys of State forest and conservation reserves to determine the location of resident owls (sites where repeat visits over a period of weeks regularly record the presence of owls, or confirmed breeding locations), and in light of these results review this strategy.*
- *Establish a 250-metre radius SMZ around nesting or residency sites as they are discovered, within which:*
  - nest trees and all trees within a radius of 100 metres from the nest tree will be protected
  - logging operations, road construction and other activities likely to disturb breeding activity during the breeding season will be excluded
- *Review this strategy for a species when 20 SPZs have been established in State forest for that species.*

Powerful Owl *Ninox strenua*
Rare, *Flora and Fauna Guarantee Act* Listed

Additional conservation guidelines have been developed for the Powerful Owl to take into account its strong dependence on the availability of arboreal prey species and the sensitivity of favoured prey to timber utilisation activities. This is detailed in a separate guideline (Appendix E).

Threatened species covered by other conservation strategies

Several rare or threatened species recorded for the Midlands FMA do not occur within forest areas (being mostly species of the basalt plains grasslands). These are not dealt with in this Plan but their conservation requirements will be addressed through a variety of other NRE planning processes. Another group of threatened species occur in the FMA which are associated with forests or woodlands but are not treated specifically in this Plan because:

- their continued presence in the FMA is uncertain or unlikely, or the location of Midlands populations is unknown
- knowledge of their biological or ecological requirements is not sufficient for development of conservation strategies
- they are considered largely insensitive to forest management operations
- no specific management action could be developed.

Species in this category are listed in Table 6. The measures taken to maintain overall biodiversity, such as ecosystem reservation and establishment of linear reserves will contribute to their conservation. Additional information may become available as wildlife survey data is improved and as FFG Action Statements are developed (where relevant). As an interim measure, any populations discovered will be included in the SMZ where harvesting will be deferred until management prescriptions can be determined.

Table 6. Threatened forest wildlife not subject to specific management strategies

Species	Conservation Status	Comments
Mountain Dragon *Tympanocryptis diemensis*	Insufficiently known	Occurs in rocky, dry forests
Four-toed Skink *Hemiergis peronii*	Insufficiently known	Occurs in dry heathlands
Samphire Skink *Morethia adelaidensis*	Rare	Last recorded in 1963. Occurs in dry chenopod shrublands
Woodland Blind Snake *Ramphotyphlops proximus*	Rare	Only two Midlands FMA records. Soil compaction considered to be a major threat.
Spotted Galaxias *Galaxius truttaceaus*	Rare	Recorded only once in the Midlands FMA

Chapter 4
TIMBER PRODUCTION

The history of timber utilisation from the forests of the Midlands FMA began with the gold rush around the 1850s. Currently, State forest in the Midlands FMA contributes about 8% of Victoria's annual production of hardwood sawlogs and a similar proportion of residual logs. Residual logs (which include pulpwood logs) and firewood are produced as by-products of sawlog harvesting and regrowth management operations. A high proportion of the sawlogs produced are sent to value-adding sawmills. Information supplied by the Victorian Association of Forest Industries indicates that, within the FMA, the industry directly employs over 450 people, has a capital investment of over $60 million, produces goods to an annual value of more than $55 million and contributes about $30 million annually to the local economy. Further information about the history of forest management and utilisation is provided in the *Statement of Resources Uses and Values, Part 2 – Timber Resources* (Tange 1995a).

The impacts of a long history of utilisation, and a number of environmental factors, are strong influences on timber production in the FMA.

- The very intensive utilisation of the Wombat State forest in the late nineteenth century means that the age-class distribution of the forest is uneven. Most areas of the forest are either mature (about 100 years old) or young regrowth arising from the introduction of even-aged harvesting systems in the mid-1970s.
- Large fires during the last thirty years, most notably in the Wombat State Forest around Barkstead and East Trentham and in the Enfield State Forest have created large areas of dense regrowth which are exhibiting unsatisfactory growth rates.
- Extensive thinning was undertaken in the Wombat and Mount Cole State Forests during the 1950s and 1960s.
- The introduction of the shelterwood system in the Wombat State Forest in 1973 enabled the establishment of areas of regrowth for harvesting in future rotations.
- Severe outbreaks of *Armillaria luteobubalina* in the Mount Cole State Forest restrict the type of harvesting and regeneration systems that can be used in this forest.
- Proclamation of the *Forests (Timber Harvesting) Act* 1990 related the permitted level of sawlog harvesting from each Forest Management Area to the sustainable yield of those Areas.
- The establishment of a large hardboard manufacturing facility in Bacchus Marsh during the 1960s has enabled the harvest and utilisation of residual logs.
- The introduction of integrated sawlog and residual log harvesting in 1990 has improved the efficiency of harvesting and regeneration operations.

These circumstances, and current policies which give strong support to value-adding utilisation of timber resources and a fully commercial approach to NRE's management of production forest, are major influences on this Plan. The Plan confirms the suitability of current harvesting and regeneration methods and introduces an extensive program of post-fire and harvesting regrowth management to ensure forest productivity is optimised. A reduction in harvesting levels and careful choice of the type and age of forest for harvesting will gradually overcome the unbalanced age-class distribution of the forest and secure a sustainable supply of sawlogs into the future. Implementation of these strategies will ensure resource security and provide for the development and growth of a sustainable timber industry.

4.1 HARDWOOD TIMBER SUPPLY

The long-term goal of forest management is to optimise sawlog supplies with the range of other environmental and community requirements. Hardwood logs are harvested from the net productive area of the General Management and Special Management Zones (GMZ and SMZ) (described in Chapter 2). Optimisation of supplies from the net productive area is achieved by:

- adopting best-practice harvesting and regeneration systems
- ensuring adequate regeneration of harvested areas
- adopting mechanisms (such as thinning or fertilisation) to enhance sawlog yield within economic and environmental constraints
- protecting forests from damage through factors such as wildfire, disease and insect attack.

Logs harvested from the FMA are utilised in several ways.

- High grade sawlogs are sawn into boards and kiln-dried for the furniture, cabinet-making and building industries, and other uses requiring stable timbers with minimal defect. Sawmills in the Midlands FMA are among the leading value-adding processors in Victoria, taking advantage of the relatively high proportion of high-grade sawlogs harvested from the FMA.
- Lower grade sawlogs are chiefly sawn into material for house framing and other general construction purposes.
- Residual logs are produced as a by-product of sawlog harvesting operations, include those low-quality logs suitable for conversion into woodchips or sawn products, but which do not form part of the sawlog sustainable yield. They are utilised for a variety of products such as pallets, fence palings or tomato stakes where short lengths can be used and the appearance and strength of the timber is less important. Residual logs may also be used to produce woodchips for conversion into hardboard or exported for the subsequent manufacture of high quality paper products.

Aims

Optimise the sustainable supply of sawlogs consistent with environmental constraints, timber industry market conditions, the structure of the forest and the impacts of fire, disease, insects and storm damage.

Meet sawlog and residual log licence and legislated commitments.

Ensure that NRE's involvement in the management of production forest is efficient and profitable and has regard for the need to invest in the future productivity of the forests.

Maximise utilisation of sawlogs from timber-harvesting operations while continuing to provide other timber products.

Progress towards an even distribution of age classes in the net productive area by the end of the current rotation.

Net productive area

The area of forest both suitable and available for sawlog production, once exclusions are made for the *Code of Forest Practices for Timber Production* (the *Code*), SPZ, and land of low inherent productivity, is defined as the net productive area.

The net productive area in the FMA, on implementation of the strategies in this Plan, amounts to 50 150 ha, or 22% of the extent of public land, and comprises the timber-production sub-zones of both the GMZ and the SMZ.

Sustainable sawlog supply

Sustainable yield is the estimated rate of harvesting that can be maintained for a given period without impairing the long-term productivity of the land, taking into account the structure and condition of the forest. The sustainable yield of sawlogs from each of the 15 FMAs in Victoria is listed in a schedule under the *Forests Act* 1958 as amended by the *Forests (Timber Harvesting) Act* 1990. For the Midlands FMA, the scheduled sustainable yield rate is 70 000 m^3 of A, B and C grade sawlogs a year (current sawlog licences total 70 400 m^3 of A, B C and D grade sawlogs per year).

Under the legislation, sustainable yields are to be reviewed:

- every five years
- when significant change in the available sawlog resource occurs
- at any time the Minister considers appropriate.

The first review of sawlog sustainable yield was due in 1996. In line with this, NRE undertook a comprehensive review of the sustainable yield in the FMA, taking into account the forest management zoning scheme and management strategies set out in this Plan. The report *Review of Sustainable Sawlog Yield – Midlands Forest Management Area* (CNR 1995a) describes the review process. Similar reviews will be undertaken during the life of this Plan.

Work for the recent review began in 1993, following refined mapping and assessment of State forest. Major steps in the review included:

- collection of additional growth information and the development of growth models for various management options
- studies to compare assessed sawlog volumes with the volumes actually harvested
- incorporation of the impacts of factors such as the likelihood of major wildfire, limits on the proportion of smaller State forest areas that can be harvested over a short period, the suppression of regeneration by the retained trees under the shelterwood system, and slow growth of the regeneration in the Barkstead and East Trentham fire areas
- modelling a range of options incorporating the proposed forest zoning scheme prepared for this Plan with the aim of optimising sawlog sustainable yield.

The review made a number of observations:

- the regrowth management program detailed in this Plan contributes an additional 6900 m^3 per year to the sustainable yield above that achievable under the existing silviculture
- the shelterwood system is a better option to use in most of the Wombat State Forest than the seed-tree, clearfell or selection systems and contributes some 3600 m^3 per year more to the sawlog sustainable yield than would be achieved by the next best option
- the forest management zoning scheme reduces sawlog sustainable yield by 900 m^3 per year.

Some additional results from the review are included in Appendix N.

The report, which was independently reviewed, recommended that the sustainable yield for the Midlands FMA be 58 000 m^3 per year of A, B, C and D grade sawlogs subject to implementation of the program of silvicultural operations outlined in the review and detailed in this Plan. The forest management zoning scheme has been adjusted as a result submissions to the Proposed Plan. The adjustment comprises forest areas added to and removed from the SPZ. Overall, the net productive area is reduced by 300 ha, to 50 150 ha. As most of the reduction comprises forest of low sawlog productivity, the combined effect of the changes is considered to have little impact on the forecast sawlog sustainable yield.

Future supply strategy

Under Section 52B of the *Forests Act* 1958, the Secretary, in determining short-term hardwood sawlog supply levels, must consider:

- the need for significant changes in levels to be implemented over the timber supply period, rather than at one time
- the need to minimise as much as possible any adverse social or economic impact of significant changes in levels.

In view of this requirement, provision has been made in the forecasts for the following.

- Continuation of the current A, B, C and D grade sawlog availability of 70 400 m^3 per year to 30 June 1996.
- A phase-down from that current level to the new sustainable yield over a five-year period starting from 1 July 1996.

Based on the recommended management strategies, methods for treating the probable growth losses from wildfire, adherence to the A, B, C and D grade sawlog standard, and the phase-down of sawlog harvesting over a five-year period from 1 July 1996, the forecast sustainable yield is 58 000 m^3 per year.

Residual logs

Wood made available to industry as residual logs comes from trees (or parts of trees) remaining after the sawlogs have been removed, and which are either too small or too defective to meet current sawlog specifications. Industry demand for this material varies with market demand for the end product. Surveys in the FMA indicate that, at present, about 30% of the total volume of residual log available on logging coupes remains after completion of harvesting operations.

Generally, the residual logs purchased by sawmills are sawn to produce low-quality timber products such as shipping pallets or fence palings. More than 90% of the total volume of residual logs harvested in the FMA is utilised by two companies: CSR Wood Products whose factory was established in 1961 at Bacchus Marsh, and which derives all of its wood resource from the Midlands FMA to manufacture hardboard (a reconstituted wood product); and Midway Wood Products at Geelong, which converts logs and sawmill residue (from several FMAs) not required for domestic processing, into woodchips for export.

The volume of sawlogs that can be harvested from a coupe, compared to the available volume of residual logs, generally increases with an increase in the productivity of the forest. By selecting specific forest areas for harvesting, it is possible to meet annual sawlog commitments while varying the volume of residual logs produced to meet fluctuating demand. The review of sustainable yield indicates that the sawlog to residual log ratio ranges from 1:1.5 in the medium- to high-productive mature forest to 1:8 in the 1983 East Trentham fire area (CNR 1995a).

The existence of a strong market for residual logs is an important aid to silvicultural activities. It enables full utilisation and cost-effective regeneration of stands which have been damaged or degraded by fire or past utilisation practices and which, as a result, carry a large proportion of lower-grade log products. Subsequent thinning operations are also able to be carried out more efficiently. Waste residual log greater than 100 tonnes per ha on the forest floor can significantly hamper future thinning operations. Future silvicultural options are maximised when post-harvest waste levels are less than 50 tonnes per ha.

The *Forests (Pulpwood Agreement) Act* 1959 provides for the annual supply of 70 000 tonnes (about 62 300 m^3) of residual log to CSR Wood Products Limited until 2009. Residual logs are made available to other licensees based on the amount estimated to be available in excess of that required under the legislated agreement. During the period 1989/90 to 1993/94, annual residual log production averaged 68 000 m^3. In 1994/95 the total annual volume reached 97 700 m^3. Evaluation of the volume of wood that will be available as by-products of the sawlog harvesting and stand treatment works under the revised sustainable yield volumes will determine how much will become available as residual logs. Under the recommended sawlog sustainable yield of 58 000 m^3 per year, residual log availability will be at least 91 000 m^3 per year (CNR 1995a). It is expected that additional volumes of residual log may become available through thinning and improved utilisation technologies and methods. In any given year, the actual volume will depend on the ratio of sawlog to residual log for the forest harvested; and the amount produced is determined by the availability of markets for very low quality logs.

Residual log users are dependent on a steady flow of logs throughout the year. Seasonal or temporary suspensions of harvesting operations, which interrupt the flow of logs, are overcome by stockpiling within State forest, close to the current operations, or at processing plants. State forest stockpiles are located and designed with good road access, protection from fire and with good drainage. They normally contain up to about 2000 m^3 of residual logs. In the forest, the stockpiles are normally located in cleared areas, such as log landings established during the first shelterwood harvest (which remain available until the second shelterwood harvest) or in clear-felled areas (until regeneration operations are undertaken). Good management of stockpiles is important to ensure environmental values are protected and NRE's financial interests in the timber are not compromised. The environmental requirements for the management of stockpiles are set out in the *Code*.

ACTIONS

Encourage the development of new value-added markets for residual logs.

Maintain markets to ensure full utilisation of residual logs from sawlog production operations

Permit the use of stockpiling to assist licensees to maintain wood flows during wet weather and seasonal closures. Formalise responsibility for the management of stockpiles to ensure a legal basis for the application of the Timber Harvesting Regulations *(1989).*

Maximise the number of coupes where the post-harvest waste-wood levels are less than 50 tonnes per hectare.

Direct residual log licensees to those coupes in which the removal of residual material will confer the maximum silvicultural advantage.

4.2 HARVESTING AND REGENERATION SYSTEMS

Successful harvesting and regeneration systems are those that:

- ensure adequate regeneration of the correct species mix
- obtain good growth
- maximise sawlog yield
- minimise environmental impact
- incorporate social and economic considerations
- protect regeneration from significant levels of damage from factors such as browsing and disease.

Guiding principles for the application of harvesting and regeneration systems in State forest are set out in the *Code*. Clear-fell, seed-tree and shelterwood systems produce stands in which all the trees are of a similar age. These even-aged systems are the predominant ones used in the mixed-species forests of the Midlands FMA. They were introduced in the 1970s after studies showed that, under the previous selection systems, the amount and growth of regeneration was poor and only the mature trees were growing well. It was also found that the selection system in mixed species forests favours peppermint regeneration over Messmate, with undesirable ecological and silvicultural consequences.

Adequate regeneration of the required type is fundamental to sustainable timber production. Analysis of regeneration survey data shows that almost all (96%) of the coupes harvested in the FMA between 1989 and 1993 were successfully regenerated (Murphy and Fagg 1996). The amount of ground suitable for seeds to germinate and develop (the seedbed) is a critical factor in whether regeneration operations are successful. The common methods of site preparation for regeneration such as the use of fire and/or mechanical disturbance, maximise the potential for regeneration success by ensuring seed-bed conditions are suitable for seedling germination and growth.

Failure to apply sound harvesting and regeneration practices leads to a decline in forest productivity. Some forest areas in the FMA, because of their history of wildfire or poor harvesting and regeneration methods, are degraded and require specific management action to realise their potential for timber production.

Aims

Maintain or improve the sawlog-productive capacity of the forest through the use of environmentally and economically sound harvesting and regeneration systems.

Restore the health and productivity of degraded forest areas.

Application of shelterwood, seed-tree and clear-fell systems

Shelterwood, seed-tree and clear-fell harvesting and regeneration systems will continue to be the main methods used in the Midlands FMA. Kellas *et al* (1994) reviewed the shelterwood system and concluded that there was no overwhelming silvicultural evidence for abandoning the system, but that other even-aged harvesting and regeneration systems such as clearfell or seed-tree could also be used. The choice between these systems will be based on social, environmental and economic considerations for each area harvested.

The shelterwood system incorporates two commercial harvests. A proportion of the trees containing sawlogs remains after the first shelterwood harvest and current practice is to harvest these after about 15 years. This provides two major benefits:

- it provides an abundant source of seed for regeneration
- it provides for regeneration of the whole coupe while allowing for continued, rapid growth of the highest quality trees on the coupe, which in turn contributes to a higher sustainable yield than would be possible under the clearfell system.

The maximum size of coupes under the shelterwood system has generally been about 120 ha, although, in recent years, first-cut coupes have been around 60 ha. The *Code* does not restrict the size of shelterwood coupes but requires them to be managed within the limits of forest type, stand condition and other relevant environmental factors. Following the second harvest, shelterwood coupes have many of the characteristics of a clear-felled area of a similar age. Accordingly, this Plan limits the maximum area for new shelterwood coupes to 40 ha, bringing them into line with the limit established by the *Code* for seed-tree and clear-fell coupes.

Regeneration operations usually provide adequate initial stocking with seedlings (in accordance with NRE prescriptions). However, the numbers of seedlings on some coupes have been reduced to unsatisfactory levels due to excessive browsing by wallabies and, to a lesser extent, deer and rabbits. This problem is particularly severe in the Mount Cole and Cobaw State Forests. Re-treatment of these areas includes mechanical soil disturbance, fencing and sowing of seed, combined with the control of wallaby populations in the immediate vicinity of fenced areas. In the Mount Cole State Forest, fences are now routinely erected around those coupes where there is a high risk of browsing damage.

Seedbed preparation

Generally, the distribution and amount of receptive seedbed across a coupe, the seed supply, and the level of competition from other species determine whether regeneration will establish successfully. A receptive seedbed can comprise either mechanically-disturbed soil (such as that provided by harvesting equipment during logging) or an ash bed (produced by burning the heads of trees and waste wood remaining after harvesting). Retreatment of inadequately stocked regeneration areas may involve mechanical disturbance of the soil surface (through ripping or root-raking) to recreate the required seed-bed.

Burning provides a good distribution of receptive seedbed across the coupe. It significantly reduces the fire hazard, reduces competition between eucalypt seedlings and other plants remaining in the coupe, and is a cheap and efficient means of providing a suitable seedbed. However, compared to mechanical disturbance, it may result in higher levels of nutrient loss from the site and damage to retained trees. In the Midlands FMA, the regeneration burn is now delayed for at least 12 months after the first shelterwood harvest. The amount of combustible fine fuels remaining after harvesting diminishes during this delay and hence fire intensity is reduced. The potential for damage to the retained trees is therefore minimised.

GUIDELINES FOR THE CHOICE AND APPLICATION OF HARVESTING AND REGENERATION SYSTEMS

Choice

The system (selection, clearfell, seed-tree or shelterwood) or combination of systems chosen for a particular coupe should take account of the characteristics of the forest stand and of other values in the area.

Use of the selection system for sawlog production in areas of the SMZ should only occur where the purpose of management of the zone requires a method of harvesting that minimises landscape impacts, and where the costs of poor regeneration can be justified by the protection of other values in the zone.

Clearfell should only be applied where there is a high risk of an outbreak of *Armillaria luteobubalina* or for salvage following wildfire.

Seed-tree systems should be applied where:

- only one economic harvest can occur (generally in stands with a dominant tree height of between 24 m and 28 m)
- trees carrying adequate seed store in their crowns can be retained at the required spacing.

Clearfell and seed-tree should be the main systems used in the Mount Cole State Forest to minimise the impact of *A. luteobubalina*.

Shelterwood systems should be used in forest stands where:

- two economic harvests can occur (generally fully-stocked stands where the dominant tree height is greater than 28 m)
- sawlog trees of a suitable size and form and capable of an enhanced rate of growth, can be retained.

Application

For seed-tree and shelterwood systems, an assessment of the amount of seed being carried by the trees should be undertaken prior to harvesting to determine if it is satisfactory. If it is not, supplementary seed will need to be collected and applied to assist regeneration.

Regeneration operations, particularly seedbed preparation, should take advantage of the peak in natural seed fall which, for Messmate, occurs in mid- to late-autumn.

The intensity of the regeneration burns should be managed to contribute to the establishment of regeneration while minimising the damage to retained trees.

Regeneration burns following the first shelterwood harvest should be conducted:

- between 12 and 24 months after the completion of sawlog harvesting (allowing time for any firewood harvesting that may be scheduled for the coupe)
- if a pre-burn assessment indicates that the number and distribution of seedlings is inadequate, or
- if burning is required to meet fire protection objectives.

During the first shelterwood harvest and subsequent regeneration operations damage to the retained trees should be kept within acceptable limits.

GUIDELINES FOR THE CHOICE AND APPLICATION OF HARVESTING AND REGENERATION SYSTEMS (continued)

Under the shelterwood system, the second harvest should generally be undertaken about ten years after the first shelterwood harvest. Retention of trees for longer than this may occur where other management objectives take precedence, such as landscape, water, flora or fauna values. Removal of the retained trees at less than ten years may occur as a salvage operation in cases where tree death or crown loss (through factors such as wind or fire) is widespread across the coupe.

ACTIONS

Apply even-aged harvesting and regeneration systems to the net productive area in accordance with the Guidelines for the Choice and Application of Harvesting and Regeneration Systems.

Limit the area of shelterwood one coupes, and continue to limit the area of seed-tree and clear-fell coupes, to 40 ha. Space coupes in accordance with the requirements established by the Code.

Protect regeneration from excessive browsing by native and introduced animals

Application of alternative harvesting and regeneration systems

Alternative silvicultural systems, such as group or single-tree selection, may be applied under special circumstances, such as:

- in areas with specific flora, fauna, landscape, water or other values which limit the application of even-aged systems – these areas will be included in the Special Management Zone
- in box–ironbark or mixed-species forests in which most of the current harvesting is to provide non-sawlog forest produce, such as firewood, posts and poles, and where the silvical characteristics of the forest type permits the establishment and growth of regeneration in small gaps.

ACTIONS

Use alternative harvesting and regeneration systems:

- *where values other than timber production (such as landscape values) must be maintained, or*
- *where the silvical characteristics of the stand allow for the economic application of alternative techniques and permit the establishment and growth of regeneration.*

Continue to review harvesting and regeneration systems and revise field practices based on research findings.

Low-volume forest management

Low-volume forests are those that produce low volumes of sawlogs under natural conditions. These forests include the Jim Crow Ranges (north-western part of the Wombat State Forest) and the Dunneworthy State Forest, both of which support durable timber species such as Red Box (*Eucalyptus polyanthemos*), Red Ironbark (*E. tricarpa*), Yellow Box (*E. melliodora*), Red Stringybark (*E. macrorhyncha* ssp *macrorhyncha*) and Grey Box (*E. microcarpa*). A combination of grazing and limited control over selective felling in the past has reduced timber values in these forests and may have altered their species composition.

Little harvesting currently takes place in the Jim Crow Ranges due to the limited number of trees of sizes and species suitable for firewood, posts or poles. Harvesting to produce green firewood in the Dunneworthy State Forest is currently limited to Departmental felling for domestic licensees or felling by commercial licensees. Assessment of these areas will be undertaken as a part of the Statewide Forest Resource Inventory (SFRI) (a program of forest mapping and timber assessment).

These durable-species forests have the potential to produce low but continuing volumes of specialist hardwood timbers and future management activities will be directed to realising that potential.

GUIDELINES FOR LOW-VOLUME FOREST MANAGEMENT

Selection, seed-tree or coppice-based systems should be applied and herbicide treatment of coppiced stumps may be used to promote seedling regeneration.

Timber harvesting should be scheduled in areas:

- with an adequate seed store in the tree crowns
- where fuel-reduction burning is planned (to reduce the cost of the regeneration operation).

ACTIONS

Restore and maintain the productivity of low-volume forests through harvesting and regeneration systems consistent with the guidelines above.

Encourage the best use of the timber harvested by favouring the sale of wood to speciality timber markets.

Rehabilitation of degraded forests

Degraded forests are those with the potential to produce commercial volumes of timber, but which currently carry low volumes of sawlogs as a result of a history of limited control over selective fellings for mining timbers and firewood, grazing by domestic stock, or wildfire damage. Details of their location and extent will become evident from SFRI. Management will seek to promote sawlog productivity and restore diversity.

Since the 1940s, five large wildfires in the Enfield State Forest have burnt most of the forest at least twice, and some areas four times, substantially degrading timber resource values. The largest of these fires occurred in 1995. As a result, salvage harvesting may be required in the areas of mature forest which do not recover from the fire. Salvage harvesting is similar to clearfell and, if carried out on a large scale in some of the smaller areas of State forest in the FMA, has the potential to reduce the structural diversity of the forest.

Several parts of the Midlands forests comprise coppice regrowth on decaying stumps which have often already provided at least two previous crops. Utilisation is revealing that decay has spread into the coppice stems, leading to substantial reduction in the volume and grade of sawlogs harvested. The seed-tree system and/or the selective removal of coppice stems is now being used in these areas. The seed-tree system provides for a high proportion of regeneration originating from seed. This proportion can be further increased by treating the cut stumps, at the time of harvesting, with herbicide. Subsequently, stems which regenerate from coppice may be removed through pre-commercial or commercial thinning operations.

GUIDELINES FOR SALVAGE HARVESTING AND REGENERATION FOLLOWING WILDFIRE

Formal salvage harvesting and regeneration programs should be prepared where a wildfire has burnt large areas (typically more than 1000 ha) of State forest and should address:

- maintenance of the structural diversity (see Section 3.1 Ecosystem Diversity) of the forest as a whole
- the potential for part or all of the burnt area to recover adequately
- priorities for harvesting the resource within the burnt area
- spacing and timing of harvesting operations
- re-establishment of young forest killed by the fire where the seed source is limited by low numbers or absence of mature trees
- the thinning of coppice in regenerated stands.

ACTIONS

On identification of degraded forests, restore their productivity by appropriate techniques, particularly those which encourage seedling regrowth.

Prepare salvage harvesting and regeneration programs in accordance with the guidelines above.

4.3 REGROWTH MANAGEMENT

Maximising future sawlog production from young forests with the potential for high productivity requires an intensive management program that:

- minimises competition for light, water and nutrients created by any non-merchantable trees in stands
- maintains stands, throughout all stages of their development, at stocking levels that optimise growth of high-quality sawlogs.

Achieving these conditions requires careful monitoring of regrowth stands and, where necessary, thinning of regrowth and the removal of overwood trees that are not required for habitat purposes. Maximum benefit will be attained by focusing on areas which have the greatest potential for sawlog production. These areas include both post-harvest regrowth and regrowth originating from fire. Detailed prescriptions and close supervision are integral parts of thinning operations to protect retained trees from damage.

The majority of the net productive area within the Midlands FMA is either regrowth forest less than 20 years old, or mature forest resulting from utilisation during the last century. The only areas of regrowth greater than 20 years old resulted from the 1950s' wildfires around Barkstead in the Wombat State Forest, and from harvesting in the Mount Cole State Forest. Because of this age structure, limited opportunities exist for thinning operations which can produce commercial quantities of small sawlogs and residual logs. Extensive commercial thinning is unlikely to occur until about 2015, when the current young regrowth forests are over 40 years old. Pre-commercial thinning may be possible within the Mount Cole State Forest but the presence of *Armillaria* will severely restrict the opportunities for commercial thinning because it may infect retained trees that are damaged during the operation.

For the next ten years the major focus for regrowth management in the Midlands FMA will be pre-commercial thinning of the young regrowth and restoring the productivity of the fire-affected areas. Implementation of these programs is a critical step in maintaining sustainable yield in the FMA.

Aims

Maintain or improve the sawlog productive capacity of the forest through the use of regrowth management techniques that are economically, technically and environmentally sound.

Increase the future proportion of high grade (currently A or B grade) sawlogs in the forest to facilitate value-adding by the timber industry.

Pre-commercial thinning and fertilising

Pre-commercial operations in young regrowth are targeted at the more productive areas and involve treatments which:

- retain the trees with the greatest potential to produce high grade sawlogs
- create the correct stocking so that growth on the retained trees is enhanced, but that sufficient competition exists between them to encourage continued height growth and minimal branching
- restore nutrient levels in areas affected by wildfire.

Almost all of the 30 700 ha of medium to highly sawlog-productive stands in the Midlands FMA is in the Wombat and Mount Cole State Forests. Of this, about 10 000 ha (see Appendix F) is regrowth at an age suitable for pre-commercial thinning or will move into this category over the next ten years. Assessments are required to accurately locate and determine the density of trees in these areas, but it is estimated that only about half of the total area will require treatment, as some will already carry the desired density and others stands may be too small or isolated to treat.

Additionally, the wildfires around East Trentham and Barkstead have resulted in about 5000 ha and 700 ha respectively of regeneration. Parts of these areas are considered to be carrying an excessive density of regrowth or retained overwood; they may also suffer from reduced nitrogen levels in the soil. The recovery of soil nitrogen levels may be linked to the level of regeneration in legume (e.g. wattle) species following fire (Tolhurst and Flinn 1992). These factors can reduce future sawlog production from the affected stand and intensive management will be required to return these areas to their potential.

In 1994, experimental trials were established in the Wombat State Forest to determine optimum treatments of regrowth, and to quantify the additional sawlog productivity that results from thinning and fertilisation of mixed-species forests. Preliminary results from these trials will not be available for up to three years. Studies in other native forest types in Victoria show substantial increases in growth as a result of these treatments. Studies will be initiated to quantify and mitigate threats to native forest values from fertilisation. Proposals for fertilisation at an operational scale will only proceed if all relevant potential environmental impacts have been addressed.

The general extent and condition of regrowth has been determined in recent broad-scale forest assessments. Further inventory work is required as the basis for operational planning.

GUIDELINES FOR REGROWTH MANAGEMENT

Pre-commercial thinning should be targeted at stands in the medium- to high-productivity forests to maximise the future growth of sawlogs, and in wildfire-affected areas to restore their productivity. Consideration should be given to the economic costs and benefits of such operations. Thinning areas should be included in the wood utilisation planning process.

Regrowth management operations should be conducted to ensure that damage to retained trees is kept within acceptable limits. Understorey species should be retained unless they contribute a high proportion of the stand stocking and are considered to have a significant competitive effect.

Regrowth thinning operations should be conducted in areas dispersed across the forest to reduce the concentration of areas with high fire hazard and to protect against the loss of thinned areas from a single wildfire.

Commercial thinning treatment should be directed to stands that:

- maximise the growth of sawlogs (younger stands should be preferred over older stands, for instance)
- allow a properly conducted operation which will minimise damage to retained trees
- are close to markets for other forest produce
- minimise timber harvesting costs.

ACTIONS

Revise existing thinning prescriptions based on research results and operational trials relevant to the Midlands FMA.

As the basis for operational planning of the thinning program, assess regrowth areas to determine the:

- *location and density of trees in moderate to high productivity sites*
- *density of regeneration in the area burnt by the Barkstead fire*
- *overwood levels and current density of regeneration in the East Trentham fire areas.*

Conduct pre-commercial thinning operations at a rate of approximately:

- *400 ha per year in the moderate to high productivity forest across the FMA*
- *300 ha per year in the forest regenerated by the East Trentham and Barkstead wildfires in the Wombat State Forest.*

Initiate research on the use of fertilisers in combination with thinning to enhance the growth of trees and, subject to satisfactory environmental and economic analyses, undertake operational trials in East Trentham and Barkstead fire areas of the Wombat State Forest.

Commercial thinning

Commercial thinning involves selectively harvesting merchantable trees that have little potential to produce large sawlogs, from regrowth stands, to enhance the growth of the remaining sawlog trees as a result of the reduced competition. Generally this occurs at a stage in the development of the stand when economic quantities of residual logs and, in some cases, small sawlogs can be harvested. It permits the salvage of useful wood from trees that might otherwise die through suppression, and provides a financial return early in the life of a stand.

Commercial thinning requires accessible markets and, although a strong market exists for the residual logs harvested as a by-product of sawlog harvesting, additional markets for the residual wood produced by thinning will have to be found.

Generally, only the medium- to high-productivity mixed-species forests in the FMA can be thinned commercially. These operations are usually carried out in stands of between 30 and 50 years of age. Currently, opportunities for commercial thinning are limited, due to the small area that is within the required age range. Forest near the Barkstead fire area is near the required age but its low growth rate means that insufficient commercial quantities of timber can be harvested. Firewood harvesting is used to commercially thin about 40 ha per year across the FMA. In addition, mechanised commercial thinning in the Enfield State Forest, totalling about 60 ha per year, is planned to begin in late 1996.

Large-scale commercial thinning cannot begin in the FMA until about 2015, when the early shelterwood areas become old enough. Sites suitable for commercial thinning are generally those that:

- have a basal area of at least 30 m^2 of regrowth and less than 8 m^2 of overwood per hectare
- have few large logs on the forest floor (that inhibit access)
- occur on slopes less than 18°.

ACTION

Identify areas suitable for commercial thinning and encourage commercial thinning operations.

Overwood removal

The suppressive effect on regeneration and regrowth of trees remaining on a coupe after harvesting (overwood) is well documented. The level of reduction in the sawlog-productive capacity of a forest stand is related to the level of overwood within it. Operations involving the selective removal of mature trees from established stands of regrowth are aimed at releasing the regrowth from competition. The operation does not remove trees required for habitat purposes.

Extensive programs of overwood removal (mainly by ring-barking) took place during the middle part of this century and is one reason for the relatively high productivity of forests in the Midlands FMA today. In 1994/95, about 200 ha was treated in the Mount Cole and Wombat State Forests. Modern techniques of herbicide stem injection have largely replaced ring-barking, bringing efficiency and occupational safety benefits.

Salvage operations immediately following the East Trentham fire only removed trees that would yield predominantly sawlogs. A suitable market did not exist for the residual logs due to the presence of charcoal in the trees. As a result, high densities of overwood trees remain in parts of the fire-affected area. The amount of charcoal has now reduced sufficiently and the opportunity exists for commercial harvesting for residual logs.

GUIDELINES FOR THE MANAGEMENT OF OVERWOOD

Suppressive overwood, including seed-trees, should be removed provided:

- it is not required for other management purposes (such as habitat trees)
- the basal area of overwood is greater than 4 m^2 per ha over a five-hectare area
- the forest is capable of producing commercial quantities of sawlogs.

ACTIONS

Continue to conduct Departmental overwood removal operations consistent with the guidelines above.

Establish a program of commercial overwood removal in the East Trentham fire area consistent with the guidelines above.

4.4 OTHER TIMBER PRODUCTS

State forests of the FMA are surrounded by several large cities, numerous towns and many farms. This creates demand for a range of timber products other than sawlogs or residual logs, including firewood and farm timbers (post and poles).

Firewood, posts and poles

Substantial quantities of firewood and, to a lesser extent, posts and poles are produced from the Midlands FMA from:

- areas that yield low volumes of sawlogs
- thinning activities
- sawlog harvesting operations (the availability of firewood from this source is well in excess of the current demand).

Harvesting is mainly undertaken by commercial licensees, providing a good measure of control, as the operator must possess a Forest Operator Licence and conform to the *Code.*

Limits have been introduced on the amount of these products that can be harvested from the Pyrenees State Forest. Elsewhere, the current harvesting rates and expected increases in short-term demand are estimated to be well within the productive capacity of the forests. However, levels in these areas have been set (based on Geographic Representation Units – see Chapter 2) prior to a review to refine the sustainable yield for those products.

Aim

Provide opportunities for sustainable supply from State forest of firewood, posts, poles and minor timber products, integrated as far as possible with other forest operations.

Firewood

Most areas of State forest in the FMA produce some firewood. Commercial operators harvest most of the firewood in the FMA, and much of this is able to be supplied as a by-product of other forest operations such as:

- *sawlog harvesting* (currently producing the bulk of the volume) – at the completion of harvesting, coupes are kept open for the collection of firewood from timber felled, but found to be unsuitable for sawlogs and not required for residual logs.
- *pre-commercial and commercial thinning* – considerable volumes of material are, and will continue to be, available from this source
- *stand improvement* – coppice regrowth is being removed from a small number of areas in the FMA to promote seedling regeneration.

Firewood collection is also undertaken by non-commercial cutters, for private use. In 1993/94, the volume of firewood sold from the FMA (to both commercial and non-commercial cutters) totalled more than 25 000 m^3, but considerable additional amounts are believed to be illegally removed. To date, ten agencies (such as service stations and milkbars) in various towns throughout the FMA have been authorised to sell firewood permits (in lots of one cubic metre). These agencies operate outside normal Departmental business hours and assist in reducing the illegal removal of firewood by increasing the opportunity for non-commercial cutters to purchase permits.

Under natural conditions in a forest, there is always a certain amount of woody debris on the ground (fallen trees and branch-wood) and a number of large dead standing trees; these are essential components of faunal habitat. Removal of this material, through firewood harvesting, can significantly reduce habitat values. Dispersed harvesting of naturally-fallen timber is unlikely to remove significant amounts of habitat. However, caution must be exercised in areas close to towns, where demand for firewood is high, because, if other sources of wood (such as logging coupes) are not available, almost all of the naturally-fallen timber may be removed.

GUIDELINES FOR THE MANAGEMENT OF FIREWOOD ACTIVITIES

Harvesting of firewood should be targeted at those areas where it has the greatest potential to increase sawlog productivity or assist forest management activities.

Agencies permitted to sell firewood permits should be established in towns in close proximity to State forest.

Maps of current domestic firewood areas should be available at relevant NRE offices and agencies in FMA, and the location of these agencies should be advertised, periodically each year, in local newspapers.

Firewood cutters should be permitted to collect wood only from where other utilisation activities have been undertaken and should not be permitted to harvest dead standing trees or collect naturally fallen wood elsewhere.

Enforcement patrols should be undertaken, especially during peak collection times.

ACTIONS

Provide firewood from timber harvesting or silvicultural operations within the GMZ and, if not inconsistent with management aims, the SMZ.

Continue to arrange for the issue of domestic firewood permits through local retail outlets.

Include areas designated for firewood harvesting on the Wood Utilisation Plan.

Posts and poles

The box/ironbark forests of the Pyrenees State Forest contribute about half of the FMA's total output of posts and poles and are preferred because the timbers they produce are more durable in service. In the mixed-species forests, the peppermints and gums are preferred.

The demand for these timbers from the Pyrenees State Forest has reached a point where limits have been placed on the amount that can be harvested. The commercial cutters who operate in these forests also have allocations from the box–ironbark forests in the adjoining Bendigo FMA. That FMA has been split into six units called 'working circles', and a sustainable yield (for non-sawlog products) is determined for each. The box–ironbark forests of the Pyrenees State Forest are considered a part of one of these working circles.

ACTIONS

Refine the sustainable level of harvest of posts and poles for each geographic representation unit in the FMA (except that the Pyrenees State Forest is considered as part of the Bendigo FMA for this purpose). In the interim, limit the amount harvested to those levels specified in Table 7.

Locate post and pole harvesting operations in areas which will improve the potential for sawlog production.

Include areas designated for post and pole harvesting on the Wood Utilisation PLans.

Table 7. Interim limits on the harvesting of posts and poles in the Midlands FMA

Geographic representation unit	Maximum annual harvest (pieces[1])	Maximum annual harvest (m^3)
Pyrenees–Dunneworthy[2]	25 000	3 750
Mount Cole–Beaufort	3 000	450
Wombat–Creswick	7 000	1 050
Enfield–Brisbane Ranges	10 000	1 500
Geelong[3]	1 000	150

Notes:
1. 'Piece' in this table is defined as a piece of round wood, 2.1 m long by 0.3 m small-end diameter under bark, and is equivalent to 0.15 m^3.
2. Adjustment of the maximum annual harvest levels in this geographic representation unit will occur in conjunction with the Bendigo FMA..
3. This material is harvested from Sugar Gum plantations within the You Yangs Regional Park.

Minor forest produce

A small demand exists for such minor forest products as the seed of eucalypts and understorey species, cut flowers, wood-chop logs and specialty timbers.

Seed, in excess of NRE requirements for regeneration, is sold under the *Forests Act* 1958 to private collectors for commercial and non-commercial purposes. The *Flora and Fauna Guarantee Act* 1988 provides for a permit process to control seed collection from protected species. Departmental guidelines set procedures for the collection of eucalypt seed for commercial, non-commercial and Departmental use.

Specialty timbers comprise:

- non-eucalypt tree species, including Blackwood (*Acacia melanoxylon*) and Cherry Ballart (*Exocarpos cupressiformis*)
- eucalypt species that are not part of the mixed-species sawlog licences, including Red Ironbark, Red Box, Grey Box and River Red Gum (*Eucalyptus camaldulensis*)
- feature material such as burls, fiddle-back and birds-eye grain, which can occur in eucalypts.

Specialty timbers in small quantities occasionally become available during sawlog harvesting and road construction. Timber resource information for the FMA is not precise enough to determine sustainable yields for specialty timbers. It is therefore prudent to consider them as a by-product of sawlog harvesting and to issue short-term licences when the resource becomes available.

Aim

Provide for the opportunistic use of other minor forest produce.

ACTIONS

Consider NRE seed requirements prior to the issue of any seed collection licences.

Direct, as far as practicable, the collection of seed and other minor forest products to those areas affected by timber harvesting, silvicultural or road-construction operations. For other areas, the activities should be conducted in a manner that is compatible with protection of the natural values.

Sell by tender or by licence for small lots, those specialty timbers produced during normal management activities that are surplus to licence commitments.

Chapter 5
STREAMS AND CATCHMENTS

The forested upper slopes of the Great Dividing Range are an important source of domestic and irrigation water for several major cities and towns, and irrigation regions within and outside the Midlands FMA.

Regional water authorities currently provide water to consumers from several catchments in the FMA and apply varying levels of treatment, depending on the nature of the catchment and the requirements of communities being supplied. Any significant reduction in water quality could add to the cost of water supply through either higher levels of treatment or the introduction of treatment where none is currently necessary. Accordingly, maintaining current water quality standards is a high priority for forest management in the FMA.

Available data indicates the quality of surface water in the forested parts of the Midlands FMA catchments is good - it is generally suitable for domestic and industrial consumption without treatment. In-stream declines in water quality can usually be attributed to agricultural or urban land uses on freehold land downstream of the forested upper catchments. The water quality of urban supplies drawn from catchments with mixed land use is influenced by all land uses in the catchment.

Catchment yield is also an important consideration in water supply. The *Code* addresses water yield protection through the requirement for selection of appropriate rotation lengths and silvicultural techniques aimed at maintaining yield at an acceptable level. Reduced catchment yield may require the construction of expensive additional storages. In the Midlands FMA, State forest comprises largely mixed eucalypt species, and annual rainfall rarely exceeds 1000 mm. In this forest type, post-harvest or post-fire water yield depressions of the magnitude observed in the tall, wet forests east of Melbourne, are considered unlikely.

A study of streamflow records recently undertaken in the Lerderderg catchment (O'Shaughnessy *et al* 1995) did not detect any yield depletion over the previous 20 years, despite the presence of timber production activities in most of the catchment. Adjacent catchments in the Wombat Forest, including those of the Loddon, Campaspe and Moorabool Rivers, have similar rainfall, geology, soils, forest types and forest management practices. Measurable yield depletions are also unlikely in these catchments. Nevertheless, flow patterns in small catchments may be altered if a substantial portion of a catchment is harvested or burnt by wildfire, even if total annual flow is unaffected.

Maintaining water quality and yield are important issues for environmental reasons as well as for water supply. Many native aquatic fauna are sensitive to alterations in water quality. The relatively undisturbed stream environments in forests are important refuges for these flora and fauna species and communities. Maintaining water quality is therefore an important factor in maintaining forest biodiversity.

The LCC recognised the special value of two rivers in State forest in the Midlands FMA in its Rivers and Streams Special Investigation (LCC 1991). The Lerderderg River was identified as a Heritage River and the Moorabool as a Representative River. The National Parks Service is coordinating the development of a Management Plan for the Lerderderg River. NRE manages public land adjacent to the Moorabool River consistent with the recommendations of the LCC report.

Although the majority of water used for domestic and irrigation purposes is obtained from surface water, groundwater is an important secondary source in the FMA. Groundwater in the form of mineral springs is a major feature of tourism in the Daylesford district.

Details of Midlands FMA water resources, including a description of water supply catchments, water distribution systems and water quality and yield data, are included in Maclean (1995b).

Aims

Ensure that in State forest:

- *in-stream water quality meets State Environment Protection Policy standards for current and likely future urban and rural water supply uses*
- *in-stream water quality within State forest is suitable for naturally-occurring populations of aquatic flora and fauna.*

Ensure that groundwater uses and values are not adversely affected as a consequence of the management of State forest on recharge areas.

5.1 CODE OF FOREST PRACTICES REQUIREMENTS

The *Code of Forest Practices for Timber Production* (*Code*) sets minimum standards for environmental protection. The continued application of the basic standards established by the *Code* provides an appropriate level of water quality protection in the General Management Zone.

The *Code* contains a number of measures aimed at protecting water quality. These include:

- the retention of riparian and other vegetation within 20 m of a permanent stream (streamside reserve)
- the retention of riparian and other vegetation within 20 m or other greater approved distance from permanent springs, swampy ground and bodies of standing water
- the retention of a filter strip at least 5 m wide on either side of temporary streams and drainage lines.

Further, the *Code* requires harvesting and carting to be suspended during periods of wet weather, and the general application of a maximum slope limit of 30° for harvesting operations.

Other *Code* requirements addressing road and track design and maintenance standards, and the siting and management of log landings and log dumps also help to ensure water quality in forest catchments is maintained.

These standards may be extended (in favour of increased protection for the environment) through FMA harvesting prescriptions or through the judgement of NRE Forest Officers while developing coupe plans.

ACTIONS

Include prescriptions for the protection of water quality in the General Management Zone, as part of the Midlands Timber Harvesting Prescriptions, based on the minimum standards established by the Code of Forest Practices for Timber Production.

Ensure standard levels of protection are extended in the development of coupe plans where:

- *steep slopes occur within the coupe*
- *erosion-prone soils occur within the coupe*
- *operations are scheduled during winter or other periods of wet weather*
- *any other local conditions warrant an extension of standard prescriptions.*

5.2 SPECIAL WATER SUPPLY CATCHMENT AREAS

Twenty-four areas in State forest in the Midlands FMA are identified as Special Water Supply Catchment Areas under the *Catchment and Land Protection Act* 1994 (these were referred to as Proclaimed Catchments under the now-repealed *Soil Conservation and Land Utilization Act* 1958).

These were identified because of their significance as water supply catchments. They vary widely in area, in the range of land uses, in soil and land-form characteristics and in the uses made of the water harvested from them. For example, Troy Reservoir Catchment is 40 ha in extent, entirely forested and provides water solely for domestic use in Beaufort. The Wimmera River Catchment amounts to 166 850 ha within the Midlands FMA, is largely used for agriculture, and the water harvested is used for stock and domestic purposes throughout western and north-western Victoria. Because of these wide variations, Special Water Supply Catchment Areas do not provide a suitable basis for strategic forest management planning. Accordingly, unless they have particular features that merit special measures (detailed below), they will be managed as part of the General Management Zone, subject to the standard prescriptions and *Code* requirements.

Special Area Plans

Special Water Supply Catchment Areas are the basis for Special Area Plans which specify how particular land management issues in the Special Water Supply Area must be addressed. Land Use Determinations and Land Use Notices prepared for Proclaimed Catchments become Special Area Plans under the *Catchment and Land Protection Act* 1994. The Minister for Natural Resources and the Department of Natural Resources and Environment must have regard to any Special Area Plan applying to land under their control.

Special Area Plans affect State forest management in five Special Water Supply Catchment Areas in the FMA, these are listed in Table 8. The format and content of these plans vary. The requirements they establish for State forest management are summarised in Table 8. The only catchment where the specific requirements of a Special Area Plan differs from the requirements of the *Code* is the Lake Merrimu catchment. Here, a 20-metre streamside reserve is required for all streams and watercourses. The *Code* requires the retention of 5-metre filter strips on both sides of temporary streams and drainage lines.

ACTIONS

Apply in the Lake Merrimu Catchment, the specified streamside reserves contained in the Lake Merrimu Special Area Plan, in addition to any soil and water management prescriptions required under the Code of Forest Practices for Timber Production *or elsewhere in this Plan.*

Consult the Catchment and Land Management Division (of NRE) and relevant Catchment and Land Protection Boards as part of the Wood Utilisation Planning process, if coupes are proposed for scheduling in Special Water Supply Catchment Areas that are subject to a Special Area Plan.

Table 8. Effect of Special Area Plans on State forest management

Catchment	Summary of management requirements specified for State forest
Djeriwarrh Reservoir	Forest operations to take place in accordance with approved* prescriptions
Lal Lal Lake Environs (Bungal Dam)	Prior approval* is required for the burning or clearing of forest or scrub land
Malakoff Creek	Forest operations to be in accordance with approved* management guidelines
Rosslynne Reservoir	Forest operations are to be in accordance with forest management prescriptions
Lake Merrimu	Forestry operations shall be carried out in accordance with approved* management conditions. No tree shall be removed and no soil shall be disturbed within a minimum distance of one chain from the banks of all streams and watercourses without specific approval*.

* Approval in all cases is required from the Soil Conservation Authority. The Secretary of the Department of Natural Resources and Environment is the successor-in-law to the Authority.

5.3 DESIGNATED CATCHMENTS

The basic standards established by the *Code* provide an appropriate level of security for water quality and yield over the majority of the Midlands FMA forests. However, for some catchments, which are used for domestic water supply, and where treatment is minimal, an additional level of security for water supply is warranted.

Catchments in which water quality or yield may be influenced by State forest management operations are considered to be those where State forest comprises a substantial proportion (greater than about one-quarter) of the catchment, or where water storages lie within or adjacent to State forest. In many of these catchments, NRE is the single largest land manager and must meet community expectations of a high standard of management. The 20 catchments in the FMA meeting these criteria are listed in Appendix G and shown on Map 2. These designated catchments have a total area in State forest of 22 200 ha, amounting to about 20% of the total area of State forest in the FMA.

Timber harvesting and other forest uses in designated catchments must be conducted in a way that ensures high levels of security for water yield and quality through the application of special management strategies.

ACTION

Include the designated catchments identified in Appendix G in the Special Management Zone and apply special management strategies aimed at enhancing the security of water quality and yield (outlined in subsequent sections).

Several strategies will be applied to State forest Designated Catchments to enhance the security of water values. These apply in addition to any standards applying in the General Management Zone. They are summarised below.

Seasonal suspension of harvesting operations

Rainfall over most of the Midlands FMA is markedly seasonal with a strong peak experienced during the winter months. A high proportion of total catchment runoff occurs during this period.

Although the *Code* applies in all cases, application of a winter closure in designated catchments will further reduce the risk of water quality being degraded by sediment and nutrient-bearing surface runoff. The period of closure in each case depends on seasonal rainfall, the nature of catchment soils and the sensitivity of the catchment to disturbance. A slighter longer closure will apply in areas that have a greater erosion hazard.

The seasonal suspension for designated catchments will apply to all harvesting and stand tending operations which involve the use of heavy machinery or otherwise cause significant soil disturbance. In areas outside of the designated catchments, NRE will develop enhanced timber harvesting prescriptions to be specifically applied during winter months. It will also limit the use of logging machinery and methods of harvesting to those which maintain a high level of security for soil and water values. In all operations and in all seasons, the soil and water quality protection measures of the *Code* will continue to apply as a minimum standard.

ACTION

Apply winter closures for logging, roadworks and other heavy earthworks in accordance with the dates specified in Table 9. Extend the period of closure should wet conditions commence earlier or continue beyond the standard seasonal closure dates.

Table 9. Winter closures and coupe size limits for Designated Catchments

Catchment	Winter closure	Max. coupe size (hectares)
Blackwood	1 June - 31 October	35
Bullarto	1 June - 31 October	20
Colbrook	1 June - 31 October	5
Collier Gap	1 June - 31 October	2
Djerriwarrh	1 June - 30 September	15
Hickmans Creek (Elmhurst)	1 June - 31 October	40
Korweinguboora	1 June - 31 October	15
Lal Lal Lake Environs	1 June - 31 October	5
Long Gully	1 June - 31 October	15
Merrimu	1 June - 30 September	40
Moorabool	1 June - 30 September	10
Mount. Cole	1 June - 31 October	20
Musical Gully	1 June - 30 September	2
Pykes Creek	1 June - 30 September	40
Rosslynne	1 June - 30 September	40
Shepherds Creek	1 June - 31 October	40
Sugarloaf	1 June - 30 September	20
Troy	1 June - 30 September	2
White Swan	1 June - 31 October	20
Wombat	1 June - 31 October	20

Prevention of soil erosion

Mobilisation of soil particles in water erosion processes is mainly related to slope angle and length, the physical and biological characteristics of the soil, and the level of soil disturbance and rainfall intensity. Preventing disturbance of soil will help to reduce the risk of sediment mobilisation that may affect water quality. A wide range of management options are available for preventing soil losses due to erosion.

Although broad inferences on erosion hazard can be drawn from information such as land systems mapping, recognition and prevention of soil erosion relies largely on judgements made at the coupe planning level. Foresters and soil scientists must determine the appropriate management of harvesting and other operations on the basis of an assessment of local conditions and the nature of the operation. Accordingly, this Plan has adopted a guidelines approach rather than attempting to zone the forest according to erosion hazard.

GUIDELINES FOR THE PREVENTION OF SOIL EROSION

These guidelines are particularly important in Designated Catchments but should be used in all forest areas.

Logging coupes and other large scale forest operations should be carefully evaluated during planning to determine appropriate techniques for preventing soil erosion.

The following factors will be considered in determining erosion prevention techniques:

- **soil type** - granite-derived soils will generally have a greater erosion risk than soils derived from Ordovician shales and siltstones
- **annual rainfall** - soils in areas with low annual rainfall will tend to have a lower organic component and therefore a greater erosion risk than corresponding soils in higher rainfall areas which will generally be better-structured
- **seasonal rainfall** - erosion hazard and sediment runoff will increase if operations are carried out during or shortly after periods of wet weather. Harvesting should be timed to minimise the possibility of operations coinciding with extended periods of wet weather.
- **slope length** - long slopes create a greater hazard than short slopes
- **logging technology** - modern rubber tyred skidders or feller-bunchers reduce soil disturbance and compaction compared to older-style tracked machines which drag logs to landings
- **sawlog resources** - logging on steep slopes or other areas with a high erosion hazard to obtain relatively low sawlog volumes is generally not warranted
- **coupe planning and design** - landing management and location, snig-track grade and location, streamside reserve and filter strip widths, the proportion of trees retained, and the nature of regeneration operations can be varied to minimise erosion risks.

Areas where particular attention should be given to prevention of soil erosion include the Mount Cole, Pyrenees and Cobaw State Forests.

Slope is a major factor in determining erosion hazard. In designated catchments where erosion hazard is assessed as:

- significant - logging should be limited to slopes less than 25 degrees
- high - logging should be limited to slopes less than a 20 degrees
- extreme - logging should not be conducted.

ACTIONS

Manage logging and other soil-disturbing operations in designated catchments in accordance with the Guidelines for the Prevention of Soil Erosion.

Prepare field guides relevant to the Midlands FMA which classify erosion hazard and assist logging supervisors in assessing the need for reduced slope limits or other special management techniques.

Regrowth management

If a significant proportion of a catchment is harvested over a relatively short period (greater than 20% to 30%), detectable changes to the seasonal pattern of runoff may result. This, in combination with a small water-supply storage, may reduce the volume of water that can be harvested. The action below establishes a limit on the proportion of young regrowth in catchments which aims to maintain near-normal patterns of seasonal yield. The limits to both the proportion and age of regrowth will be refined as more information becomes available from hydrological research in mixed species forests.

ACTION

Schedule timber harvesting operations to limit the proportion of regrowth up to 20 years old (including post-shelterwood one areas) to a maximum of 20% of the area of public native forest in designated catchments.

In some catchments, the proportion of regrowth may currently exceed the 20% limit. In these cases, second-cut shelterwood harvesting will continue to be scheduled but no further first-cut shelterwood or clearfell/seed-tree harvesting will occur until stands in the catchment mature to the stage where the 20% limit is not exceeded. In calculating the area of regrowth, the area of native forest in any conservation reserve and other public land in the catchment will be included and consideration will be given to the hydrological impacts of the management of any private land in the catchment.

Coupe size and annual harvest area

The risk of adverse impacts on water quality in a catchment will be influenced by the size of areas within the catchment that are subject to disturbance and the overall proportion of the catchment disturbed. Small logging coupes (relative to catchment size) and ensuring that logging operations affect no more than a small proportion of the catchment will add an extra layer of security for water quality. The *Code* imposes a maximum area of 40 ha for clearfell and seed-tree coupes but no limit on the maximum area of shelterwood or selection coupes.

ACTIONS

Limit clearfell, seed-tree or first-cut shelterwood operations to 5% of the area of public land in designated catchments over any three-year period.

Limit the gross area of individual logging coupes, including first-cut shelterwood coupes, to the areas specified in Table 9.

Road and track management

Runoff from earth- or gravel-surfaced roads has been identified as the major potential source of sediment inflows into streams. The presence of roads in catchments is unavoidable. They are used for access to timber resources, fire protection, recreational use and for access to water storages. However, a number of measures can be taken to reduce the hazard of degradation of water quality from roads. Some of the more important of these are:

- ensuring road design standards are appropriate for the nature of use the road will receive
- use of appropriate construction practices
- careful design and construction of stream crossings
- regular drainage maintenance programs
- minimising the length of the road network in the catchment
- seasonal or permanent closure of roads.

NRE endeavours to maintain high standards of road design, construction, management and maintenance throughout State forest. Ensuring high standards is particularly important in designated catchments, and roads in these areas should be given a high priority in resource allocation decisions.

ACTIONS

Review the design and use of roads and stream crossings in designated catchments to ensure appropriate standards are in place.

Ensure roads in designated catchments receive a high priority in annual maintenance programs.

Apply seasonal and permanent road closures as detailed in Chapter 10 (Forest Roads).

Fire

Wildfire in water-supply catchments can have a marked effect on water quality and, possibly, yield. If heavy rain follows soon after a fire, and before ground cover plants have re-established, large quantities of ash and sediments in runoff may seriously downgrade the colour and taste of water supplies as well as cause increased turbidity and levels of suspended solids.

Some of the hazards to water quality may arise from the construction of extensive bulldozed fire control lines necessary to control the spread of wildfire. These are routinely rehabilitated following completion of the fire control operation. The *Code of Practice for Fire Management on Public Land* (CNR 1996) addresses the protection of water quality in fire suppression and management operations. This will provide the basis for operational guidelines controlling these activities.

Fuel-reduction burning can reduce the intensity and spread of wildfire, enhancing the security of water supplies against the impact of wildfire. However, some of the water quality impacts observed following wildfire may also arise following fuel-reduction burning, albeit to a lesser extent. A limitation in the extent of, and care in the conduct of, these burns will minimise this risk but must be balanced with other fire-protection requirements.

GUIDELINES FOR THE CONDUCT OF PRESCRIBED FUEL-REDUCTION BURNS IN DESIGNATED CATCHMENTS

Consistent with NRE's legal obligations to carry out sufficient works to protect life and property from wildfire, and the *Code of Forest Practices for Fire Management on Public Land*:

- the proportion of public land in Designated Catchment areas subject to prescribed fuel-reduction burning should be no more than 20% in any single year.
- fuel-reduction burning should be avoided in very small catchments or in close proximity to water storages
- fuel-reduction burns should be managed to avoid destruction of riparian vegetation.

ACTION

Ensure Designated Catchments receive high priority in post-fire rehabilitation works.

5.4 GROUNDWATER

The fractured sedimentary rocks that underlie the Great Dividing Range are major groundwater recharge zones for both local and regional aquifers. Increased recharge has been identified as one cause of the dryland salinity problems that have arisen in catchments, particularly those to the north of the Divide. Regional salinity strategies for the Loddon, Corangamite, Campaspe, Wimmera and Avoca River catchments all stress the importance of maintaining and, where possible, restoring trees on recharge areas to reduce groundwater accessions. As the maintenance of tree cover is a fundamental aim of State forest management, no special action is required to ensure natural rates of recharge are maintained in State forest recharge areas.

Mineral water aquifers are an important component of Daylesford tourism. Recharge sites for these aquifers are likely to be the sedimentary ridges surrounding the town. Pollution of mineral water aquifers has occurred within parts of Daylesford township as a result of septic tank effluent leaching into the aquifer, usually in close proximity to the springs. Sanitary facilities associated with State forest recreation sites may cause similar problems unless a high standard of design and maintenance is applied.

ACTION

Ensure the design of any recreation facilities in close proximity to mineral springs, or likely recharge areas within State forest, includes measures to prevent pollution of mineral water aquifers.

5.5 MONITORING

Water quality and streamflow at various sites in the Midlands FMA is regularly monitored through the Victorian Water Quality Monitoring Network. Other organisations, including the EPA and research organisations monitor water quality on an occasional basis.

The data collected by these organisations provide a basis for monitoring the implementation of the strategies included in this Plan and the *Code*. Data may be used either for short-term spot checks of catchment condition or to assist in detecting any long-term trends that may result from catchment use.

The data collected in water monitoring programs need to be compared with agreed water quality objectives. The *State Environment Protection Policy – Waters of Victoria* (Vict. Govt. Gazette No. S13, February 1988) establishes legal water quality objectives. Indicators are also being developed to measure overall catchment health.

ACTIONS

Establish liaison processes with organisations involved in monitoring water quality and yield to regularly obtain water quality data relevant to State forest management.

Where suitable data are available, conduct periodic (on a 5- to 10-year time frame) analyses of catchment flow and quality data to detect any trends which may result from forest management practices.

As well as monitoring the outcomes of the management of forested catchments, it is important to monitor compliance with the measures directed to maintaining catchment conditions established in this Plan. The Forests Service has established a system of audit to ensure compliance with the *Code*. This system provides a framework for monitoring the implementation of the measures for maintaining stream and catchment values detailed in this Plan.

ACTION

Assess compliance with the catchment management measures established as part of the Midlands Forest Management Plan while undertaking audits of compliance with the Code of Forest Practices for Timber Production.

Chapter 6
FOREST PROTECTION

6.1 FIRE

Fire is a natural part of the environment. South-eastern Australia is recognised as one of the most fire prone regions in the world and unplanned fires (wildfires) can be disastrous. The Midlands FMA has a history of periodic, large damaging wildfires. Wildfires may result when a combination of factors, including heavy fuel concentrations, droughts and extreme weather conditions, provide favourable conditions for the ignition and development of fire. However, properly managed, fire can be used beneficially:

- to protect life, property and public assets, by reducing fuel quantities and hence reducing the spread and intensity of a fire
- to create suitable site conditions for seedling regeneration following the harvesting of trees
- for other forest management purposes, including habitat management and weed control.

Aboriginal use of fire included cooking, warmth, hunting, improving access and habitat manipulation. The repeated incidence of fires prior to European settlement, as a result of lightning and the activities of the Aborigines, shaped the development of the native plant and animal communities. Fire regimes (described by their frequency, intensity and timing) were altered by the early squatters who used fire to promote new growth of grasses and to assist in land clearing and the search for gold.

Individual plant and animal species and vegetation associations in the FMA have developed with, and will survive, a range of fire regimes. The major vegetation associations here are broadly similar in terms of their sensitivity to fire and their capacity to recover and regenerate after fire.

Compared to fires occurring in the tall, wet sclerophyll forests of central and eastern Victoria, fires in the forests of the Midlands FMA are more frequent, less intense and generally do not result in the death of the dominant trees. Moderate to high intensity fires may cause the loss of tree crowns but these are replaced initially by epicormic growth along the stems of the affected trees. Plants in these forests have a number of other adaptations, such as regeneration of the stems from lignotubers or the crown from epicormic buds, hard-coated seeds and thick insulating bark, that enable the species to survive fire.

The *Forests Act* 1958 requires NRE to "*carry out proper and sufficient work for the prevention and suppression of fire in every State forest, national park and all protected public land*". Fire management on public land in the Midlands FMA is governed by regional fire protection plans for Ballarat (1987) and Geelong (1988). These plans are scheduled for review over the next year. The Code of Practice for Fire Management on Public Land (CPFM) "lays down principles, standards and guidelines that apply to fire management on all public land in Victoria to ensure that, in an effective, efficient and safe manner:

- human life, property, and assets are protected, as far as is practicable, from the deleterious consequences of wildfire
- environmental values including the vigour and diversity of the State's indigenous flora and fauna are protected, as far as is practicable, from the deleterious effects of wildfire and inappropriate fire regimes
- water catchment, airshed and landscape values are conserved
- archaeological, historical and other cultural values are conserved."

(CNR 1996)

A number of important forest values which can be adversely affected by fire are identified in this Plan, including:

- high quality timber stands
- cultural values (including landscape, Aboriginal places and post-contact historic sites)
- sites of threatened flora and fauna.

NRE's strategies for the suppression of wildfires are detailed in the Fire Protection Plans. This Plan therefore does not address fire management in detail. The purpose of this section is to ensure that the forest and fire plans are complementary.

Aim

Ensure that management strategies in the Forest Management Plan and those in the Fire Protection Plans covering the FMA are complementary.

Wildfire

The majority of wildfires in the Midlands FMA over the last 15 years were either deliberately or accidentally caused by humans; lightning caused only 8% of fires. This contrasts with the rest of the State where, over the same period, lightning was responsible for approximately 25% of fires. Appendix H.1 details the causes of wildfires on public land in the FMA between 1973 and 1993. Most fires in the Midlands FMA occur between November and April.

Few wildfires have burnt more than 5 ha and major ones which exceed 1500 ha are rare. There were seven major wildfires greater than 1500 ha over the 20 years to 1995 that, combined, burnt over 46 000 ha of public land (see Appendix H.2).

The adverse impacts of fires on the natural or timber values of forests may be substantial. The effect of major wildfires on natural values includes the removal of the mosaic of forest structure and the almost complete removal of potential food sources for the surviving animals. Large numbers of animals may also be killed and the impact of this can be amplified in this FMA by the absence of links to other large forest areas from which recolonisation of the burnt areas can occur.

Harvesting of salvageable wood may mitigate the reduction in timber values that occurs when a mature forest is burnt, but when a young forest is burnt, no timber can be salvaged. The greatest loss occurs when the trees are almost of sawlog size (at about 60 years of age) and the forest is reverted to regeneration by wildfire. Young forest was killed in the Barkstead (1962) and East Trentham (1983) wildfires. The effect of these fires on timber values is discussed further in Chapter 4 - Timber Production.

The recent (1995) fire at Enfield affected more than 80% of the combined area of State forest and State park. The fire occurred in extreme weather conditions, resulting in extensive areas where tree crowns were removed and many trees died. Where the tree crowns regenerate, salvage harvesting may be unnecessary, although epicormic growth usually produces defects in the subsequent wood. Assessment of post-fire recovery will determine the amount of area requiring salvage harvesting (see Rehabilitation of Degraded Forests in Chapter 4).

Prescribed fire

Also termed planned or controlled fire, prescribed fire is used as a management tool to:

- regenerate harvested forest
- reduce fuel loads
- manipulate habitat.

Generally, they can be carried out safely from September to November and from April to May.

The effect of fire on various species varies widely and depends on:

- the particular species' adaptations for survival
- habitat requirements
- season, intensity and extent of the fire
- the health of individual plants or animals.

While information is available on the response of certain individual species to fire, very little is available detailing the response of plant and animal communities. In 1984, a multi-disciplinary research program was initiated by NRE to study the ecological effects of repeated fuel-reduction burning. Five long-term fire-effect study areas are established in the Wombat State Forest to assess and describe the effects of repeated (rotational) spring and autumn fuel-reduction burning on:

- flora, fauna and soils
- the functional process of the dry sclerophyll forest system
- the short- and long-term stability of such ecosystems.
  (Tolhurst & Flinn 1992)

The fire-effect study areas (identified in Appendix B) form part of the Special Management Zone. Management actions which conflict with the purpose of the study will be excluded. Once the areas are no longer required they will revert back to General Management Zone, unless an alternative forest management zone applies. Two of the study areas are required until 2000, the balance until 2010.

Preliminary findings of the studies in relation to the application of fuel-reduction burning include:

- within two years of spring burns and four years of autumn burns, fuel loads on the forest floor reach levels equivalent to areas that have remained unburnt for more than 30 years. However, the structure of shrub and bark fuel is modified for more than 10 years, and this reduces the 'spotting' potential over this period.
- the diversity of animal habitat and the structure of plant populations were reduced in the short term
- unburnt patches can be important to the survival and recolonisation of the burnt area by invertebrates, small mammals, reptiles, birds and plants
- areas subject to rotational burns of less than three years should be scheduled for autumn burns rather than spring burns
- nitrogen levels may be reduced if burns occur at less than 10-year cycles
- rotational spring burning, especially, may result in longer-term ecological effects.

The report indicates that ecosystem management in Victoria may require diverse fire regimes rather than regular cyclic burning. The research work will also compare repeated fuel-reduction burning with both the effects of less frequent high-intensity wildfire and fire exclusion (Tolhurst & Flinn 1992).

ACTIONS

Include the Wombat Forest Fire Effects Study Areas into the Special Management Zone.

Exclude management actions that conflict with the goals of the fire research program until such time as the areas are no longer required.

Address the findings of the research program when the Fire Protection Plans are reviewed.

Fuel-reduction burning

The aim of fuel-reduction burning is to reduce the amount of available fuels, so that wildfires in the fuel-reduced area burn at a lower intensity and are easier to suppress than is the case in areas with high fuel loads. The frequency of burning will depend on the priority for fuel reduction, the rate of accumulation and decomposition of fuel and the spatial arrangement of bark, shrubs and other fine fuels.

A key element of fire plans is a zoning system for fuel-reduction burning, designed to help protect life, property and assets. Desired levels of fuel loads and the frequency and priority for burning are set for each zone. By maintaining low fuel levels in strategically placed zones, the development of major wildfires which originate inside, or spread into, the fuel-reduced area is hindered. Public land is therefore zoned for fuel-reduction burning to provide the most cost-effective protection with due regard given to the range of all forest values and to fire plans developed by other agencies, such as Municipal Fire Prevention Plans.

The CPFM defines five fuel-management zones and indicates how they are to be applied on public land. Fuel-reduction may be applied in only three of the zones, the others either apply to the management of specific flora and fauna or require the exclusion of prescribed burning. Fire protection plans will now nominate the desired range of fuel characteristics (within specific limits) for each of the three protection zones. A brief description of the five zones is contained below.

- *Zone 1 - Asset protection,* this provides the highest level of strategic protection to human life, property and highly valued public land assets and values. This zone will normally occupy only a small proportion of public land.
- *Zone 2 - Strategic fuel-reduced corridors,* this comprises corridors of sufficient width and continuity to provide a substantial barrier to the spread of fire, to minimise the damage caused, and areas to assist in safe and efficient fire suppression
- *Zone 3 - Broad area fuel-reduced mosaic,* this will provide an irregular mosaic of areas where fuel reduction will complement works undertaken in Zones 1 and 2
- *Zone 4 - Specific flora and fauna management,* this will provide for the use of prescribed burning for the active management of specific flora and/or flora
- *Zone 5 - Exclusion of prescribed burning,* this will provide for the exclusion of prescribed burning for at least the period of the plan from areas of vegetation in which there would be high potential for economic, ecological or cultural loss if it was subjected to prescribed burning.

ACTIONS

Carry out fire protection and management works in accordance with the Fire Protection Plans covering the FMA.

In reviewing Fire Protection Plans, consider:

- ***strategies for protecting high quality timber stands and thinned areas from wildfire***

- *the use of fuel-reduction burning within high quality timber stands*
- *strategies for protecting important cultural values from wildfire*
- *complementarity between the forest management zoning scheme established in this plan and the fire protection zoning scheme*
- *timing, distribution, intensity and extent of burn within fuel-reduction burning zones.*

Permit other activities in Zone 1 where they do not significantly affect the goals of the zone.

Habitat management burning

Prescribed burning is a powerful tool for manipulating ecosystems to achieve biodiversity or pest control objectives. Many plant communities are adapted to specific fire regimes and depend on the continuation of that regime for their existence. Some animal species, such as the Common Dunnart, appear to be adapted to survival in vegetation communities at a particular stage of post-fire succession. Pest plants populations can be modified by careful use of planned fire.

The use of fire to achieve biodiversity goals in State forest is rarely practised within the Midlands FMA. However, burning to control Furze (or Gorse – *Ulex europaeus*) and Radiata Pine (*Pinus radiata*) is commonly undertaken in combination with other control methods.

ACTIONS

Identify, as ecological information becomes available, and include within Protection Zone 4 or Zone 5 those plant and animal communities that require a particular fire regime or fire exclusion.

Use prescribed burning as appropriate to assist in the control of pest plants.

Regeneration burning

The majority of Victorian forest plants, including the dominant eucalypts, regenerate prolifically following fire. Fire is also an important component of the regeneration techniques practised in the FMA. The use of fire to induce regeneration reduces competition for developing seedlings, provides a receptive seedbed, enhances germination levels and reduces the high fuel hazard that results from harvesting operations.

Usually, a moderate to high intensity fire is used to burn coupes following timber harvesting. Regeneration burns following the first shelterwood harvest are a compromise between a fire hot enough to induce seed fall and to achieve the required seed bed, and one not so hot that it kills the retained trees (or causes high levels of crown scorch to them). Excessive crown scorch induces the formation of epicormic shoots along the stem of the tree which appear as degrade in the wood laid down subsequently.

Management of regeneration burns following the first shelterwood harvest has recently changed. This burn is now delayed to between one and two years after harvesting is complete. This reduces the amount of elevated fuels, resulting in a less intense fire and hence less damage to retained trees.

ACTION

Refine and develop the prescriptions for regeneration burns based on field experience and fire and silvicultural research findings.

6.2 PEST PLANTS AND ANIMALS AND PLANT DISEASES

While best known for the losses they cause in agricultural land, pest plants and animals and diseases can also adversely affect economic and environmental values of public land. Pest plants bring about a reduction in the health and regenerative capacity of native plants, changes in vegetation composition and associated loss of habitat for native fauna. Pest animals in native forest disrupt natural ecosystems through competition for resources, by direct predation or by grazing of native plants. Grazing or burrowing by pest animals also disturbs vegetation and soil, allowing weeds to establish and contributing to erosion on susceptible sites.

The effectiveness of pest control programs on agricultural land can be reduced if the pest species are present on neighbouring public land. Likewise, forest and conservation reserve values can be compromised if adjacent freehold land contains infestations of pests that may spread onto public land. Because plant propagules and pest animals cross land management boundaries, effective pest control must be coordinated across both public and private land.

NRE, through its Catchment Management and Sustainable Agriculture Service, monitors pest infestations and control programs using the Pest Management Information System (PMIS), a computerised database. This system enables:

- preparation of pest management plans
- allocation of resources and the implementation of control programs
- monitoring the effectiveness of control programs.

PMIS information provides much of the basis of this chapter.

Two pieces of legislation have a major influence on pest control in State forests:

- *Catchment and Land Protection Act* 1994 provides for the classification of weeds and pest animals and for their eradication or control. It also establishes a system of community consultation through Catchment and Land Protection Boards which prepare Regional Catchment Strategies. Not all pest species on public land are declared weeds or pest animals under the provisions of the Act, however, which usually refers to their agricultural context.
- *Flora and Fauna Guarantee Act* 1988 lists predation of native wildlife by the introduced Red Fox (*Vulpes vulpes*) and the spread of gravel infected by Cinnamon Fungus (*Phytophthora cinnamomi*) as potentially threatening processes.

The *National Forest Policy Statement* (Commonwealth of Aust. 1992a) calls for forest management agencies to monitor and appropriately control the threat to publicly-owned native forest ecosystems posed by feral animals, exotic plants, pests and diseases. Consistent with this, the *Code of Forest Practices for Timber Production* (CFL 1989) requires that 'care must be taken to prevent the introduction and/or spread of disease or insect and plant pests in timber production forests'.

The *Good Neighbour Program* is a major policy initiative which allocates resources towards cooperative weed and pest animal control programs on the freehold/public land boundary. Under the program, NRE works with landholder groups and local government to identify pest control needs and to undertake coordinated work on both public and private land, bringing benefits to both landholders and the values of public land. The Good Neighbour Program currently provides most of the resources for pest plant and animal control in the Midlands FMA.

Aims

Protect the ecological, economic and cultural values of State forest from damage by pests plants and animals and diseases.

Prevent the introduction of new pest species into the FMA, or their spread into sensitive areas.

Planning and programming for pest plant and animal control

Effective pest plant and animal control requires well planned and designed programs. This requires the priorities for control of pest species in State forest to have regard not only to the management goals of State forest but also the overall catchment priorities expressed in the Regional Catchment Strategies. It also requires consultation and coordination with regional Catchment and Land Protection Boards and, where necessary, with Landcare groups and individual landholders to develop agreed priorities and implement joint action.

A key initiative of this Plan is to introduce rolling three-year works planning for the control of pest species. This approach will:

- ensure pest plant and animal control programs will be implemented within the framework established by this Plan
- provide a vehicle for consultation with Catchment and Land Protection Boards and community groups
- ensure funding is allocated to areas of greatest need
- ensure any necessary follow-up works are identified in advance and included in annual programs.

GUIDELINES FOR PEST PLANT AND ANIMAL CONTROL PROGRAMS

Programs should be conducted:

- with due regard to cost and efficiency
- using methods which are defined in relevant NRE policies and guidelines
- in consultation with relevant Catchment and Land Protection Boards and Landcare groups
- with an evaluation program.

Preparation and implementation of programs for State forest in the Midlands FMA should be based on the framework established by this Plan and relevant legislation and policy. These programs should be prepared on a rolling three-year basis and include:

- maps showing the location of areas proposed for treatment
- any cooperative management arrangements with adjoining land managers
- the nature of infestations
- the threat posed by infestations
- control methods to be used
- necessary follow-up works.

Pest plants

Infestation by pest plants of State forest occurs mainly along the boundaries with freehold land, beside roads and tracks, along watercourses, and on disturbed sites such as picnic areas and log landings. Although the forests of the FMA have had a long history of utilisation and disturbance, the interior of forest areas, where disturbance has been relatively minor, is generally free of significant infestations, although there is potential for progressive invasion from the margins. Timber harvesting and other management activities, however, potentially provide opportunities for pest plant species to establish.

The introduction and spread of the propagules of pest plants through the forest is aided by:

- dumping of garden rubbish and soil
- vehicles and machinery (in tyres, radiators or in adhering mud)
- movement of sand and soil
- animals, including native animals (seeds dropped during feeding or in the coat or dung)
- water movement in streams and channels.

Many exotic plants have become naturalised and, in most cases, eradication is not feasible. Several species are capable of aggressive invasion of forest areas.

Pest plants may be declared to be 'noxious weeds' under the provisions of the *Catchment and Land Protection Act* 1994. The Act also provides for their categorisation as State Prohibited, Regionally Prohibited, Regionally Controlled or Restricted (see Table 10).

Table 10. Classification of weeds under the *Catchment and Land Protection Act* 1994

Category of weed	Definition
State Prohibited	a) it does not occur in Victoria, or b) it occurs in Victoria but it is reasonable to expect that it can be eradicated from the State.
Regionally Prohibited	a) it is not widely distributed throughout the region b) it is capable of spreading further in the region c) it is reasonable to expect that it can be eradicated from the region.
Regionally Controlled	a) it occurs in the region b) it is capable of spreading further in the region and should be stopped from doing so c) to prevent its spread, continuing control measures are required.
Restricted	a) it is a serious threat to primary production, Crown land, the environment or community health in another State or Territory b) it has the potential to spread into and within Victoria c) if sold or traded in Victoria there would be an unacceptable risk of it spreading within Victoria and to other States or Territories.

At present, no State Prohibited weeds are known to occur in the State forests of the FMA. Regionally Prohibited and Regionally Controlled weeds occurring in, or on the margins of, State forest are listed in Appendix I. The most common and widespread of these are Furze, Blackberry, English Broom and, to a lesser extent, Cape Broom. These weeds are invasive and can readily spread through undisturbed forest.

Blackberry often forms dense, thorny thickets along streams and roadsides in higher rainfall areas. This growth habit causes large areas of forest to be unsuitable as habitat for native wildlife, interferes with recreation activities, and can provide harbour for pest animals. Other weeds, such as Spear Thistle, Hemlock and Wild Teasel, can establish following disturbance by timber harvesting and road construction activities, but usually only persist if the disturbance is regular on sites with damp, fertile soils.

Some weeds do not currently pose a problem in State forests in the FMA, but have the potential to do so in the future. Ragwort, for example, is established in the Mount Beckworth Scenic Reserve. This plant is thought to have been transported into the Reserve from the Otways on logging machinery brought in to harvest nearby softwood plantations. Ragwort or other potential problem weeds could similarly be introduced into State forests in the FMA from infested areas elsewhere.

Some naturalised non-indigenous plants have not been declared under the *Catchment and Land Protection Act* 1994, but may still pose a threat to forest values. These are regarded as 'environmental weeds'. Often escaped pasture or garden species, these plants are not considered to be agricultural pests, but can adversely affect the survival or regeneration of native plant species. Table 11 lists some of the more significant environmental weeds found in the State forests of this FMA; several are almost ubiquitous.

Table 11. Significant environmental weeds in State forest in the Midlands FMA

Common name	Scientific name	Common name	Scientific name
Blue Periwinkle	*Vinca major*	Radiata Pine	*Pinus radiata*
Early Black Wattle	*Acacia decurrens*	Spanish Heath	*Erica lusitanica*
Cootamundra Wattle	*Acacia baileyana*	Tree Lucerne	*Cytisus palmensis*
English Ivy	*Hedera helix*	Quaking Grass	*Briza maxima*
Smilax	*Myrsiphyllum asparagoides*		

Spraying with herbicide, or cutting and poisoning are the main methods of pest plant control used in forests, depending on the particular weed species and their location. In areas of State forest close to population centres, mechanical removal and spraying of weed infestations are also used as fire prevention measures. NRE is continuing to investigate improved methods of pest plant control.

GUIDELINES FOR CONTROL OF PEST PLANTS

Resources for pest plant control should be allocated having regard to the following priorities:

- State Prohibited weeds
- Regionally Prohibited weeds
- new weed infestations of any classification which can be feasibly eradicated
- Regionally Controlled weeds where these have an environmental or economic impact on State forest values
- environmental weeds which have a significant effect on ecosystem diversity.

Direction of resources to particular infestations should account for:

- their impact on State forest values
- their impact on nearby agricultural land (in keeping with the *Good Neighbour Program*)
- the potential for successful eradication or control.

The effectiveness of weed control programs should be monitored to:

- ascertain the rate of control or further spread
- determine if follow-up work is required
- determine if control practices require modification.

ACTIONS

Prepare and implement three-year pest plant control programs for State forest in the Midlands FMA based on the Guidelines for Control of Pest Plants and relevant legislation and policies.

Maintain comprehensive records of the locations of pest plant infestations and control actions taken.

Implement hygiene practices for all plant and machinery working in areas known to have significant infestations of pest plants. Specifically:

- *subject NRE machinery to hygiene standards, detailed in works prescriptions*
- *require that contract machinery conforms to machinery hygiene standards through the inclusion of appropriate clauses in contracts*
- *subject timber harvesting machinery to hygiene standards through FMA timber-harvesting prescriptions and coupe plans.*

In conjunction with other public land managers, carry out community awareness programs aimed at reducing the dumping of rubbish and garden waste in State forest.

Seek opportunities to implement cooperative management programs with community groups involved in pest plant control activities.

Plant diseases

Depending on the type of pathogen and its interaction with climate, soil type, aspect, altitude and disturbance, a plant diseases can seriously impact on forest ecosystems. The two main diseases affecting growth and survival of native plants in the forests of this FMA are Cinnamon Fungus (*Phytophthora cinnamomi*) and Honey Fungus (*Armillaria* species). The significance of these diseases to timber production is discussed further in the *Statement of Resources, Uses and Values Background Paper – Timber Resources* (Tange 1995a).

Cinnamon Fungus

A water-borne organism living in the soil, Cinnamon Fungus attacks and destroys the roots of many native and introduced trees and shrubs, often leading to the death of the plants. The death of Austral Grass Trees (*Xanthorrhoea australis*) in a forest area is often an indication of infection. Once the disease is established in a susceptible community, there is no known means of eradication.

The disease is favoured by the following conditions:

- gravel or soils of low fertility containing little organic matter
- soil temperatures of at least 10°C
- wet weather during spring, summer and autumn.

Serious outbreaks of Cinnamon Fungus causing dieback of trees have occurred in the south-east of the FMA, particularly in the Brisbane Ranges National Park and surrounding forest blocks (Weste 1986). Other affected areas include the Lerderderg State Park, the north-eastern section of the Wombat State Forest, and the Pyrete Range. Isolated parts of State forest around Daylesford and Ballarat also contain small areas of infection.

Cinnamon Fungus is primarily spread through the use of infected gravel in road construction and in run-off of drainage water from infected sites. Infected soil adhering to vehicles and machinery (particularly when used off-road) could introduce the disease into uninfected areas of forest.

The National Parks Service 'Policy and Procedures Manual' (NPS 1994) includes a guide to control of Cinnamon Fungus and specifies hygiene practices which are appropriate to management of the disease in State forest. A management zone has been established around all known occurrences of the disease in the FMA (see Map 3) any new infestations will similarly be included in the zone.

GUIDELINES FOR CINNAMON FUNGUS CONTROL

Active measures should be implemented to minimise the risk of introduction or movement of plant diseases into uninfected areas.

Hygiene measures to contain and control the spread of Cinnamon Fungus include:

- washing machinery before moving into uninfected areas
- restricting activities where the movement of soil or gravel is likely to cross from infected sites into healthy vegetation
- minimising the relocation or movement of infected gravel or soil during road and track construction or maintenance works, logging operations or wildfire suppression and pre-suppression works
- restricting or controlling drainage water run-off from roads and tracks away from healthy vegetation
- testing gravel from infected areas and using only uncontaminated gravel in uninfected areas
- cleaning and disinfecting vehicles, machinery, tools and equipment used in infected areas.

The effectiveness of hygiene practices should be monitored to:

- ascertain effectiveness of control measures or rate of further spread
- determine what follow-up work is required
- determine if control practices require modifications.

ACTIONS

Implement the Cinnamon Fungus control guidelines as the general basis for control of the spread of the disease.

On identification of a site infected by Cinnamon Fungus, include it in the quarantine zone. (All known occurrences of the disease are included in this zone, see Map 3).

In the quarantine zone:

- *implement machinery hygiene practices for all plant and machinery working in areas believed to be infected by Cinnamon Fungus before they are permitted to move elsewhere within the zone*
- *subject all plant and machinery working in the quarantine zone to machinery hygiene procedures before leaving the quarantine zone.*

Maintain records of the locations of all Cinnamon Fungus infestations.

Honey fungus

Armillaria species are native root-rot fungal diseases which kill trees by girdling the main roots and stem. The fungus can be spread through adjacent tree roots, stumps or small pieces of infected wood.

Of the four species recorded, *Armillaria luteobubalina* is the main cause of dieback. In the Midlands FMA, *Armillaria* root rot has seriously damaged areas in the Mount Cole State Forest and, to a lesser extent, in the Wombat State Forest. While the hygiene measures described above can assist in containing the spread of Cinnamon Fungus, these measures are less effective for the control of *Armillaria*, which relies on the appropriate choice of silvicultural system. This is discussed further in Harvesting and Regeneration Systems in Chapter 4.

Pest animals

Many species of pest animal have become established in Australia as a result of deliberate or accidental releases. The *Catchment and Land Protection Act* 1994 classifies pest animals as either Prohibited, Controlled, Regulated or Established. These classifications have yet to be finalised and, at present, all vermin defined under the repealed *Vermin and Noxious Weeds Act* 1958 transfer to the new Act as Controlled Pest Animals.

Foxes and rabbits are common and widespread in the FMA. They often shelter in the forest fringes and feed on adjacent cleared land, creating problems for adjacent land holders. Feral goats are established in parts of the Wombat and Mount Cole State Forests, and feral pigs occur in the Cobaw State Forest. Other animals considered as pests, but which are localised or less common, include wild dogs and feral sheep. Several deer populations exist in State forest in the Midlands FMA. These populations have the potential to adversely affect forest regeneration operations and forest environmental values if their populations become too high. Feral cats, which contribute to the decline of native fauna, are also common in forests throughout the FMA.

Browsing by rabbits in conjunction with other browsing animals, such as wallabies, can damage regeneration following timber harvesting. Certain pest species may also act as vectors for diseases in native animal communities.

Control of pests such as rabbits and foxes is generally concentrated around forest perimeters, mainly using 1080 poison. Buried bait, such as Foxoff®, is used for fox control and poisoned carrots are used for rabbits. Close to built-up areas, Pindone® is often used in place of 1080 as it has no secondary poisoning effects. Rabbit poisoning campaigns have occasionally been undertaken in localised areas of regenerating forest where severe browsing problems exist. In most such campaigns the bait is dyed to discourage consumption by native animals. Where poisoning campaigns may affect non-targeted wildlife, control programs are carried out in consultation with NRE wildlife biologists.

The Rabbit Calicivirus Disease (RCD), a potential biological control agent for rabbits, has been recorded within the Midlands FMA. Laboratory trials and overseas experience confirm that only European rabbits are susceptible to RCD, which is transmitted by rabbits and possibly other vectors such as birds and insects. Experience in the release of other biological control agents show that successful rabbit eradication in an area will require the traditional control measures (shooting, fumigation and ripping of burrows) to be used in concert with outbreaks of the RCD.

Shooting and trapping of goats and pigs, mainly by recreational hunters, has been used to assist in the control of these pests in parts of the Wombat and Cobaw State Forests. To date there have been no campaigns to control feral cats in State forest, although initial trapping trials have begun in some parks in the FMA.

As many pest animals range between State forest, adjacent parks and private land, effective control involves cooperation between neighbouring land managers. Group pest control schemes result in better success and yield greater community and departmental benefits.

GUIDELINES FOR CONTROL OF PEST ANIMALS

Priority should be given to control of Prohibited, Controlled, Regulated or Established pest animals as required by the *Catchment and Land Protection Act* 1994 and to the management of threatening processes listed in Schedule 3 of the *Flora and Fauna Guarantee Act* 1988.

Direction of resources to particular pest species should account for the potential for successful eradication and control as well as for their impact on:

- State forest environmental or economic values
- the conservation of rare or endangered native flora and fauna
- neighbouring parks, reserves and reference areas
- neighbouring agricultural land.

Pest animals of particular importance for control in the Midlands FMA include:

- rabbits, because of their impact on agricultural pastures and forest regeneration
- foxes, because of the ecological impacts and the threat they pose to livestock
- feral goats and pigs, because of their potential to cause serious damage to forest environments and their potential role as livestock disease vectors
- feral cats, because of their impact on native wildlife.

Pest control programs should be monitored to:

- ascertain effectiveness of control
- determine if follow-up work is required
- ascertain effects on non-target species
- determine if control practices require modification.

ACTIONS

Prepare and implement three-year pest animal control programs for State forest in the Midlands FMA based on the Guidelines for Control of Pest Animals and relevant legislation and policies.

Maintain comprehensive records of the occurrences of pest animals and control methods taken.

Chapter 7
RECREATION, TOURISM AND CULTURAL HERITAGE

Each year, many thousands of people from the cities and towns in and surrounding the Midlands FMA visit the forests seeking opportunities for recreation in a natural environment. Although important in their own right, forest recreation opportunities are also a significant part of the region's attractiveness to tourists. Even those visitors who do not enter the forest for specific recreation visits, enjoy the forested landscapes surrounding towns such as Daylesford, Beaufort, Macedon and Ballarat.

The cultural values of the Midlands FMA include the rich history of the region. Aborigines long occupied the FMA before it was occupied first by the squatters, and then the miners and timber-getters during the early to mid-1800s. Recognition of the continuing importance of land to Aboriginal culture and protection and interpretation of the historical relics of the pastoral, timber-getting and mining days are important goals of forest management.

7.1 RECREATION

A diverse range of forest environments, high standard vehicle access and recreation facilities and the proximity of the Midlands FMA to large population centres makes it a popular destination for forest recreation. Visitors pursue a wide range of activities including pleasure driving, bush-walking, camping, hang-gliding, orienteering, hunting and fossicking and prospecting. The forests also provide opportunities for nature-based recreation, and historical and environmental education.

The proximity of the forests to large population centres ensures high visitor use and continued growth in the demand for nature-based recreation facilities and activities. Some of the demand for State forest recreation in the FMA include:

- activities in areas close to population centres and major tourist destinations
- activities that may be restricted in or excluded from parks such as horse-riding and hunting
- vehicle-based recreation, including four-wheel-driving
- interpretation and education about native forests and their management.

Meeting these demands in an environmentally sensitive manner is a high priority for forest management. In doing so, NRE provides a valuable community service, contributes to regional tourism and helps to protect the forest from the impacts of large visitor numbers.

Aims

Provide forest visitors with:

- *a diverse range of forest recreation settings*
- *equitable access and opportunity for all forest recreation activities that are consistent with the other objectives of this Plan*
- *facilities to enhance enjoyment of the forest environment, and to provide a focus for forest recreation activities*
- *information to assist understanding of forest recreation opportunities, and the forest environment and its management.*

Complement and coordinate State forest recreation opportunities, activities and facilities with those provided by the parks and reserves system.

Recreation settings

Different forms of forest recreation are best enjoyed in settings that are appropriate to the nature of the activity. A developed picnic ground with toilets and other facilities is often the best setting for a family picnic. In contrast, bush-walking and nature study are usually best enjoyed in relative solitude, away from busy vehicle tracks and other visitors.

The *Recreation Opportunity Spectrum* (described in Tange 1995b) classifies recreation settings on the basis of the presence of developed facilities and remoteness from access. Analysis of current recreation settings in the Midlands FMA indicates that remote settings are absent, semi-remote settings very limited and that the majority of State forest falls into the roaded-natural setting. Most forest picnic and camping sites are semi-developed and developed settings are almost absent from public land.

Continuing *ad hoc* development of access, facilities and forest utilisation tends to further diminish the availability of semi-remote settings, which are currently confined to the Lerderderg State Park, the Pyretes Range, the Pyrenees State Forest and Langi Ghiran State Park. Maintenance of these areas in a semi-remote condition is important for the maintenance of diversity in recreation settings.

ACTION

Include all existing areas of State forest that are currently classified as semi-remote in the SPZ. Exclude timber harvesting, recreation developments and new roads or tracks from these areas and maintain any existing roads and tracks at or below its current road classification (see Road Classification - Chapter 10).

Recreation activities

The Midlands FMA forests are used for a diverse range of recreation activities. The majority of visitors use the forest for passive recreation such as camping, bush-walking and scenic driving. Organised active events such as orienteering and trail-bike and car rallies are common, and increasing in frequency and in the numbers of participants. Many opportunities exist for pleasure driving, which incorporate areas of State forest, and include established drives such as the Major Mitchell Trail.

While NRE seeks to provide opportunities for as wide a range of forest-dependent recreation activities as possible, it must also have regard to the impact of certain activities on the forest environment, and on other recreational users. Potential conflicts can often be avoided or minimised by separating conflicting uses in space or time, and by ensuring organised activities with large numbers of participants adopt measures which minimise environmental impacts.

Voluntary codes of practice have been developed for activities such as horse-riding, bush-camping, trail-bike riding, mountain-bike riding and bush-walking (Australian Alps National Parks (1993a, 1993b and 1994) and CNR (1993, 1994, 1995c and 1995d)). While some of these are directed towards users of particular conservation reserves, they have a general application and serve as a useful guide to users of the Midlands forests.

Several recreational user groups make a significant contribution to recreation management in the forests. Some four-wheel-drive clubs participate in adopt-a-track schemes which assists in recreational track maintenance. Hunting, bush-walking and hang-gliding organisations have also contributed labour and resources to develop facilities or to provide information.

Some organisations provide recreation services on a commercial basis. This is a relatively minor use of the forests at present and is largely confined to horse-riding and bush-walking tours. These tours often provide access to forest recreation activities which would be unavailable to tour participants using their own resources. As such, the tours contribute to NRE management objectives by increasing recreation access and opportunities. Commercial tour operators are required to obtain a permit and this provides an opportunity for NRE to set conditions which help to ensure the activity is consistent with other management objectives.

Defence force training is not technically a form of recreation but its impacts and management are similar to those of organised recreation events. Defence force training is a legitimate use of State forest (as recommended by the Land Conservation Council) which, in most cases, has a relatively minor impact. NRE and the Australian Defence Forces (ADF) have established effective liaison processes which serve to meet the ADF's needs without compromising NRE's management objectives.

GUIDELINES FOR THE MANAGEMENT OF RECREATION ACTIVITIES

Opportunities should be provided for appropriate recreation activities in State forest that are excluded or restricted in Parks and reserves (eg. hunting, walking of dogs, large-scale organised recreation events).

Recreation activities which are incompatible with other State forest values or uses or which are not forest-dependent, should be discouraged through community education or, where necessary, regulation.

Recreation activities should not significantly affect forest environmental values. Organisers of large-scale events should be encouraged to contact NRE to ensure adequate measures are taken to protect environmental values.

Planning, management and delivery of recreation programs should be coordinated between State forests and parks and reserves to ensure diverse forest recreation opportunities are maintained and to assist in separating incompatible uses.

Regular liaison with major community based recreation groups should be maintained to facilitate communication with recreational users and to promote recreation activity codes of practice.

Commercially-run recreation activities should be facilitated where the activity will increase participation in State forest recreation while remaining consistent with other forest management objectives. Commercial tour permits should address the need to protect environmental values and to minimise the impact of large groups on other users.

ACTION

Manage State forest recreation activities in accordance with the Guidelines for the Management of Recreation Activities and Table12.

Table 12. Management actions for specified recreation activities for State forest in the Midlands FMA

Activity	Action
Pleasure driving (2WD)	Maintain the existing forest drive in the Wombat State Forest. Establish a new forest drive in the Mount Cole State Forest. Maintain network of 2WD trafficable roads to formal recreation sites.
Four-wheel-driving (4WD)	Seek to maintain the existing extensive track network subject to environmental and other constraints. Continue liaison with 4WD clubs. Encourage 'adopt- a-track' schemes and adherence to the 4WD Touring Code of Practice. Develop, in conjunction with 4WD groups and the National Parks Service, preferred 4WD routes catering for novice to experienced drivers.
Trail-bike riding	Seek to maintain the existing extensive track network subject to environmental and other constraints. Continue liaison with trail-bike clubs. Encourage 'adopt a track' schemes and adherence to the Trail-bike Riding Code of Practice.
Car rallies	Focus competitive rallies in the Enfield Wombat, Mount Cole and Ben Major State Forests. Exclude competitive car rallies from the Canadian State Forest and areas in close proximity to residential development. Restrict competitive rallies in the Creswick State Forest and other developed visitor use areas to periods of low visitor use.
Bush-walking	Maintain the target number* of walks by duration. Maintain semi-remote opportunities in the Pyrete and Pyrenees State Forest. Continue liaison with Great Dividing Trail Group and encourage the development of other community based recreation walking trails, especially around major population areas.
Camping	Maintain target numbers* of camping areas and facilities. Develop and widely distribute information on the nature and location of developed camping areas.
Picnicking	Maintain the target number* of recreation sites. Provide disabled access to facilities wherever feasible. Develop and widely distribute information on the location and nature of picnic sites.
Bicycle-riding	Develop a mountain-bike circuit in conjunction with the National Parks Service combining existing vehicle roads and tracks in the Wombat State Forest and the Hepburn Regional Park. Continue to permit access to open vehicle tracks but exclude mountain-bikes from closed tracks and walking tracks.
Rogaining and orienteering	Maintain access to all existing mapped areas. Maintain liaison with rogaining and orienteering associations in the development of new maps or the conduct of events.
Horse-riding	Maintain access to all existing vehicle tracks. Liaise with horse-riding groups to encourage adoption of the Horse Riding Code of Practice. Encourage the use of the Chinamans and Smith Bridge recreation sites as the main camping areas for horse-riding in the Mount Cole State Forest.
Hang-gliding and para-gliding	Continue liaison with hang-gliding and para-gliding organisations in regard to use and maintenance of existing sites and management of large events. Maintain current levels of road and track access to sites. Restrict usage of sites to licensed fliers.
Rock-climbing	Encourage clubs to become involved in site management through 'adopt-a-rock' schemes.
Fossicking and prospecting	Provide information on areas available for fossicking and prospecting and encourage the development and adoption of a code of practice.
Defence force training	Focus the Australian Defence Forces training into the Enfield, Ben Major, Creswick and Wombat State Forests (away from established recreation sites and walking tracks).

Note* Recreation facility targets are detailed in the next section.

Recreation facilities

Recreation facilities in State forest, such as fireplaces, toilets and picnic tables, serve a number of roles. They add to visitor enjoyment and provide a focus for recreation activities such as bush-walking. They also assist recreation management by confining activities such as camping to sites that are capable of supporting the use, and by providing a focus for the distribution of visitor information.

Most State forest recreation facilities are located in the Wombat and Mount Cole State Forests where the largest number of visitors congregate, and where access is good and the sites well-publicised. These facilities complement those provided by other public land managers and by the private sector. Coordination of the location and nature of State forest facilities with other recreation facility providers is an important part of State forest recreation management.

The nature, location and quality of visitor facilities can have a large bearing on the enjoyment of State forest by visitors. Overcrowded, dilapidated or poorly located sites can detract from a recreation experience. Poorly maintained sites are prone to vandalism.

NRE's challenge is to meet user demand for well-located and maintained sites while achieving high standards of design and maintenance. This will be achieved through a reduction in the total number of sites to allow maintenance resources to be directed towards the most popular sites. There is also a need to better promote existing sites to visitors to the region.

The focus for State forest recreation planning in the Midlands FMA is to provide a core group of facilities within each of the Geographic Representation Units (described in Chapter 2). The types and number of facilities to be maintained are based on perceived demand, acceptance of some traditional use areas and the need to provide opportunities for visitors to learn about forest management activities. Recreation facilities in State forest are generally designed to provide only basic facilities but they should be as physically accessible to the widest range of people possible.

Community groups can contribute to the development of recreation facilities. The Great Dividing Trail Group is a community-based organisation which is establishing a series of walking tracks linking Daylesford to Ballarat, Bacchus Marsh and Castlemaine. Walkers on the trail will be exposed to a variety of the uses of land in the area. In State forest the trail is intended to show people a 'working forest'. Prepared notes and signs along the trail can be used to provide interpretation of forest management activities.

There is currently no commercial involvement in recreation facilities on State forest. Private sector involvement may contribute to meeting community demand while preserving limited NRE funding for services with no commercial potential. Any such developments will proceed only if they contribute to overall State forest recreation values and meet social, environmental and economic criteria.

GUIDELINES FOR RECREATION FACILITY MANAGEMENT

Sufficient recreation facilities should be provided within each Geographic Representation Unit, consistent with available recreational settings, to meet current demand and likely growth in demand over the next 10 years. The types and number of facilities provided should also be consistent with NRE's capacity to maintain facilities to a high standard while maintaining environmental values.

Revision of the target numbers of recreation facilities to be provided should be based on:

- changed demand for recreation facilities and activities in State forest (and other public land)
- the need to minimise environmental site impacts that may occur if sites are too small for existing demand
- the need to maintain all sites in good condition.

Facility design should be consistent with the settings defined by the Recreation Opportunity Spectrum. No facilities should be established in semi-remote settings and the impact of large facilities on the roaded-natural setting should be considered prior to establishment of new sites. In general, facilities should be developed to blend into the natural forest surroundings and to provide users with a forest recreation experience.

Recreation sites should be regularly assessed to determine if replacement, repair or removal of damaged facilities is required, or unacceptable environmental impacts are occurring as a result of use or design of the site. These problems may be minimised by:

- improving the level of management controls at the site
- altering the number and type of facilities at the site (eg increasing or rationalising car parking)
- providing alternative sites
- education and/or enforcement programs
- closing and rehabilitating the site.

Scenic and educational drives should incorporate:

- a description of State forest management strategies for biodiversity conservation, sustainable wood production and other management features
- interpretation of scenic and historic features
- explanation of current forest management activities such as timber harvesting, thinning and fuel-reduction burning
- the location of existing recreation facilities and interpretive facilities
- Forest drives should be regularly reviewed to ensure they remain up-to-date.

ACTIONS

Maintain a network of walking tracks based on duration of walk within State forest with the targets for each Geographic Representation Unit detailed in Table J.1 in Appendix J.

Upgrade, establish or close recreation facilities as outlined in Appendix K and maintain facilities to the Geographic Representation Unit targets detailed in Table J.2 in Appendix J.

Establish in the Mount Cole State Forest, and maintain in the Wombat State Forest, self-guided scenic drives to provide a focus for interpretation of State forest and its management.

Survey recreation facilities on State forest to determine accessibility for disabled visitors. Prepare and distribute information on the location, type and accessibility of facilities for the disabled. Design and construct all new visitor facilities to provide access for the disabled consistent with the overall objectives of the site.

Explore opportunities for appropriate private sector involvement in the development and maintenance of State forest recreation facilities. Market any opportunities identified to potential investors.

7.2 TOURISM

Nature-based tourism is experiencing strong growth in Australia, reflecting community interest in environmental issues and a desire to seek alternative tourism options. Daylesford is the major focus for tourism in the Midlands FMA but other centres, including Woodend, Ballarat, Beaufort and Avoca are significant tourist destinations in their own right. In several of these centres, investment and employment in tourism is a major part of the local economy.

The major attraction for most tourists to the Midlands FMA are the historical and cultural features of the cities and towns. The forests are not a primary attraction but add value to tourist experience by providing natural surrounds for several of the towns and the major access routes to the region. Many visitors to the major tourism centres also enjoy short drives through the forest, often using picnic facilities provided on their route.

NRE currently seeks to enhance regional tourism by providing for a wide range of forest recreation activities, by providing forest recreation facilities, and by making tourist-oriented information available in the cities and towns of the FMA. Opportunities for further involvement in regional tourism exist through facilitating forest eco-tourism activities and further improving existing facilities and information services.

NRE is keen to facilitate the development of nature-based tourism but recognises that the industry must be developed within a framework that ensures activities are conducted in a manner which maintains forest values. This is achieved through use of a licensing system which regulates access to the forests and enables the establishment of conditions for commercial activities.

Many forest visitors enjoy camping in the forests, but commercial accommodation on freehold land adjacent to the forests enables visitors to enjoy the natural values of the forests in comfortable surrounds. The requirements of these visitors are addressed through recognition of the sensitivity of commercial accommodation ventures in the landscape management guidelines (see below). The requirements of scale and infrastructure for most accommodation ventures is incompatible with State forest recreation management objectives. Accordingly, NRE does not intend to permit such ventures within State forest in the Midlands FMA.

ACTIONS

Maintain liaison with regional tourism organisations to assist coordination between the provision of NRE facilities and information with those of the private sector.

Facilitate the development of nature-based tourism ventures while ensuring that operations maintain environmental and recreational values and minimise conflicts with other users.

Seek to highlight State forest eco-tourism opportunities in regional tourism strategies and tourist newspapers.

Develop guidelines for the future provision of State forest recreation and landscape management along major tourist travel routes in collaboration with Regional Tourist Associations and the National Parks Service.

7.3 LANDSCAPE

The landscape of the Midlands FMA is dominated by human alterations. Agricultural land, pine plantations, roads, highways, towns and cities occupy most of the landscape. Forested public land makes up a small, but important, component of the overall scenery. However the forests of the Midlands FMA do offer the visitor naturalness in sharp contrast to the surrounding altered landscape. Tange (1995b) provides more background information on landscape values in the Midlands FMA.

Management actions can impact on the landscape viewed by visitors to the area, and what they see may strongly influence their perceptions of native forest management. If not properly managed, some activities in State forest, particularly timber harvesting, can have a detrimental effect on the landscape and therefore on people's impressions of the impact of these activities on overall forest management. Because the naturalness of surrounding forests is part of the region's attractiveness to tourists, maintaining landscape benefits has a direct economic benefit.

The benefit of maintaining natural forest landscapes must be balanced against the economic contribution of the timber industry. Harvested areas of forest and regrowth stands will therefore be a part of the experience of visitors to State forest in the Midlands FMA. However, any impression of dominance of timber harvesting can be managed by careful planning of logging coupes, interpretative signs on tourist routes or lookouts, and vegetative screening.

All areas of State forest in the Midlands FMA are surrounded by private property. A small number of businesses, such as tourist accommodation, are adjacent to State forest. These may gain commercial benefit from the naturalness of the surrounding forested landscape which may be adversely affected if the impacts of forest management activities are not properly managed.

Aims

Protect landscape values, especially in areas of greatest scenic quality and viewer interest.

Minimise the visual impact of management activities on the landscape.

Provide visitors with opportunities to view a range of forest management activities.

Landscape management on public land is guided by the Visual Management System (VMS) (Williamson and Calder 1979). This uses a combination of scenic quality, visitor sensitivity and distance classes to set visual quality objectives for an area. The VMS can be used for detailed landscape planning or to develop broader landscape management strategies. In preparing this Plan, the VMS was used to help identify the key areas in State forest where detailed planning will be required to protect landscape values.

The Land Conservation Council has identified areas in the Mount Cole and Pyrenees State Forest that require protection of their scenic values. These include the larger, more developed sites which act as foci for the majority of visitors who expect them to be in a natural setting. The setting will be maintained by establishing a Special Protection Zone which will exclude incompatible management activities.

GUIDELINES FOR MANAGEMENT OF HIGH SENSITIVITY LANDSCAPE AREAS (these guidelines are based on the Visual Management System)

All high sensitivity landscape areas should be considered as part of the Special Management Zone.

Foreground (those views up to 500 m from high-sensitivity travel routes and look-outs and major forest-dependent tourism developments)

Most landscape alterations should be temporary, subtle and not evident to the casual observer.

Logging coupes, and new road alignments or easements should generally be screened from view. Retention of buffering vegetation between roads and logging coupes will be the main method of screening. The width of the vegetation screening will vary according to local variations in topography and vegetation type, although 20 m should be a minimum. Selection logging may occur in the buffer provided an effective screen is maintained.

Middle ground (those views between 500 m and 6.5 km from high-sensitivity travel routes and lookouts)

Landscape alterations may be evident in the short term, but should only be subtly apparent within two years of the alteration.

Logging coupes, new roads and easements in these areas should be shaped, positioned and timed to minimise their visual impact.

ACTIONS

Maintain landscape values along high sensitivity travel routes, lookouts (listed in Appendix L) and adjacent to major forest-dependant tourism developments in accordance with the Guidelines for the Management High Sensitivity Landscape Areas.

Include provision for landscape management along high-sensitivity travel routes and sites on individual coupe plans.

Place the recreation sites listed in Appendix M and its environs into Special Protection Zones.

7.4 CULTURAL HERITAGE

The public and private land in the Midlands FMA contains evidence of the rich and long history of human habitation in the area. State forest contains evidence of Aboriginal occupation and numerous sites demonstrating recent history, including settlement, transportation, mining and timber-getting. Places of traditional significance for Aboriginal people, and other areas highly valued for their aesthetic, historic or social values, are also part of the cultural heritage. Most areas with significant cultural values are contained in parks, historic reserves or private land. State forest does, however, contain important sites and also individual sites in close proximity which, when combined, paint a valuable picture of recent history. Tange (1995b) provides further background information on cultural heritage values in the Midlands FMA.

Aims

Protect significant cultural values from potentially damaging human activity.

Encourage sensitive use of selected historic places for the education and enjoyment of the public.

Retain a representative range of the themes of historic places across the Midlands FMA.

Aboriginal places

Aboriginal places include areas of traditional and continuing significance to Aboriginal communities, and sites with material evidence of Aboriginal occupation and use. There are only five recorded sites on State forest in the Midlands FMA. These are important and may potentially be threatened by timber harvesting, road construction or other activities. Other sites may exist on State forest that are not yet known. A comprehensive survey of Aboriginal places on State forest has not been undertaken and some sites may only become evident when the vegetation or soil surface is disturbed. Close consultation with local Aboriginal communities and Aboriginal Affairs Victoria is essential to ensure that Aboriginal sites are protected.

Protection of Aboriginal places and consultation with Aboriginal communities with an interest in the place are required under State and Commonwealth legislation.

ACTIONS

Include all known Aboriginal places in the Special Management Zone and determine management requirements in consultation with Aboriginal Affairs Victoria and local Aboriginal communities.

Maintain liaison with Aboriginal Affairs Victoria and local Aboriginal communities to facilitate information sharing and to provide opportunities for input into forest management decisions.

Use confidential records of the location of Aboriginal places during the preparation of Wood Utilisation Plans and other operational plans as a means of ensuring protection of the places.

Historic places

A number of studies have been undertaken to document and assess the Historic Places in the Midlands FMA, these have occurred:

- as part of the data collection to assist in land-use determinations by the Land Conservation Council (LCC) – including proposed recommendations following the *Special Investigation of Historic Places in South-western Victoria* (LCC 1996a and LCC 1996b)
- through a joint project between NRE and Heritage Victoria to identify historic mining sites.

Local historians have also provided locations of historic timber and mining sites in the Wombat State Forest.

More than 90 historic sites, ranging from locally to nationally important, are located on State forest in the Midlands FMA. The vast majority of historic sites relate to early timber utilisation or mining activities. The major emphasis will be to protect significant historic sites from human disturbance and inappropriate development, and to establish a process for their long-term management. Selected sites or groupings of sites which provide an understanding of the history of the area may be used in recreation and interpretation programs.

GUIDELINES FOR THE MANAGEMENT OF HISTORIC PLACES

Forest management activities should be modified so that they do not impinge on the fabric of significant sites. Consultation should occur with Heritage Victoria where proposed forest management activities may disturb historic sites that have National or State significance. Consultation with Historic Places Branch should occur where proposed forest management activities may disturb sites of State or regional significance.

Measures to protect historic sites may include:

- limitations on heavy machinery movement to specified crossing points
- removal of vegetation that may cause damage to the site
- improving drainage around a site
- placement of a SPZ or SMZ around the site, based its significance and susceptibility to loss or damage.

Management plans for historic sites or themes should be progressively developed, having regard to the significance of the site and it susceptibility to loss.

Sites that are used for education and interpretation should be:

- accessible
- close to current recreation facilities or a grouping of sites illustrating a theme(s) of forest activity
- robust to disturbance so that their integrity is maintained.

ACTIONS

Manage historic places in State forest in accordance with the principles of the Burra Charter (International Council on Monuments and Sites). The most significant and/or representative sites will be placed in SPZ or SMZ depending on its susceptibility to loss.

Incorporate measures to protect historic sites into the Native Forest Harvesting Prescriptions.

Ensure that proposed activities do not adversely affect historic places, in line with the guidelines above, through the annual forest management operational plans such as the Wood Utilisation Plans and fuel-reduction burning plans.

Chapter 8
OTHER FOREST USES

8.1 OCCUPANCIES AND UTILITIES

State forest may be leased or licensed for a wide variety of private uses. These include the construction and use of buildings for private or community purposes, rubbish tips, or the placement of utilities such as power lines, communications facilities and water or gas pipelines. Currently, 34 licences or leases for occupations and utilities cover areas of State forest within the FMA. Most licences are for a particular use and are issued on an annual basis. Leases are generally held for a longer period, with rent paid annually. All occupation licences or leases are subject to conditions which ensure that management practices are appropriate for public land.

Some occupancies or utilities in State forest serve a valuable community purpose. Telecommunications facilities on the summit of Lookout Hill and Ben Nevis are examples. Others provide mainly private benefits, or are incompatible with the general objectives of State forest management because of their impact or the exclusive nature of the use.

Aim

Regulate the private and institutional occupation of State forest to those uses that are dependent on access to State forest and which provide a high level of public benefit.

GUIDELINES FOR THE MANAGEMENT OF OCCUPANCIES AND UTILITIES

Private or institutional occupation of State forest should be restricted to uses that:

- do not substantially conflict with conservation, timber production or recreation objectives
- cannot be located on freehold land
- contribute to the management of State forest
- provide a public benefit which outweighs any social or environmental cost.

ACTIONS

Assess current licences and leases, and any applications for new occupancies, to determine if they meet the Guidelines for the Management of Occupancies and Utilities.

Phase out occupancies and utilities which do not meet the above guidelines by the year 2000. Where occupied sites have been substantially modified by use, and where other State forest values will not be adversely affected, explore the option of excision and sale of the occupied land.

8.2 MINERAL EXPLORATION AND MINING

The Midlands FMA continues to support a range of mining and extractive activities. Much of the European history the area is associated with gold mining, which was an important industry in the FMA from the 1850s until the turn of the century. Although gold mining almost ceased during the middle years of the 20th Century there has been a resurgence in mining exploration in recent years due largely to improving gold prices and new mining and processing technologies. The development of new mines in the FMA has considerable economic potential.

Gold remains the major target of the mining industry in the Midlands FMA. Other minerals of interest include antimony and coal at Bacchus Marsh and kaolin at Lal Lal, Creswick and elsewhere.

Under the *Mineral Resources Development Act* 1990 access to State forest for exploration and mining requires a licence and approval of a Work Plan by Minerals and Petroleum Victoria (a division of NRE). Mining Work Plans include rehabilitation plans, and are approved only after consultation with the relevant land management agency. Exploration Work Plans do not require rehabilitation plans, but are subject to set of conditions which include rehabilitation measures. State and local government planning schemes apply to mining activities except where an Environment Effects Statement has been prepared.

Most of the State forest in the Midlands FMA is covered by exploration licences. Only a very small number of these is likely to proceed to mining operations. Exploration may involve drilling, large-scale remote sensing techniques, the removal of rock samples for testing, or the removal of bulk samples for proving mineral content. These activities generally have only a minor impact on forest values.

A number of small gold-mining ventures exist on State forest across the FMA particularly in the Wombat State Forest around Blackwood. The area of individual mining tenements varies from less than a hectare to 275 ha. Currently, more than 3000 ha of State forest is under 35 mining tenements, primarily mining licences.

The area disturbed by mining depends largely on the type of operation. Surface alluvial operations may impact on the whole area of a tenement, whereas an underground operation may only affect the area over which tailings are deposited and structures placed. In practice, most of the mining ventures in State forest involve small areas of disturbance (in the order of half a hectare) compared to the available area under the tenement. Off-site impacts of mining potentially include sedimentation in streams, and damage to forest roads by ore transport trucks. Two large gold mines are currently under development outside of State forest, south of Ballarat. One of these is an underground mine, the other will be a large open cut. These are representative of the type of mine that may proceed in State forest if significant economic ore deposits are identified in the future.

Aims

Permit mining and exploration in State forest in accordance with the Minerals Resources Development Act *1990.*

Minimise the impact of exploration or mining activities on State forest values.

ACTIONS

Seek to ensure that operational and rehabilitation requirements and approved work plans for all mining or exploration activities effectively protect forest values, including those identified in the Special Management and Special Protection Zones. As a minimum, these should address:

- ***biodiversity conservation***
- ***protection of catchments and streams***
- ***impacts on forest recreation and tourism and cultural and landscape values***
- ***impacts on sawlog resources***
- ***management and maintenance of forest roads.***

8.3 EXTRACTIVE MATERIALS

Private extractive sites in State forest were licensed under the *Forests Act* 1958. Extraction of rock, sand, gravel, clay or soils (including in any new NRE-managed sites) is now regulated under the *Extractive Industries Development Act* 1995 and licences are subject to the consent of, and any conditions specified by, the Secretary of Natural Resources and Environment.

NRE manages about 10 gravel pits for its own use in road maintenance operations. However, these resources are mostly of poor quality, and most NRE road surfacing material is obtained from commercially-operated quarries supplying crushed bluestone. Some NRE pits that are no longer in use require rehabilitation.

Three extractive industry work authorities exist in State forest in the Midlands FMA, covering and a total area of 43 ha. The main resources sought are rock, gravel and sand. Granitic sand is the main resource of any significant quantity in State forest in the FMA. Extractive resources in State forest are not critical to the economic development of the region. Outside of State forest, extractive materials are provided on a commercial basis from several locations. These sources generally meet the needs of private and government uses in the FMA.

Aims

Limit the use of State forest extractive material resources to:

- ***the maintenance of forest roads and other forest management operations***
- ***private or commercial uses if the resource cannot feasibly be obtained from freehold land.***

GUIDELINES FOR THE MANAGEMENT OF EXTRACTIVE ACTIVITIES

The opening of new NRE-managed pits or the consent for extractive activities and the conditions to be applied should be determined based on the:

- impact of proposals on State forest Special Management Zone
- the availability of the resource on freehold land or other sites
- environmental and other impacts of the proposal.

No new extractive activity will be allowed within the Special Protection Zone, except if it will make a significant contribution to the regional economy and the values within the Zone can be maintained or be provided elsewhere.

ACTIONS

Issue work authorities for extractive activities and open new NRE-managed pits in accordance with the Guidelines for the Management of Extractive Activities and relevant legislation.

Prepare, as required, work plans detailing procedures for stockpiling of topsoil, utilisation of available material, public safety, rehabilitation works and protection of landscape values for all extractive sites, including those directly managed by NRE.

Progressively identify and rehabilitate redundant pits on the basis of their:

- *size*
- *impact on soil and water values*
- *impact on flora and fauna values*
- *impact on timber values.*

8.4 GRAZING

Grazing in State forests within the FMA is mostly restricted to small allotments on the fringes of townships where usually a only a few sheep, cattle or horses are agisted. The natural vegetation on many of these has been substantially modified, although some allotments retain much of their natural values. Of the 44 current grazing licences issued for public land in the FMA, 27 are located on State forest and cover a total area of about 120 ha.

Licences are issued on an annual basis. State forest grazing licences for the FMA contribute a total annual rental of about $2500 (1994/95). The addition to farming income from licensed grazing on State forest in the FMA is considered to be minor. Licences are subject to regulations made under the *Forests Act* 1958, standard conditions set out by the Department, and special conditions relating to particular licences.

Grazing may compromise forest values through removal of vegetation cover and trampling, leading to loss of habitat, soil compaction and erosion, and the introduction and spread of exotic plants.

Aims

Exclude grazing by domestic stock from State forest areas retaining natural values.

Ensure ongoing grazing licences conform with sound stock and land management practices.

GUIDELINES FOR GRAZING MANAGEMENT

Grazing should be phased out from State forest allotments in which the native tree and shrub vegetation is in a substantially natural condition.

The impact of grazing by domestic stock on State forest should be regularly monitored.

Affected licensees should be consulted when the cancellation or modification of licences is under consideration.

Sites should be rehabilitated, where necessary, following cancellation of grazing licences.

No new grazing licences should be issued for State forest allotments.

ACTIONS

Review current licences to assess the impact of grazing on water quality, soil stability, flora and fauna values and fire management.

Phase out all grazing licences from allotments on State forest, which retain their natural values, by the year 2000.

Review and modify licence conditions where necessary so that they are consistent with sound land management practices.

8.5 BEE-KEEPING

The forests of the FMA are regarded as an important, though fluctuating, resource by the bee-keeping industry. They provide a source of nectar and pollen for the production of honey, beeswax and various other by-products. Most forest areas within the FMA are utilised for bee-keeping, with vehicle access being the primary limiting factor. The strategies in this Plan have been developed with regard to the NRE policy on Apiculture (bee-keeping) on Public Land.

Usage of the forest varies from year to year, depending on the flowering patterns of the eucalypts which form the major nectar resource. Species of particular value are Yellow Box (*Eucalyptus melliodora*), Messmate (*E. obliqua*), Manna Gum (*E. viminalis*), Red Box (*E. polyanthemos*) and Red Stringybark (*E. macrorhyncha*). Several shrub and understorey species also provide useful nectar resources. Because of the sporadic flowering seasons, apiarists require access to a wide range of areas to maintain honey production. Decisions to relocate annual licences or discontinue temporary permits of individual sites because of other management imperatives, need to have regard to the importance to apiarists of reliable access to nectar and pollen resources.

Access to State forests for bee-keeping is controlled through the issue of annual licences and temporary permits (3 or 6 month), usually under the *Forests Act* 1958. Licences allow access to a site for locating hives and, usually, exclusive use of forest nectar and pollen resources within a radius of 1.6 km or 0.8 km. Annual licences, which are issued for pre-determined sites, are usually automatically renewed subject to the licensees' compliance with licence conditions. As they may be transferred from one licensee to another, annual licences are often called 'permanent' licences. Temporary licences are also issued for pre-determined sites to assist orderly and efficient utilisation of the resource, while allowing licensees to capitalise on prolific flowering seasons. There are 34 annually-licensed bee farm sites and 95 sites currently identified for temporary licensing on State forest in the FMA.

Some studies suggest that introduced bees may adversely affect native ecosystems (Paton 1993). Although the magnitude of these effects has not been evaluated, issues of potential concern include:

- competition with native fauna for nectar and pollen
- a long-term decline in native pollinator populations as a result of competition for resources
- inefficient pollination of native plant species
- hybridisation of native plant species
- occupation of tree hollows by feral bees.

Bee-keeping is consistent with the broad management objectives of State forest, provided that care is taken with the location and management of apiaries. Large bee populations may interfere with recreational activities by creating a nuisance for picnickers and campers. NRE generally avoids licensing sites in the vicinity of recreation areas, at least during periods of heavy use.

Apiaries are excluded from areas reserved under the *Reference Areas Act* 1978 and the *Wilderness Act* 1992. Where these areas abut State forest, a buffer strip is identified in State forest, within which no bee farm sites are permitted.

Some forest management activities may impact on bee-keeping in State forest. The removal of all or part of the tree canopy during timber harvesting reduces the short- to medium-term availability of nectar. Retention of a few trees to provide shade for hives enables bee-keepers to use sites sooner after harvesting operations. Smoke and heat from fuel-reduction burning may kill foraging bees, and damage buds and flowers required for nectar. NRE endeavours to coordinate fuel-reduction burning activities with use of forest areas by bee-keepers to minimise conflict.

Aim

Provide apiarists with opportunities for bee-keeping in State forest while minimising any adverse impacts on other values.

ACTIONS

Maintain effective and regular liaison with bee-keeping industry organisations.

Issue licences or permits for bee farms in State forest except:

- *within 2 km of Reference Areas (scheduled under the Reference Areas Act 1978)*
- *within 500 m of developed recreation sites (see glossary)*
- *within Special Protection Zones (unless bee-keeping does not conflict with management aims)*
- *within 1.6 km of an annual bee site or 0.8 km from an occupied temporary site.*

Restrict the issue of temporary bee-farm permits to pre-determined sites to ensure orderly allocation of forest areas for bee-keeping and adequate prior consideration of the suitability of sites. Mark all sites in the field as an aid to location and management.

Allow a degree of overlap between sites if there are no management impediments, and if the affected licensees consent.

Establish new temporary sites on demand, based on a site inspection which considers, at a minimum:

- *the general suitability of the site and its proximity to other annually-licensed and temporary sites*
- *fire protection requirements*
- *the standard of access to the site and the cost of maintaining access*
- *the need for a suitable cleared area for the location of hives.*

Consult with licensees when their sites may be affected by timber harvesting, fuel-reduction burning or other forest management activities within their bee-ranges, or where unsuitably located sites must be moved.

Chapter 9
RESEARCH AND EDUCATION

9.1 RESEARCH

Understanding of forest ecosystems, management activities and their interaction is increasing as a result of forest research programs conducted by NRE and other organisations. Continued research activity is an integral part of responsible forest management.

Two long-term monitoring programs were established in the Midlands FMA during the 1960s. An extensive network of continuous forest inventory plots were established throughout the Wombat forest as a basis for improved information on forest growth rates. At Stewart's Creek, near Daylesford, a catchment hydrology experiment was established to study the impact of land use changes on water yield and quality. Both these studies continue to provide useful forest management data. During the 1980s, a major study was initiated to determine the effectiveness of low intensity prescribed fire as a fuel-reduction technique, and to investigate the ecological impacts of successive fuel-reduction burns conducted at regular and irregular intervals. These projects continue to provide valuable forest management data. Many other short- and long-term projects have been undertaken to examine the effects of management activities such as fuel-reduction burning, harvesting and regeneration systems, and thinning and fertilising on the forest. The main areas for study have been in the Wombat, Creswick and Mount Cole State Forests.

State-wide research priorities for the Forests Service are reviewed annually. Research underway or to be conducted within the Midlands FMA includes:

- the Wombat Fire-Effects Study
- Wombat and Mount Cole Mixed Species Silvicultural Systems studies – thinning and fertilising trials (including environmental impacts), reporting of the Mount Cole Armillaria study and continued monitoring of Bullarto silvicultural trial.

Specific Midlands FMA research needs have also been identified in various chapters of this Plan.

In most cases research is initiated by NRE or by educational institutions (usually Universities). NRE issues consent to organisations or individuals to undertake research on public land and may specify conditions. Currently the Ballarat University and The University of Melbourne use some specific areas of State forest for study. The period of study varies and some is opportunistic (eg. NRE trialed infra-red scanning technologies for the estimation of crown scorch following the 1995 Berringa fire in the Enfield State Forest and State Park). Depending on the nature of the study some sites may be used once or are revisited. They can provide valuable information about the forest environment.

The long-term exclusive use of areas of State forest for research may conflict with some forest management objectives, but in some circumstances the benefits outweigh the cost. Some management activities, which are incompatible with the objectives of the research, may need to be excluded. A list of NRE research sites is contained in Table 13 and are identified on the zoning map (see Maps 4 and 5).

Aim

Improve knowledge about forest ecosystems and management activities, and their interaction.

GUIDELINES FOR ASSESSMENT OF RESEARCH PROJECT APPLICATIONS

Approval for applications to undertake research should consider the duration, type and method of the study and other NRE requirements or conditions.

Use of existing research sites and reference areas or education areas in preference to State forest should be encouraged (particularly if the nature of the intended research may require the suspension of normal management activities).

Exclusive use of an area of State forest may be permitted depending on:
- the public benefit of the study
- other uses or requirements for the proposed study area
- duration of the study.

ACTIONS

Permit research projects in accordance with the guidelines listed above.

Maintain a register of research sites in State forest.

Exclude management actions that are incompatible with the objectives for approved research projects, until such time as the areas are no longer required (proposed zoning of existing research sites is shown in Table 13).

Table 13. Midlands FMA research sites

Research Project	No. of sites	Zoning	Future management
Armillaria research - Wombat and Mt Cole State Forests	25	SMZ	Exclude timber harvesting and other management activities which will affect research objectives until 2020.
Fire-effects study area (FESA) Wombat State Forest	5	SMZ	Exclude timber harvesting and other management activities which will affect research objectives in the Kangaroo Creek and Burnt Bridge FESAs until the year 2000 and the Blakeville, Musk Creek and Barkstead South FESAs until 2010.
Stewart's Creek catchment hydrology	1	SPZ	Restrict timber harvesting and any other activities to those which contribute to experimental objectives.
Forest growth plots	2	SMZ	Exclude timber harvesting and other management objectives which will affect research objectives until 2010.
Regrowth thinning and fertiliser trials in the Wombat State Forest	2	SMZ	Restrict timber harvesting and other management operations to those that are compatible with the objectives of the research until 2020.
Continuous forest inventory (CFI) plots	23 (subset of the CFI plots)	SMZ	Protect unharvested plots and a 50-metre buffer until 2020. Review the need for further protection at this time.

9.2 EDUCATION AND INTERPRETATION

State forests in the Midlands FMA are frequently visited by students from schools, universities and TAFE colleges as part of their teaching programs in the life or earth sciences, or environmental studies. NRE facilitates access to the forest for educational use, as well as provides educational information in the form of guest speakers from among NRE staff, or written resources for use by students.

The Land Conservation Council has identified a number of areas of public land in the FMA as education areas. Two of these, the Spargo Creek and Tylden North Education Areas, are managed by the Forests Service. Both receive only limited use by school groups at present and lack any specific resource material that would facilitate their use.

A good community understanding of the role of State forests and of forest management will aid the implementation of forest management programs. Providing access and resources for school and community groups is a useful basis for an improved understanding.

Aim

Improve community understanding and awareness of the role of State forests and of forest management.

ACTIONS

Continue to make NRE staff available as guest speakers for school and community groups, having regard to other management commitments.

Develop educational resource material for a variety of educational users (primary to tertiary level) to facilitate educational uses of State forest and in particular, the education areas.

Chapter 10
FOREST ROADS

The intensive and well-developed forest road and track network in the Midlands FMA reflects the history of development and utilisation of the land. The State forest road and track network amounts to 1800 km and has a variety of uses, including access for forest utilisation, recreation, fire management, and access to parks, reserves and private property. Most forest roads and tracks have multiple uses. Ongoing road works in the Midlands FMA mainly involve maintenance, modest improvement programs and minimal road construction.

Responsibility for road construction and maintenance in Victoria is shared among five agencies, summarised in Table 14. This Plan deals primarily with roads and tracks managed by NRE in State forest.

Table 14. Responsibility for road construction and maintenance in Victoria

Authority	Responsibility
Roads Corporation	Proclaimed main roads and highways
Local Government	Roads and legal easements providing access to private property
NRE	Roads and tracks on public land
Victorian Plantations Corporation	Roads and tracks in plantations on public land
Commonwealth Government	Financial contribution to the maintenance of access to Commonwealth installations on public land

Establishment of most of the forest road network, which began in the 1840s and accelerated in the 1920s with the advent of motor trucks, was largely unplanned and incremental. The main thrust of present roading programs is to rationalise and consolidate access within the forest. Major issues to be addressed include:

- cost and benefits of upgrading existing or building new roads
- NRE's capacity to maintain the present network
- provision of access for recreational purposes
- instances of duplication of access to particular forest areas
- the design, construction and maintenance of existing and new roads to maximise economic benefits and minimise environmental impacts.

The majority of forest roads in the FMA were built prior to the introduction of the *Code of Forest Practices for Timber Production* (*Code*); which specifies minimum standards of road design to ensure public safety and to minimise environmental impacts. Implementation of the *Code* has resulted in a progressive improvement in the standard of road construction and maintenance.

In addition to the standards specified by the *Code*, road management operations should also seek to:

- provide efficient, practical and direct transport routes
- minimise user costs caused by delays to traffic
- minimise vehicle damage.

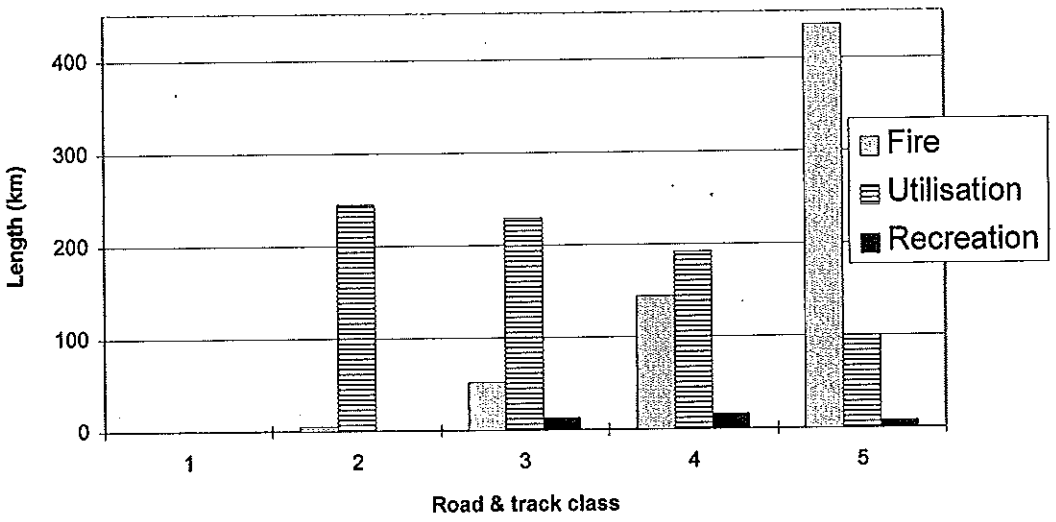
NRE is responsible for the management of the permanent road network. Where roads are used for timber extraction, maintenance and upgrading funds are provided by the timber industry through a roading charge paid on the volume of timber harvested. Timber licensees are directly responsible for the construction and maintenance and closure of temporary roads built to provide access to logging coupes.

Road classification

NRE categorises roads by function and standard. Function defines the major uses of each road. The three functions recognised in the Midlands FMA are fire management, forest utilisation and recreation. Roads may have more than one function. The primary function for the higher class roads is forest utilisation, while fire management generally requires only lower class roads.

Road standards are based on design parameters, such as carriageway width, grade, alignment and the radius of curves and the width, material, and depth of the pavement. These determine such factors as vehicle speed and access during wet weather. Forest roads and tracks are divided into five classes (Figure 2), ranging from Class 1 – surfaced, all weather, double-lane primary roads, to Class 5 – vehicular tracks which are generally four-wheel-drive only.

Figure 2. Length of roads and tracks in State forest by class and function



Aims

Provide a road network suitable for forecast levels of forest utilisation, recreation and fire management.

Design, construct, upgrade and maintain forest roads to standards adequate for intended uses, safety and minimal environmental impact.

GUIDELINES FOR ROAD MANAGEMENT

Roads should be designed, constructed, upgraded and maintained to meet specific management goals.

Roads constructed for a once-off use (e.g a fuel-reduction burning track) should be closed when no longer required.

Roads which are not designed or intended to support traffic during winter should be subjected to seasonal closures.

Roads and tracks required only for intermittent management uses (such as for fire management access) should be closed to non-management vehicles in order to reduce maintenance costs.

Roads with no current or foreseeable legitimate use should be permanently closed and rehabilitated.

Environmental impacts, recreational uses and the community benefit of roads and tracks should be considered when deciding on road maintenance or closure.

As far as is practicable road funding should be organised on a user-pays basis. Where the user-pays principle applies, the expenditure of roading funds should be planned in consultation with the users.

Road works

The present road improvement program identifies roads which require upgrading in order to meet current standards or to provide for forecast timber-transport requirements. Schedules for the construction and major improvement of roads (such as widening) in State forest are provided in the Wood Utilisation Plan, which is revised annually and includes details of major road works required in the next year and planned road works for the two subsequent years.

The need to extend the permanent road network is governed mainly by the need to provide permanent access to timber resources. In most parts of the Midlands FMA the existing road network is sufficient. Parts of the Pyrenees State Forest, however, still require further road construction and improvement to gain access to sawlog, firewood and post and pole resources.

ACTIONS

Incorporate into the Wood Utilisation Plan a three-year road construction and major road improvement schedules.

In the location, design and construction of additional roads and in major road improvements:

- *provide the shortest practical and economical haulage distance*
- *meet the requirements of as wide a range of uses (including forest utilisation, recreation and fire protection) as practicable*
- *utilise the existing road and track infrastructure*
- *minimise environmental impacts*
- *meet safety requirements.*

Road inventory and works scheduling

A computer database (the ROADS system) enables the maintenance of an inventory of roads in an area and the recording of details of maintenance schedules and road works undertaken. This database establishes the criteria for classification of forest roads based on both function and standard. The system is currently used for roads in the Mount Cole and Wombat State Forests.

A Geographic Information System (GIS) can be used to record information about a roading network based on its location in the landscape. The system enables classification of roads and sections of roads according to function and standard as well as the identification of particular roads, such as those with high visual amenity.

ACTION

Establish and maintain a comprehensive inventory of the permanent road network, road maintenance requirements and works completed throughout the FMA.

Road closures

It is sometimes necessary to periodically close forest roads or restrict their use by certain types of vehicles. Such closures may be temporary, seasonal or permanent.

NRE is responsible for decisions concerning closures of roads and tracks in State forest, national, State and regional parks and other areas of forested public land. Representatives of the Victorian Association of Four-Wheel-Drive Clubs are consulted regarding proposed road and track closures.

Temporary road closures

Temporary road closures are generally implemented for short periods of time, primarily in the interests of public safety while forest management activities are in progress. The *Code* requires suspension of the transport of logs at any time of the year during periods of wet weather.

ACTION

Implement temporary road closures on those roads:

- ***considered to be unsafe for vehicular use***
- ***undergoing management activities that will affect public safety***
- ***where continued use could result in damage to the road surface or unacceptable levels of stream sedimentation.***

Seasonal road closures

A number of forest roads and tracks in the Midlands FMA are closed from 15 June to 31 October every year. This period may be extended if unsuitable weather conditions persist. Vehicles could significantly damage these tracks during wet weather, leading to erosion and consequent environmental degradation. Roads may also be closed for the winter following road improvement works, to protect the surface from damage.

As seasonal road closures can inconvenience forest users, particularly recreational vehicle users, closures are publicly advertised in local and metropolitan newspapers. The list of seasonally-closed roads (see Table 16) is reviewed annually.

Table 16. Seasonal road and track closures in State forest in the Midlands FMA*

WOMBAT STATE FOREST	MOUNT COLE STATE FOREST
Albion Track	Branding Yards Track
Amblers Lane Track (south of Hayden Track junction with Wombat Track)	Colliers Gap Road
Billet Creek Track	Firebreak Track
Dale Creek Track	Frees Point Road
Day Track	Hutchings Track
Diggers Track	Long Gully Road
Firth Road One Track	Lower Wimmera Road
Firth Road Two Track	Manly Point Track
Four Forty One Track	Mugwamp Track (Mount Cole Road to Mugwamp picnic area)
Green Gully Track	Mugwamp Track (Mugwamp picnic area to Freemans Track)
Henry Track (western section)	Phillipson Creek Track
Howards Road	South Boundary Road
Loam Ridge Track	Telephone Track
Mahers Track	
Mount View Track	
Mount Wilson Track	
Nolans Ridge Track	
Nugget Track (Old Blackwood Road to Yankee Road section)	
Ottie Track	
Paradise Track	
Remeasure Track	
Ruth Track	
Schillitoe Track	
Swaby Track	
Toe Rag Track	
Water Commission Track	
Werribee Track	
Wheeler Track	
XL Track	

Note:

* The period of closure is usually from 15 June to 31 October each year

Permanent road closures

Permanent road or track closures may be applied for a variety of reasons, including:

- reduction of maintenance costs
- protection of environmental values
- maintenance or enhancement of recreational opportunities
- preservation of public safety
- removal of duplicated access to an area.

A road or track which has been closed to public vehicle access may be retained for use by management and emergency vehicles. Some closed roads may also be retained for recreational use by bush-walkers and horse-riders.

ACTIONS

Close roads and tracks on a seasonal basis where required to:

- *confine winter road traffic to suitable all-weather roads*
- *prevent vehicle traffic on roads and tracks which are unsafe during winter*
- *limit damage to the road and track network*
- *prevent an increase in stream sedimentation*
- *protect the road and track surfaces during the winter following road and track construction and improvement works.*

Notify the public of seasonal closures newspaper advertisements.

Permanently close and rehabilitate those roads and tracks listed in Table 17 and which:

- *no longer serve any useful purpose*
- *are potentially hazardous to users*
- *cause unacceptable levels of stream sedimentation*
- *provide access to environmentally sensitive areas.*

Erect signs to advise the public about road and track closures.

Monitor public compliance of the closures and undertake enforcement patrols where necessary.

Continue consultation with relevant four-wheel-drive groups concerning seasonal and permanent road and track closures.

Table 17. Permanent road closures in State forest in the Midlands FMA

WOMBAT STATE FOREST	MOUNT COLE STATE FOREST
Ambler Lane 1 Track	Biros Track (off Hell Hole Track to Mt Cole Main Road) *
Ambler Lane 2 Track	Hell Hole Track *
Campaspe One Link Track	Branding Yard Track (from track junction to Sibbrett Point) *
Campaspe Two Link Track	Ditchfield Road to Dairymaid Road Track *
Fingerpost One Track	Old Dairy Maid Track *
Fingerpost Two Track	Link Track (between Mt Buangor Track and Mugwamp) *
Firth Road One Track	Victoria Hill Road *
Firth Road Two Track	Track between Old Dairy Maid Road and Frees Point Road (unnamed) *
Firth Road Three Track	
German Gully Track	
Gerrys Link Track *	
Johnson Corner Track	
Hayden Track * (south of junction with Wombat Track)	
off Burnt Mill Road (four tracks) *	**COBAW STATE FOREST**
off Gerry Road Track	Croziers and Greenways Link Track
Old Bullarto Track	Greenways and Croziers Link Track
Stockyard Track	Mansfield Track
Wombat Station Track	off Camp One Track
	off Camp Two Track
	Reillys Cross Track
	Ridge Track
	Soil Pit Track

Note: *Tracks to be retained as access for management vehicles only, particularly for fire-suppression purposes.

Shared responsibilities

NRE shares responsibility for the maintenance of some roads with either local government or the Victorian Plantations Corporation. Several organisations can have responsibility for different sections of a road, but it may maintained by one of the organisations involved. This informal division of responsibility has been established over many years.

Commonwealth Government

Telecommunications facilities at Mount Ben Nevis and Lookout Hill (both in the Mount Cole State Forest) are managed by agencies of the Commonwealth Government. Road access to these sites is maintained by NRE using funds provided by the respective Commonwealth agency.

Victorian Plantations Corporation

State-owned softwood plantations and associated roads are managed by the Victorian Plantation Corporation. In the Midlands FMA, many of these plantations are surrounded by, or are adjacent to, areas of State forest, State parks or regional parks. Public land surrounding the township of Creswick, for instance, includes pine plantations, State forest and regional park. Roads managed by NRE may be required for the haulage of plantation sawlogs and residual logs and, conversely, plantation roads may be required for haulage of hardwood sawlogs and residual logs.

ACTION

Liaise with the Victorian Plantations Corporation to establish appropriate cost sharing arrangements for shared forest roads, taking into account:

- ***the standard and length of the roads along haulage routes***
- ***the volume, frequency and season of log haulage***
- ***other users of the roads.***

Road funding

Where practicable, funding of road works is to be arranged on a user-pays basis. Where the user-pays principle applies, expenditure of roading funds is planned in consultation with the users.

Funding for roading programs is obtained from two major sources: the 'roading charge' component of timber royalties and allocations from State Treasury. Disbursement of the former occurs in consultation with the timber industry through the Midlands Roading Advisory Committee and is spent on roads that are used for timber extraction for more than three years in any ten-year period. Funds from the State Treasury are allocated to roads which are primarily used for recreation, fire management or other community service benefits. The Treasury may also allocate specific grants to maintain or improve roads, tracks or recreation facilities associated with the use of four-wheel-drive vehicles.

ACTION

Continue liaison with the timber industry, through the Midlands Roading Advisory Committee, regarding the level of the roading charge and the priorities for the expenditure of funds raised by the roading charge.

Chapter 11
PLAN IMPLEMENTATION

The Forests Service comprises four business units:

Forest Management - *provides for the sustainable management of Victoria's State forest through policy development and management planning*

Commercial Forestry - *responsible for activities related to the commercial use of State forest and for ensuring that these activities generate an acceptable commercial return*

Fire Management - *responsible for fire prevention and suppression on public land in Victoria*

Centre for Forest Tree Technology - *provides information through research for the management of publicly-owned native forest and plantations.*

Each of these business units will play a role in the implementation of the Forest Management Plan over the next ten years.

The Manager, Forests and Fire – South West Region will be responsible for ensuring overall implementation of this Plan which will entail:

- adoption of the zoning scheme for day-to-day forest management activities
- ongoing multi-disciplinary planning to ensure that management strategies and the zoning scheme are up to date and based on the best available information
- implementation of specific initiatives
- monitoring and reporting to assess the effectiveness of the Plan and its implementation.

The Senior Forester – Midlands will be responsible for all actions relating to the commercial use of State forest, including harvesting and regeneration, regrowth management, sawlog and residual log production and other commercial uses of forest produce.

11.1 REVIEWING THE PLAN

The management of Victoria's State forests is based on the best available information and an innovative and progressive approach to natural resource management. This Plan provides for the refinement of management guidelines, prescriptions and the zoning scheme in response to new information or changes in government policy, community expectations, technology and timber market conditions. A key feature of this Plan is the use of management guidelines for natural values, and the translation of these into the Special Protection and Special Management Zones. Inherent in the process is the provision to improve management guidelines and the zoning scheme in response to new information. Refinements will be made in an objective, systematic manner to avoid disruption to the forward planning and conduct of timber harvesting operations. A multi-disciplinary approach is essential to this process.

This Plan applies until 2006 or unless circumstances warrant a major review. Such a review may occur in five years' time to incorporate information from the Statewide Forest Resource Inventory and Ecological Vegetation Class surveys.

ACTIONS

Each year the Manager, Forest and Fire – South West Region will:

- *review and certify to the Regional Manager – South West Region the Wood Utilisation Plan prepared by the Senior Forester – Midlands*
- *approve prescriptions for the preparation of coupe plans for harvesting in the Special Management and General Management Zones*
- *consider new information and, if necessary, make recommendations on possible refinements or amendments to management strategies or the zoning scheme. (Guidelines for reviewing management strategies and management zones are set out below.)*

The zoning scheme will be mapped at a scale of 1:25 000 and printed on base maps to be used for day-to-day forest management activities. Up-to-date copies will be lodged at the Ballarat, Daylesford, Maryborough and Beaufort offices of NRE and will be available for public inspection.

GUIDELINES FOR REVIEWING MANAGEMENT STRATEGIES AND ZONES

Management guidelines in this Plan will be reviewed under the following circumstances:

- when research information on key species becomes available (for example, on completion of population viability analyses for forest owls, or the location of significant populations of the Brush-tailed Phascogale)
- if new species are identified that are considered to be threatened
- as required by new legislation, policies or action statements.

Management zone boundaries may require review if:

- changes to management strategies for certain species or values mean that the zoning system is more or less than adequate for those values
- field inspections or better mapping indicate that minor amendments are required to create practical management boundaries
- a zone is found not to contain the values for which it was identified - amendments may be required to ensure that conservation targets are met
- new records are listed for species whose conservation targets have not been met
- new records of some species warrant changes to zones to include areas of good-quality habitat in exchange for areas of poorer quality habitat
- existing boundaries are found to place unnecessary restrictions on practical access to areas for timber production or for infrastructure development (easements etc).

Proposed changes to the zoning scheme will be assessed according to whether they:

- adequately conserve the values listed in the zoning scheme register (Appendix B). There should be no net deterioration in the standard of protection of values in the SPZ.
- maintain a well-distributed, inter-connected network of protected areas
- minimise practical problems for timber harvesting or access in the General Management Zone
- make the best use of areas that are unavailable for timber harvesting due to other considerations such as slope, access and site quality
- avoid conflict with strategic burning corridors.

ACTION

Each year an up-to-date zoning map and a list of any proposed zone will be made available for public viewing and comment. Following consideration of comments received and relevant specialist advice, approval will be sought from the Secretary of the Department of Natural Resources and Environment for adoption of the revised zones.

11.2 WOOD UTILISATION PLANNING

While the zoning scheme establishes the area of State forest available for timber harvesting, the volume of forest products to be supplied is specified in sawlog licences issued on the basis of sustainable yield forecasts. Sawlog licence conditions require NRE to provide licensees with Wood Utilisation Plans (WUP) by 31 March each year. WUPs specify the individual areas (coupes) of State forest that are approved for harvesting to meet licence commitments. They are supplied to a consortium of sawlog licensees who organise the harvesting and transport of logs. Harvesting is supervised by NRE and must be conducted by licensed operators in accordance with the *Code of Forest Practices for Timber Production*.

In the past, preparation of WUPs involved individual consideration of each proposed logging coupe to ensure compliance with policy commitments to conserve forest values (flora, fauna, landscape, soil and recreation opportunities). The information formerly used to check individual coupes has been used to develop the management strategies and zoning scheme in this Plan. This will streamline preparation of WUPs and remove some of the delays and difficulties inherent in the old system. New information will be considered with a view to the possible amendment of the zoning scheme or management strategies rather than considering coupes in isolation.

ACTION

The Senior Forester – Midlands will prepare the rolling three-year Wood Utilisation Plan in accordance with Departmental guidelines and consistent with the content of this Plan and licence requirements.

11.3 MONITORING

Integral to sustainable forest management is the development of criteria and indicators against which the effects of forest management and utilisation activities can be determined. In response to this need, identified in the *National Forest Policy Statement*, a working party was established with the task of developing a set of national baseline standards against which the criteria for forest management and utilisation activities can be assessed. The working group found that such standards should be progressively developed and incorporated into codes of practice for forest operations (JANIS 1995).

NRE has a number of processes established to monitor forest management and utilisation activities, including:

- Regular audits of timber harvesting operations in State forest are undertaken to provide information on implementation of the *Code of Forest Practices for Timber Production.*
- Water quality in State forest streams is regularly monitored through the Victorian Water Quality network. These data can be used to detect trends in water quality and yield in forest catchments.
- Forest areas subject to timber harvesting and other management operations are recorded each year, and timber volume and area harvested are compared to forecasts of sustainable yield.
- The Statewide Forest Resource Inventory project is establishing a consistent description for forests throughout the State and will provide a baseline for future monitoring of changes in the condition of the forests.
- Forest sawlog growth and standing sawlog and residual volume are monitored through measurement of the Continuous Forest Inventory plots.
- The Pest Management Information System provides the means to record pest infestations and to report on the effectiveness of control programs.
- The Wildlife Atlas and Flora Information System provides a means of collecting and reporting on flora and fauna data collected by a wide variety of sources.

Geographic Information Systems assist in data recording and storage, and enable the analysis of data sets to examine the relationship between proposed forest operations and forest management zones and to determine the area subject to harvesting.

A primary goal of this Plan is the conservation of flora and fauna across their range and, since the measurement of all forest species is not feasible, appropriate indicators should be selected. These indicators could include arboreal mammals, forest dwelling owls, medium-sized ground marsupials, litter- and log-dwelling invertebrates and flora and fauna in streams (JANIS 1995).

ACTION

Continue existing monitoring activities including, in particular, audits of the Code of Forest Practices for Timber Production, and the collection of data on areas and volumes of timber harvested.

Develop and progressively implement criteria and indicators for forest biodiversity, water quality and other environmental values.

11.4 REPORTING

Implementation of this Plan is a key step in ensuring the sustainability of forest management in the Midlands Forest Management Area. Accordingly, it is important to regularly review and report on its implementation. These reviews will provide the basis for systematically adapting the Plan to changing information and circumstances and thus, ensuring it remains relevant.

ACTION

Prepare an annual report, to coincide with the release of the Wood Utilisation Plan, on implementation of the Forest Management Plan which may include:

- *implementation of biodiversity management guidelines, new records of threatened species, and any observed responses to management initiatives*
- *key timber production data, such as area and volume harvested by product type, areas thinned or subject to other stand improvement operations critical to the maintenance of sustainable yield, and the outcomes of regeneration and stocking surveys*
- *water quality and yield prescriptions and, in particular, the extent of harvesting in Designated Catchment Special Management Zones*
- *implementation of pest plant and animal control guidelines*
- *recreation and tourism initiatives*
- *major road maintenance or construction works*
- *compliance with the* Code of Forest Practices for Timber Production *and* Timber Harvesting Regulations *(1989)*
- *significant research outcomes.*

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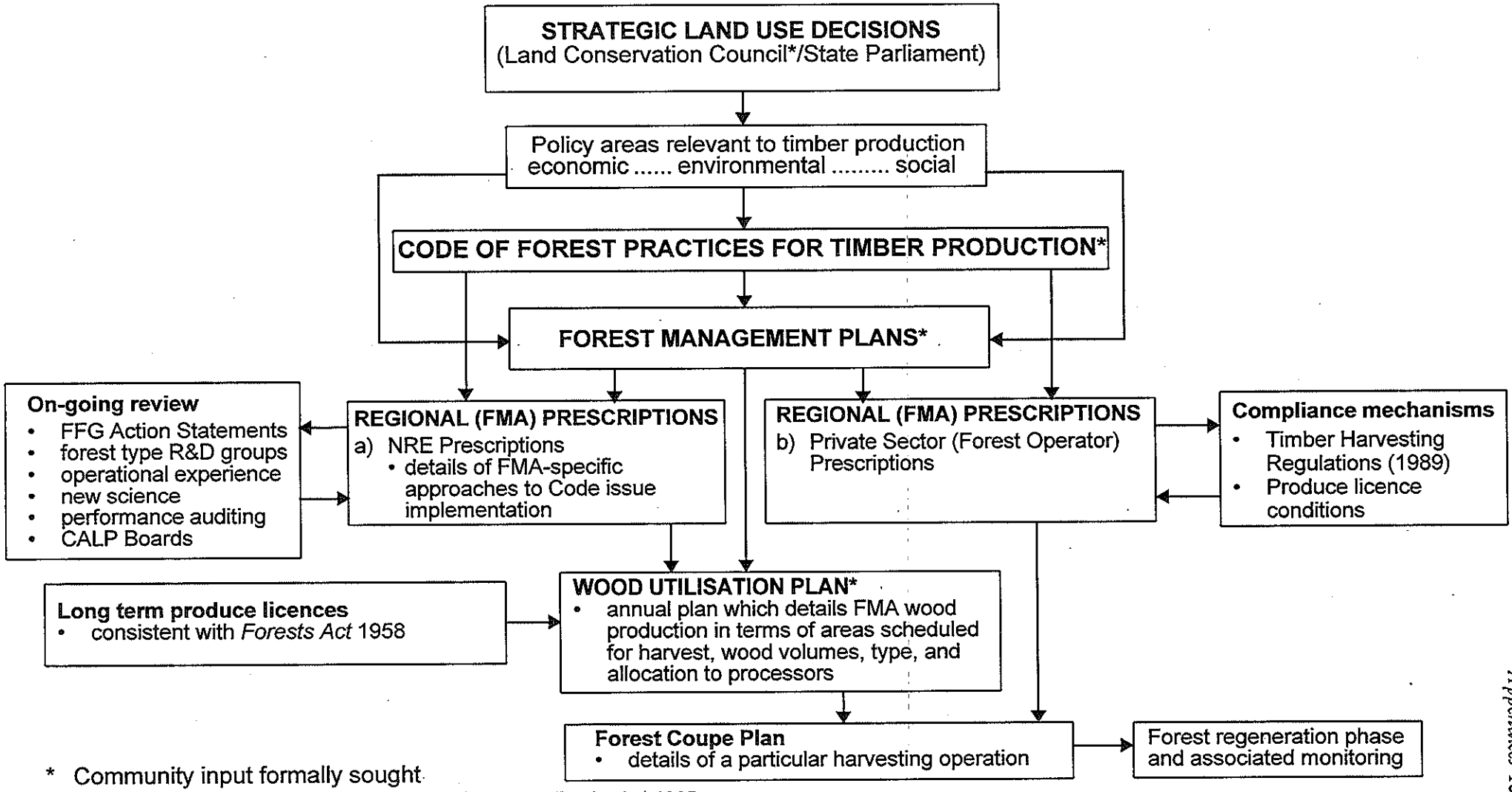
APPENDICES

APPENDIX A

Planning and control of the environmental aspects of timber production operations on public land in Victoria



* Community input formally sought

Source: Proposed Code of Forest Practices for Timber Production 1995

APPENDIX B

Zoning scheme register

(Note: Small areas have not been separately identified to assist with the clarity of the maps. Where SPZ overlays SMZ, usually only the SPZ attributes are described)

WEST SHEET - MAP NUMBER 4

Site Number	Zone	Attributes
Pyrenees State Forest		
1	SPZ	Linear reserve
2	SPZ	Retained habitat
3	SPZ	Semi-remote recreation opportunity
4	SPZ	Linear reserve and Semi-remote recreation opportunity
5	SPZ	Semi-remote recreation opportunity
6	SPZ	Semi-remote recreation opportunity
8	SPZ	Linear reserve
9	SPZ	Governor's Rock Scenic Reserve
11	SMZ	Powerful Owl habitat
12	SMZ	Powerful Owl habitat
13	SMZ	Powerful Owl habitat
14	SPZ	Linear reserve
15	SPZ	Linear reserve
16	SPZ	Waterfalls Scenic Reserve
17	SPZ	Retained habitat
18	SPZ	Retained habitat
19	SPZ	Retained habitat
20	SMZ	Sugarloaf designated catchment
21	SMZ	Sugarloaf designated catchment
22	SPZ	Linear reserve
23	SPZ	Linear reserve
24	SMZ	Sugarloaf designated catchment
25	SPZ	Retained habitat
26	SPZ	Retained habitat
27	SPZ	Retained habitat
Dunneworthy State Forest		
28	SPZ	Retained habitat
29	SPZ	Linear reserve
30	SPZ	Retained habitat
Mount Cole State Forest		
7	SMZ	Elmhurst designated catchment
10	SMZ	Powerful Owl habitat
31	SMZ	Collier Gap designated catchment
32	SMZ	Powerful Owl habitat
33	SMZ	Collier Gap designated catchment, Powerful Owl habitat
34	SPZ	Ben Nevis Scenic Reserve
35	SPZ	Linear reserve
36	SPZ	Linear reserve
37	SPZ	Linear reserve
38	SMZ	Powerful Owl habitat, Shepards Creek designated catchment
39	SPZ	Linear reserve
40	SPZ	Ben Nevis Scenic Reserve

Site Number	Zone	Attributes
41	SPZ	Retained habitat
42	SPZ	Linear reserve
43	SMZ	Elmhurst designated catchment, Powerful Owl habitat
44	SMZ	Elmhurst designated catchment
45	SMZ	Elmhurst designated catchment
46	SMZ	Elmhurst designated catchment, Powerful Owl habitat
47	SMZ	Shepards Creek designated catchment, Powerful Owl habitat
48	SPZ	Linear reserve
49	SMZ	Powerful Owl habitat
50	SMZ	Powerful Owl habitat, Shepards Creek designated catchment
51	SPZ	Linear reserve
52	SPZ	Linear reserve, Powerful Owl habitat and Recreation facility
53	SPZ	Linear reserve, Powerful Owl habitat
54	SPZ	Powerful Owl habitat
55	SPZ	Powerful Owl habitat
56	SPZ	Powerful Owl habitat
57	SMZ	Powerful Owl habitat
59	SMZ	Powerful Owl habitat, Shepards Creek designated catchment
60	SMZ	Mountain Brushtail Possum habitat, Powerful Owl habitat, Shepards Creek designated catchment
61	SMZ	Powerful Owl habitat, Shepards Creek designated catchment
62	SMZ	Powerful Owl habitat, Shepards Creek designated catchment
63	SPZ	Linear reserve
64	SPZ	Powerful Owl habitat, Victoria Mill Scenic Reserve, recreation facility
65	SPZ	Victoria Mill Scenic Reserve, recreation facility
66	SMZ	Powerful Owl habitat
67	SMZ	Powerful Owl habitat, Mt Cole Creek designated catchment
68	SMZ	Long Gully designated catchment, Powerful Owl habitat
69	SPZ	Mugwamp Picnic and Camping Area
70	SMZ	Long Gully designated catchment
71	SPZ	Retained habitat
72	SPZ	The Glut Scenic Reserve, recreation site
73	SPZ	The Glut Scenic Reserve, recreation site
74	SPZ	Linear reserve
75	SPZ	Linear reserve
76	SPZ	Linear reserve
77	SPZ	Retained habitat
78	SPZ	Retained habitat
79	SPZ	Linear reserve
Ben Major State Forest		
80	SPZ	Retained habitat, Powerful Owl habitat
88	SMZ	Powerful Owl habitat

Site Number	Zone	Attributes
Waterloo State Forest		
87	SMZ	Powerful Owl habitat
89	SPZ	Linear reserve
Musical Gully State Forest		
90	SMZ	Powerful Owl habitat, Musical Gully designated catchment
91	SMZ	Powerful Owl habitat
92	SMZ	Powerful Owl habitat, Musical Gully designated catchment
93	SPZ	Powerful Owl habitat
94	SPZ	Powerful Owl habitat
Trawalla State Forest		
95	SPZ	Retained habitat
EAST SHEET - MAP NUMBER 5		
Linton and Enfield State Forest		
96	SPZ	Retained habitat
97	SPZ	Powerful Owl habitat
98	SMZ	Powerful Owl habitat
99	SMZ	Powerful Owl habitat
100	SPZ	Linear reserve
101	SPZ	Linear reserve
102	SPZ	Retained habitat
103	SPZ	Retained habitat
104	SPZ	Linear reserve
105	SPZ	Retained habitat
106	SPZ	Retained habitat
107	SPZ	Retained habitat
Canadian State Forest		
108	SPZ	Retained habitat
Creswick State Forest		
109	SPZ	Retained habitat
110	SPZ	Retained habitat
111	SPZ	Retained habitat
112	SMZ	White Swan designated catchment
113	SMZ	Powerful Owl habitat
114	SMZ	Powerful Owl habitat
115	SMZ	Powerful Owl habitat
Lal Lal State Forest		
116	SMZ	Lal Lal designated catchment
118	SPZ	Linear reserve
119	SPZ	Retained habitat
120	SPZ	Retained habitat
121	SPZ	Linear reserve
122	SPZ	Linear reserve
123	SPZ	Retained habitat
124	SPZ	Linear reserve
125	SPZ	Linear reserve
Whipstick State Forest		
126	SPZ	Retained habitat
127	SPZ	Linear reserve
128	SPZ	Retained habitat

Site Number	Zone	Attributes
Wombat State Forest		
Hepburn Area		
131	SMZ	Powerful Owl habitat
Barkstead Area		
129	SPZ	Retained habitat
132	SPZ	Linear reserve
134	SMZ	Korweinguboora designated catchment
135	SMZ	Moorabool designated catchment
136	SPZ	Linear reserve
137	SMZ	Fire Effects Study Area
138	SPZ	Retained habitat
139	SMZ	Armillaria Reference Site
140	SMZ	Korweinguboora designated catchment
Blakeville/Spargo Creek Area		
141	SPZ	Powerful Owl habitat
142	SPZ	Linear reserve
143	SPZ	Powerful Owl habitat
144	SPZ	Powerful Owl habitat
145	SPZ	Powerful Owl habitat, Linear reserve
146	SPZ	Powerful Owl habitat
147	SPZ	Linear reserve
148	SPZ	Powerful Owl habitat
149	SMZ	Powerful Owl habitat
150	SMZ	Powerful Owl habitat
151	SMZ	Powerful Owl habitat
152	SMZ	Powerful Owl habitat
153	SPZ	Linear reserve
154	SMZ	Powerful Owl habitat
155	SMZ	Powerful Owl habitat
156	SMZ	Powerful Owl habitat
157	SMZ	Colbrook designated catchment, Powerful Owl habitat
158	SMZ	Colbrook designated catchment, Powerful Owl habitat, Greater Glider habitat
159	SMZ	Colbrook designated catchment, Greater Glider habitat
160	SMZ	Greater Glider habitat
161	SMZ	Powerful Owl habitat, Greater Glider habitat
162	SPZ	Greater Glider habitat, Powerful Owl habitat
163	SPZ	Powerful Owl habitat, Linear reserve
164	SPZ	Retained habitat, Powerful Owl habitat
166	SPZ	Linear reserve
168	SPZ	Powerful Owl habitat, Greater Glider habitat (and Fire Effects Study Area - SMZ)
169	SPZ	Greater Glider habitat, Powerful Owl habitat
170	SPZ	Greater Glider habitat, Powerful Owl habitat
171	SMZ	Colbrook designated catchment
172	SPZ	Retained habitat
175	SMZ	Pykes Creek designated catchment
176	SMZ	Pykes Creek designated catchment
178	SPZ	Linear reserve
179	SPZ	Nolans Creek Recreation Site, Lerderderg Heritage River
326	SPZ	Linear reserve
328	SPZ	Linear reserve
Blackwood Area		
180	SMZ	Powerful Owl habitat
181	SMZ	Pykes Creek designated catchment, Powerful Owl habitat
183	SMZ	Powerful Owl habitat
185	SPZ	Linear reserve

Site Number	Zone	Attributes
186	SMZ	Powerful Owl habitat
187	SMZ	Blackwood designated catchment, Powerful Owl habitat
188	SMZ	Blackwood designated catchment
189	SMZ	Blackwood designated catchment
190	SMZ	Blackwood designated catchment
191	SMZ	Armillaria Reference Site, Blackwood designated catchment
192	SMZ	Powerful Owl Habitat, Blackwood designated catchment, Armillaria Reference Site
193	SPZ	Linear reserve
194	SPZ	Linear reserve
195	SMZ	Fire Effects Study Area
196	SPZ	Linear reserve
197	SPZ	Linear reserve
329	SPZ	Retained habitat, Lerderderg Heritage River
East Trentham Area		
173	SPZ	Linear reserve
199	SPZ	Linear reserve
200	SPZ	Retained habitat
201	SPZ	Linear reserve
202	SPZ	Linear reserve
203	SPZ	Linear reserve
204	SMZ	Powerful Owl habitat
205	SPZ	Firth Park Recreation Area
206	SMZ	Powerful Owl habitat
207	SMZ	Powerful Owl habitat, Rosslynne designated catchment
208	SMZ	Rosslynne designated catchment
209	SPZ	Linear reserve
210	SPZ	Linear reserve
211	SPZ	Retained habitat
212	SMZ	Powerful Owl habitat
213	SMZ	Thinning research trial
214	SMZ	Rosslynne designated catchment
215	SPZ	Retained habitat
216	SPZ	Linear reserve
217	SPZ	Linear reserve
218	SMZ	Powerful Owl habitat
219	SPZ	Linear reserve
220	SPZ	Anderson's Sawmill Site (part of Firth Park Recreation Site)
221	SPZ	Powerful Owl habitat
222	SPZ	Linear reserve, Powerful Owl habitat
223	SPZ	Powerful Owl habitat, Spot-tailed Quoll habitat
224	SMZ	Powerful Owl habitat
225	SMZ	Rosslynne designated catchment, Powerful Owl habitat
226	SPZ	Spot-tailed Quoll habitat, Powerful Owl habitat
227	SPZ	Spot-tailed Quoll habitat
228	SPZ	Spot-tailed Quoll habitat, Powerful Owl habitat
229	SPZ	Spot-tailed Quoll habitat, Retained habitat
230	SMZ	Rosslynne designated catchment
231	SMZ	Rosslynne designated catchment
232	SMZ	Rosslynne designated catchment
233	SMZ	Powerful Owl habitat
234	SMZ	Powerful Owl habitat
235	SMZ	Powerful Owl habitat
249	SPZ	Powerful Owl habitat and retained habitat

Site Number	Zone	Attributes
Kangaroo Creek/Coliban Area		
236	SPZ	Linear reserve
237	SPZ	Linear reserve
238	SPZ	Linear reserve
239	SPZ	Fire Effects Study Area
240	SMZ	Fire Effects Study Area
241	SMZ	Fire Effects Study Area
242	SPZ	Linear reserve
243	SPZ	Linear reserve
244	SMZ	Powerful Owl habitat
246	SPZ	Powerful Owl habitat (and Silvicultural trial - SMZ)
247	SMZ	Powerful Owl habitat
248	SMZ	Powerful Owl habitat
250	SPZ	Powerful Owl habitat
252	SPZ	Lyonville Springs recreation site
253	SPZ	Wombat Creek recreation Site
254	SMZ	Powerful Owl habitat, Bullarto designated catchment
255	SMZ	Bullarto designated catchment
256	SMZ	Wombat designated catchment
257	SMZ	Wombat designated catchment
258	SPZ	Linear reserve
259	SPZ	Linear reserve
260	SPZ	Stewarts Creek research area
312	SMZ	Bullarto designated catchment
313	SPZ	Powerful Owl habitat
314	SPZ	Powerful Owl habitat
315	SPZ	Powerful Owl habitat
316	SPZ	Linear reserve, Powerful Owl habitat
317	SMZ	Bullarto designated catchment
318	SMZ	Powerful Owl habitat
319	SPZ	Linear reserve
320	SPZ	Linear reserve
321	SMZ	Bullarto designated catchment
322	SMZ	Bullarto designated catchment, Powerful Owl habitat
323	SMZ	Armillaria reference site
324	SMZ	Armillaria reference site
325	SMZ	Armillaria reference site
326	SPZ	Linear reserve
327	SPZ	Linear reserve
Pyrete Range (Wombat State Forest)		
270	SMZ	Powerful Owl habitat, Merrimu designated catchment
271	SMZ	Merrimu designated catchment
272	SMZ	Merrimu designated catchment
273	SMZ	Merrimu designated catchment
274	SMZ	Merrimu designated catchment
275	SMZ	Merrimu designated catchment
276	SMZ	Powerful Owl habitat, Merrimu designated catchment
277	SMZ	Djerriwarrh designated catchment, Powerful Owl habitat
278	SMZ	Djerriwarrh designated catchment, Powerful Owl habitat
279	SMZ	Djerriwarrh designated catchment
280	SMZ	Djerriwarrh designated catchment
281	SMZ	Merrimu designated catchment, Powerful Owl habitat
282	SMZ	Merrimu designated catchment, Powerful Owl habitat

Site Number	Zone	Attributes
283	SPZ	Linear reserve
284	SPZ	Linear reserve, Powerful Owl habitat
285	SPZ	Powerful Owl habitat, Retained habitat
286	SPZ	Retained habitat
287	SPZ	Retained habitat, Powerful Owl habitat
288	SPZ	Linear reserve
289	SPZ	Semi-remote recreation opportunity
290	SPZ	Linear reserve, Semi-remote recreation opportunity
291	SPZ	Semi-remote recreation opportunity
292	SPZ	Semi-remote recreation opportunity, Powerful Owl habitat
293	SPZ	Linear reserve, Semi-remote recreation opportunity
294	SPZ	Linear reserve, Semi-remote recreation opportunity, Powerful Owl habitat
297	SPZ	Powerful Owl habitat, Semi-remote recreation opportunity
299	SPZ	Semi-remote recreation opportunity
300	SPZ	Powerful Owl habitat
301	SPZ	Semi-remote recreation opportunity
302	SPZ	Linear reserve
303	SPZ	Powerful Owl habitat, Semi-remote recreation opportunity
304	SPZ	Linear reserve
307	SPZ	Linear reserve
Cobaw State Forest		
261	SMZ	Powerful Owl habitat
262	SPZ	Powerful Owl habitat
263	SPZ	Retained habitat
264	SPZ	Powerful Owl habitat, Retained habitat
265	SMZ	Powerful Owl habitat
266	SPZ	Powerful Owl habitat
267	SPZ	Retained habitat, Powerful Owl habitat
268	SPZ	Retained habitat
269	SPZ	Retained habitat

APPENDIX C

Description of the Geographic Representation Units

Unit 1. Pyrenees–Dunneworthy

This GRU occupies the north-western corner of the FMA and includes the Pyrenees Ranges and the Dunneworthy State Forest, near Ararat. The majority of public land is State forest. Major conservation reserves are the Landsborough Flora and Fauna Reserve and the Percydale Historic Area, both in the Pyrenees.

Most of the unit lies on sedimentary rocks of Upper Cambrian origin. Land-forms in forest areas comprise mostly gentle to steep hills. Annual rainfall ranges between about 500 mm and 700 mm.

Forest type varies with rainfall from box–gum woodland in the dry parts of the Dunneworthy State Forest, which are generally not sawlog-productive, to Messmate-dominated forests on the upper slopes of the Pyrenees, which supply about 2000 m^3 of sawlogs per annum.

Unit 2. Beaufort–Mount Cole

Occupying the central-western part of the FMA, this GRU is dominated by the Mount Cole range. Most public land here is State forest but the unit also contains the Buangor and Langi Ghiran State Parks and the Ben Major Flora Reserve.

The steep hills of the Mount Cole range have formed on Lower Devonian granites. Other parcels of State forest, such as Trawalla south of Beaufort, lie on Upper Cambrian sedimentary rocks and mostly comprise gentle to moderate hills. Rainfall varies from about 700 mm to nearly 1000 mm on the upper slopes of the Mount Cole range.

The wetter parts of the unit support productive Messmate/Peppermint/Gum Open Forest. Drier areas support Red Stringybark/Box and Gum/Box Open Forests and Woodlands. The Mount Cole State Forest supplies about 6000 m^3 of sawlogs per annum and is the second most important source of sawlogs in the FMA. Recreation is also an important use of the State forests and parks of the Mount Cole range.

Unit 3. Wombat–Creswick

This unit occupies the north-eastern part of the FMA, lying generally east of Ballarat and north of the Western Highway. It contains the largest blocks of public land in the FMA, principally the Wombat State Forest and the adjoining Lerderderg State Park, as well as a large number of smaller areas of public land.

Except for some igneous rocks at Mount Macedon, the forests lie almost entirely on Ordovician or Tertiary sediments. Extensive areas of Quaternary basalts surrounding the forested public land have been almost entirely cleared for agriculture. Land forms in the forested areas are mostly gentle to steep hills. Rainfall in this unit is the highest for the FMA, exceeding 800 mm over extensive areas of the Wombat State Forest and reaching 1000 mm at its higher elevations.

Most of the forests in this unit comprise Messmate/Peppermint/Gum Open Forest. In drier areas, Red Stringybark/Box forests occur. The Messmate-dominated forests are the major source of sawlogs in the FMA, providing about 55 000 m^3 per annum.

Unit 4. Enfield–Brisbane Ranges

Lying south of Ballarat and Bacchus Marsh, this unit comprises State forest around Enfield and Linton but also includes the Brisbane Ranges National Park and the Enfield and Werribee Gorge State Parks.

Underlying geology in forested areas is mostly Ordovician sediments, with Tertiary sediments more common in the eastern part of the unit, underlying the Brisbane Ranges. Forest landforms are mostly gentle to moderate hills but areas of steep hills occur around Mount Doran and on the escarpment of the Brisbane Ranges. Rainfall is generally less than 700 mm, falling below 500 mm in the Brisbane Ranges.

The forest types of the unit reflect the relatively low rainfall and shallow soils. Messmate is confined to the wetter areas and the majority of the forests comprise Red Stringybark/Box Open Forest and similar associations. The unit makes a minor contribution to sawlog production (about 2000 m^3 per annum).

Unit 5. Geelong

The Midlands FMA extends south to Geelong and the Bellarine Peninsula. Forest and woodlands in this unit are confined to the You Yangs Regional Park and the Inverleigh Flora and Fauna Reserve. Posts, poles and firewood are supplied from Sugar Gum plantations in the You Yangs. Because it contains no substantial areas of State forest, this unit has been excluded from most analyses in the Plan.

APPENDIX D

Representative conservation of Midlands FMA vegetation communities in Geographic Representation Units

Vegetation Community	Pyrenees/Dunneworthy		Mt Cole/Beaufort		Enfield/Brisbane Ranges		Wombat/Creswick		Total*	
	Area (ha)	Protected (%)	Area (ha)	Protected (%)	Area (ha)	Protected (%)	Area (ha)	Protected (%)	Area (ha)	Protected (%)
Snow Gum Open Forest I / Woodland I	0	—	22	100	0	—	11	100	33	100
Alpine Ash/Mountain Ash Open Forest IV	0	—	0	—	0	—	136	100	136	100
Swamp Gum Open Forest I/II	0	—	0	—	391	100	0	—	391	100
Box Ironbark Open Forest I/II	674	46	0	—	0	—	0	—	674	46
Gum/Peppermint Open Forest I/II	0	—	2234	54	0	—	0	—	2234	54
Gum/Box Woodland I/ Open Forest I	2390	46	2124	55	0	—	60	100	4574	51
Scent Bark/Peppermint Open Forest I/II	0	—	1021	14	809	13	1144	91	2974	43
Red Stringybark/Box Open Forest I/II	12 246	40	9955	53	0	—	165	100	23 866	43
Stringybark/Peppermint Open Forest I/II	0	—	0	—	19 924	68	17171	74	34 095	71
Messmate/Peppermint/Gum Open Forest II/III	9595	24	7314	22	16 166	41	60 663	31	93 738	31

Geographic Representation Units are described in Chapter 2.

Protected areas are public land in the parks and reserves system and Special Protection Zones in State forest. Additional protection for vegetation communities is provided in State forest reserves required under the *Code of Forest Practices for Timber Production*.

*Totals exclude the Geelong Geographic Representation Unit where no representation analyses have been conducted.

APPENDIX E
Conservation guidelines for Powerful Owls

Powerful Owls occupy and defend large territories. The size of the territory is partly determined by the population density of arboreal mammals which form a large part of their diet. Pairs are monogamous and annually return to nesting sites in large hollow trees. Outside of the breeding season, the birds roost in tall trees with dense foliage such as Blackwood or Cherry Ballart. The species has been recorded in a wide range of forest types including tall wet forests on Mount Macedon to low dry open forest in the north and west of the FMA. Conservation of this large, predatory species with a naturally low population density and specific habitat requirements is a major challenge for forest management. A FFG Action Statement is in preparation for the species.

TARGET POPULATION

NRE will ensure that core habitat requirement for a minimum of 25 pairs of Powerful Owls will be provided in the Midlands FMA. This figure is based on estimates of the viable population of Powerful Owls in Victoria and the proportion of suitable Powerful Owl habitat in the Midlands FMA. This figure is a preliminary one and will be refined as more sophisticated estimates are made of the viable population of Powerful Owls.

The overall FMA target will be broken down into specific targets for each Geographic Representation Unit as follows:

Planning unit	Currently protected post-1985 records	Planned target (pairs)	Area of currently protected habitat (all public land) (ha)
Pyrenees/Dunneworthy	1	3	525
Beaufort/Mt Cole	5	4	3 570
Wombat/Creswick	14	14	9 180
Enfield/Brisbane Ranges	4	4	2 465
Total	24	25	15 740

The target population will be based on records from State forest, conservation reserves and other suitable public land areas. Private land records will be used where conservation covenants apply.

SELECTION OF POWERFUL OWL RECORDS

Powerful Owl conservation measures will be based on confirmed records of Powerful Owls. Records may be either sighting or sound records, roost trees or nesting records. Acceptable records are those which are suitable for inclusion in the NRE's Wildlife Atlas. In general, new records will be considered to be better than old records and nesting and roosting records better than sighting records. The experience and skills of the observer will also be considered. The advice of experienced wildlife biologists will be sought in making these judgements. The currency of records will be reviewed on a regular basis to ensure the conservation guideline is applied to the 25 highest-quality, reliable records. Application of specific conservation measures has been restricted to records less than 10 years' old.

SPECIFIC CONSERVATION ACTIONS

The conservation measures to be applied to each of the 25 Powerful Owl records will be as follows:

- *Within a 3.5 km radius of a Powerful Owl record:*
  - retention of all large, dense foliage Blackwood trees
  - a minimum of 500 ha of mature forest will be reserved from harvesting (this may be in the form of existing conservation reserves or, where necessary, areas of State forest SPZ)
  - a further 500 ha of mature forest, or regrowth forest of a minimum age of 30 years, will be maintained through appropriate scheduling of timber harvesting.

For nesting or resident owl records in addition to the 25 receiving special habitat protection:

- *Establish a 250 metre radius SMZ around sites as they are discovered, within which:*
  - nest trees and all other trees within a radius of 100 metres from the nest tree or residence area will be protected
  - logging operations, road construction and other activities likely to disturb breeding activity during the breeding season will be excluded.

APPENDIX F

Area by period of origin of medium- to highly-productive regrowth forests in the Mount Cole and Wombat State Forests

Period of origin of the regrowth	Area (ha)		
	Wombat State Forest[1]	Mount Cole State Forest	Total
Early 1990s	4 775	230	5 005
Late 1980s	1 840	0	1 840
Early 1980s	6 560	960	7 520
Late 1970s	550	0	550
Early 1970s	200	165	365
Late 1960s	0	0	0
Early 1960s	1 055	255	1 310
Late 1950s	12	1 200	1 212
Early 1950s	0	0	0
Late 1940s	180	0	180
Total	**15 172**	**2 810**	**17 982**

Note :

Regrowth areas include the Barkstead and East Trentham fire areas as well as about 8500 ha in which the second shelterwood harvest is to be undertaken.

APPENDIX G

Designated catchments

Water supply catchment	Total area (ha)	Proportion of State Forest	Authority (principal towns supplied)	Notes
Blackwood	1042	68%	Central Highlands W. A. (Blackwood)	Water is harvested from Split Tree, Kyneton and Long Gullies. Small storage.
Bullarto	670	59%	Central Highlands W. A. (Daylesford)	Water supply is untreated.
Colbrook	1700	75%	Central Highlands W. A. (Ballan)	Part of the Pykes Special Water Supply Area on Korweinguboora Creek.
Collier Gap	86	100%	Private supply (Eversly and Crowlands)	Small weir supplying Eversly and Crowlands - owned and operated by a private co-operative.
Djerriwarrh	2601	50%	Western Region W. A. (Melton)	Also supplies water for Toolern Vale.
Hickmans Creek (Elmhurst)	1200	100%	Grampians Region W. A. (Elmhurst)	Small supply on the northern slopes of the Mount Cole range.
Korweinguboo ra	3297	36%	Barwon W. A. (Geelong)	Surrounded by softwood plantations.
Lal Lal Lake Environs	1652	8%	Central Highlands W. A. (Ballarat and Geelong)	Principal storage for Ballarat. Designated catchment corresponds with the Special Water Supply Area.
Long Gully	383	100%	Central Highlands W. A. (Beaufort)	Major source for Beaufort - piped to Musical Gully and Troy Storages.
Merrimu	8450	45%	Southern Water (Melton)	Bulk supply sold to Western Region W. A. Also supplies Bacchus Marsh. Catchment is supplemented by a pipeline from the Lerderderg River.
Moorabool	2950	21%	Central Highlands W. A. (Ballarat)	Second (after Lal Lal) major source of water for Ballarat.
Mount Cole	460	70%	Grampians Region W. A. (Ararat)	
Musical Gully	55	78%	Central Highlands W. A. (Beaufort)	Storage basin for Beaufort. Relatively small catchment in proportion to basin capacity
Pykes Creek	10877	41%	Southern Water (Werribee Irrigation)	Used principally for irrigation.
Rosslynne	9019	38%	Southern Water (Sunbury)	Bulk supply sold to Western Region W. A. Also the major supply for Gisborne.
Shepherds Creek	1363	92%	Private supply (Warrack)	Small weir supplying Warrack township - owned and operated by a private co-operative.
Sugarloaf	928	83%	Central Highlands W. A. (Avoca)	
Troy	40	100%	Central Highlands W. A. (Beaufort)	Storage basin for Beaufort. Relatively small catchment in proportion to basin capacity
White Swan	434	37%	Central Highlands W. A. (Ballarat)	Terminal storage with a short storage period. State forest immediately adjacent.
Wombat	937	57%	Central Highlands W. A. (Daylesford)	Water supply is untreated.
Total	48151	46%		

APPENDIX H.1
Causes of wildfires on public land in the Midlands FMA, 1973–1993

Cause of fire	Number of fires	Proportion of total (%)
Lightning	106	8
Campfire/barbecue escape	116	8
Deliberate	545	39
Waste disposal	86	6
Burning off or relight from private land	201	14
Burning off or relight from public land	29	2
Other	199	14
Unknown	132	9
Total	1414	100

APPENDIX H.2
Major wildfires on public land in the Midlands FMA, 1975–1995

Fire season	Public land area	Locality	Area of public land burnt (ha)	Total area burnt (ha)
1977	Creswick State Forest and Regional Park	Creswick	2 075	2 075
1977	Wombat State Forest	Trentham	1 675	1 675
1981	Wombat State Forest	Pyretes forest	3 196	3 200
1983	Mt Macedon Regional Park	Mount Macedon	1 864	6 100
1983	Wombat State Forest and Lerderderg State Park	East Trentham/Macedon	13 400	24 500
1983	Wombat State Forest and Lerderderg State Park	Greendale	13 720	15 940
1995	Enfield State Forest and State Park	Berringa	8 650	10 500
Total			44 580	63 990

APPENDIX I

Regionally prohibited and regionally controlled weeds occurring in State forests within the Midlands FMA

Common name	Scientific name	Catchment and Land Protection Region					Comments
		Wimmera	Glenelg	North Central	Corangamite	Port Phillip West	
African Daisy	*Senecio pterophorus*	P	P	P			Currently restricted to the Avoca area
Blackberry	*Rubus fruticosus L agg.*	C	C	C	C	C	Widespread throughout forests of the FMA
Boneseed	*Chrysanthemoides monilifera*	C	C	P	C	C	Main infestation are in the You Yangs Regional Park; nearby forest blocks may also contain the plant
Boxthorn	*Lycium ferocissimum*	C	C	C	C	C	Light infestations in the Wombat State Forest, particularly the Bullarto area
Cape Broom	*Genista monspessulana*	C	C		C		Most infestations are at the interface of forest with freehold land
English Broom	*Cytisus scoparius*	C			C		Most infestations are at the interface of forest with freehold land
Furze/Gorse	*Ulex europaeus*	C	C	C	C	C	Widespread throughout the forests of the FMA
Hawthorn	*Crataegus monogyna*		C		C		Isolated occurrences at forest margins throughout the FMA
Hemlock	*Conium maculatum*		C		C	C	Disturbed sites in wetter areas, such as in the Creswick State Forest
Serrated Tussock	*Nassella trichotoma*		C	P	P	C	On bare or disturbed areas or lightly timbered areas in the south-east of the FMA, such as at Lal Lal
Spear Thistle	*Cirsium vulgare*		C		C		Disturbed sites and roadsides
Spiny Rush	*Juncus acutus*	C	C	C	C	C	Most occurrences are on private land - in streams and swampy areas in the Trentham—Glenlyon area
Sweet Briar	*Rosa rubiginosa*	C	C		C	C	Few scattered occurrences around Creswick
Topped Lavender	*Lavandula stoechas*			P			Isolated occurrence on fringes of forest around Scarsdale
Wild Teasel	*Dipsacus fullonum ssp. fullonum*		C		C		Disturbed sites in wetter areas

P = Regionally Prohibited Weed
C = Regionally Controlled Weed
Source: staff of the Catchment and Land Management Division and PMIS

APPENDIX J.1

Number and type of walking tracks to be maintained in State forest by Geographic Representation Unit

Geographic Representation Unit	Target number of walks for State forest in the Midlands FMA			Number of walks in parks and reserves in the Midlands FMA			Total walks
	Short	Medium	Long	Short	Medium	Long	
Beaufort	4 (4)	5 (5)	1 (1)	4	4	3	21
Enfield/Brisbane Ranges	3 (0)	2 (0)	0 (0)	2	7	1	15
Pyrenees	1 (1)	1 (1)	1 (1)	2	0	0	5
Wombat/ Creswick	3 (3)	1 (1)	3 (0)	13	2	2	24

Note: Figures in brackets show the number of walks currently provided in State forest.

APPENDIX J.2

Visitor facility and camping targets by Geographic Representation Unit for State forest in the Midlands FMA

Planning Unit	Target numbers of recreation facilities for State forest in the Midlands FMA				Picnic and camping sites all public land
	Picnic only sites	Picnic and camping sites	Lookout site	Forest drive	
Beaufort	5 (7)	4 (4)	2 (2)	1 (0)	14
Enfield/Brisbane Ranges	1 (1)	5 (5)	0 (0)	0 (0)	24
Pyrenees	1 (1)	3 (4)	1 (1)	0 (0)	8
Wombat/ Creswick	3 (5)	3 (3)	1 (1)	1 (1)	36

Note: Figures in brackets show the number of facilities currently provided in State forest.

APPENDIX K

Management of State forest visitor facilities

Site name	Management action
MOUNT COLE STATE FOREST	
Ben Nevis	Maintain as picnic and scenic viewing area
Red Rock	Maintain access to site
Chinamans	Maintain as picnic and camping area with walking tracks
Victoria Mill	Maintain as picnic and scenic viewing area with walking tracks, and develop interpretation as part of the forest drive
Mugwamp	Maintain picnic and camping area with walking track
Lookout Hill	Close and rehabilitate
The Glut	Maintain as picnic area with walking track
Lower Wimmera	Close and rehabilitate
Mount Lonarch	Maintain as scenic viewing area
Richards	Maintain picnic and camping area with walking tracks
Smiths Bridge	Maintain as a picnic site, close camping area and rehabilitate
Ditchfields	Maintain as picnic, camping and scenic viewing area with walking tracks, and develop interpretation as part of the forest drive
Eversley-Sugarloaf	Maintain access to site
WOMBAT STATE FOREST	
Werribee	Maintain as picnic area with walking track
Binks	Maintain as picnic and camping area
Paradise	Close and rehabilitate
McLaughlins	Maintain as scenic viewing area
Nolans	Maintain as picnic area and provide a camping area away from the river
Wombat Creek	Relocate to provide views of Wombat Creek Dam; maintain as picnic area only
Kangaroo Creek	Close and rehabilitate
Firth Park	Maintain as picnic, camping and scenic viewing area with walking tracks
Lyonville Springs	Maintain as picnic and scenic viewing area with walking tracks
DUNNEWORTHY STATE FOREST	
Delaney Gap	Close and rehabilitate
McKenzie Dam	Maintain as picnic and camping area
Boydies Dam	Maintain as picnic and camping area
TRAWALLA STATE FOREST	
Chapmans	Close and rehabilitate
PYRENEES STATE FOREST	
Governors Rock	Maintain as picnic and scenic viewing area
Waterfalls	Maintain as picnic, camping and scenic area with walking tracks
CANADIAN STATE FOREST	Encourage local friends or community-based recreation groups to establish and maintain short walks and medium walk around Ballarat–Buninyong, in conjunction with NRE.
WHIPSTICK STATE FOREST	
River Track	Maintain as picnic and camping area
Police camp	Encourage local friends or community-based recreation groups to establish and maintain facilities at the camp in conjunction with NRE
BUNGAL STATE FOREST	
Ballark	Maintain as picnic and camping area
Koolaroo	Maintain as picnic area only
LAL LAL STATE FOREST	Encourage local friends or community-based recreation groups to establish and maintain short and medium walks linking State forest with the Lal Lal Historic Area, in conjunction with NRE.
Picnic site 1	Maintain as picnic and camping area
Picnic site 2	Maintain as picnic and camping area

APPENDIX L

High-sensitivity travel routes and lookouts for State forest in the Midlands FMA

Mt Cole State Forest	**Wombat State Forest**
Western Highway (Mt. Langi Ghiran- Beaufort)	Midland Highway (Kennedys Gully-Springmount)
Mount Cole Main Road	Ballan Daylesford Road
Beaufort- Lexton Road	Daylesford- Malmsbury Road
Ben Nevis Picnic Area (Lookout)	Daylesford- Trentham Road
Lookout Hill Picnic Area (Lookout)	Kyneton- Trentham Road
Mount Buangor Picnic Area (Lookout)	Myrniong Trentham Road
Creswick State Forest	Western Freeway (Bacchus Marsh- Bungaree)
White Swan Road	Ballan-Daylesford Road
Springs Road	Greendale- Myrniong Road
Daylesford- Ballarat Road	Greendale- Trentham Road
Bungaree Creswick Road	Bacchus Marsh- Gisborne Rd
Clunes Creswick Road	Gisborne- Melton Road (Pyrites forest)
Creswick Dean Road	Daylesford Botanic Gardens Lookout
Midland Highway (Ballarat-Springmount)	Jackson Lookout - Hepburn
Pyrenees State Forest	Lerderderg River (Heritage River Section)
Pyrenees Highway (Avoca-St. Arnaud- Ararat Road)	**Canadian State Forest**
Ararat- St. Arnaud Road (Crowlands-Landsborough)	Navigators Road
Sunraysia Highway (Avoca-Tanwood)	Ballarat- Buninyong Road (Sovereign Hill-Buninyong)
Enfield State Forest	Black Hill Lookout
Glenelg Highway (Linton-Smythesdale)	Sovereign Hill Lookout
Sebastopol- Smythesdale Road(Smythesdale-Ross Creek)	**Lal Lal State Forest**
	Lal Lal Falls Road
	Midlands Highway (Clarendon-Meredith)

APPENDIX M

Recreation sites in the Midlands FMA with Special Protection Zone buffer

Mount Cole State Forest	Wombat State Forest
Ben Nevis	Werribee
Chinamans	Binks
Victoria Mill	Nolans
Mugwamp	Firth Park
The Glut	Lyonville Springs
Richards	Wombat Creek Dam
Ditchfields	
Pyrenees State Forest	
Governors Rock	
Waterfalls	

APPENDIX N

Results from the forecast of sawlog sustainable yield for the Midlands FMA

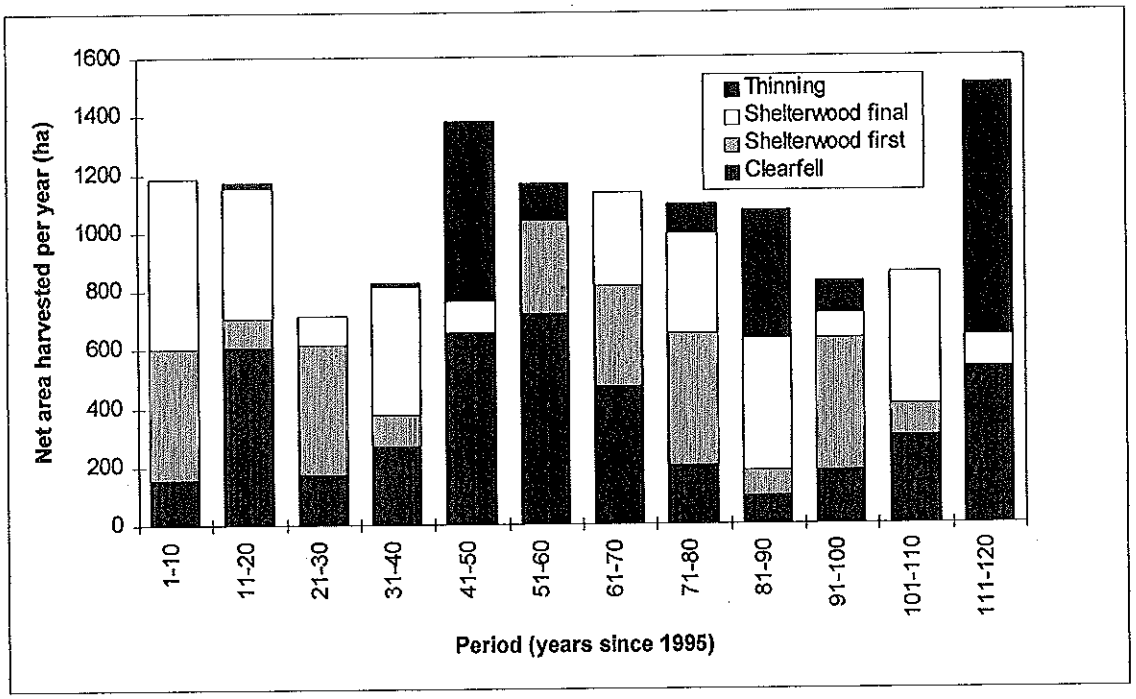
The following graphs result from the Integrated Forest Planning System used to determine the sustainable yield of sawlogs for the Midlands Forest Management Area. They detail forecasts of:

- net area harvested in 10-year periods by harvesting and regeneration system
- sawlog volume in 10-year periods by harvesting and regeneration system
- net area harvested in 10-year periods within grouped forest areas
- forest age structure in the years 1995, 2115, and 2185.

The results shown were prepared from the analyses undertaken for the Review of Sustainable Sawlog Yield for the Midlands Forest Management Area (CNR 1995a). Reviews of sustainable yield are required by the *Forests Act* 1958 (as amended by the *Forests (Timber Harvesting) Act* 1990). The reviews occur every five years, following significant change in the available sawlog resource, or at any time the Minister considers appropriate. The next review is required by 2001.

The results of the analysis will also be periodically examined to compare the predicted yields and area harvested against actual harvesting results. This will allow refinement of the assumptions in the model to provide a sustainable yield estimate with a higher level of confidence. Adjustments to the sustainable yield rate would occur as required under the *Forests Act* 1958.

Figure N1: Forecast net area to be harvested (hectares) by operation type for the Midlands FMA



The type of harvesting operation, over the next twenty years, will shift from the current predominance of shelterwood one into mainly shelterwood two and clearfell. (All Shelterwood two operations are scheduled to occur in the period immediately following the Shelterwood one operation.) Figure N1 shows that the type and area of harvesting operation conducted in the FMA can vary markedly between periods.

Figure N2: Forecast sawlog volume (m^3) to be harvested in 10-year periods by harvesting and regeneration system in the Midlands FMA

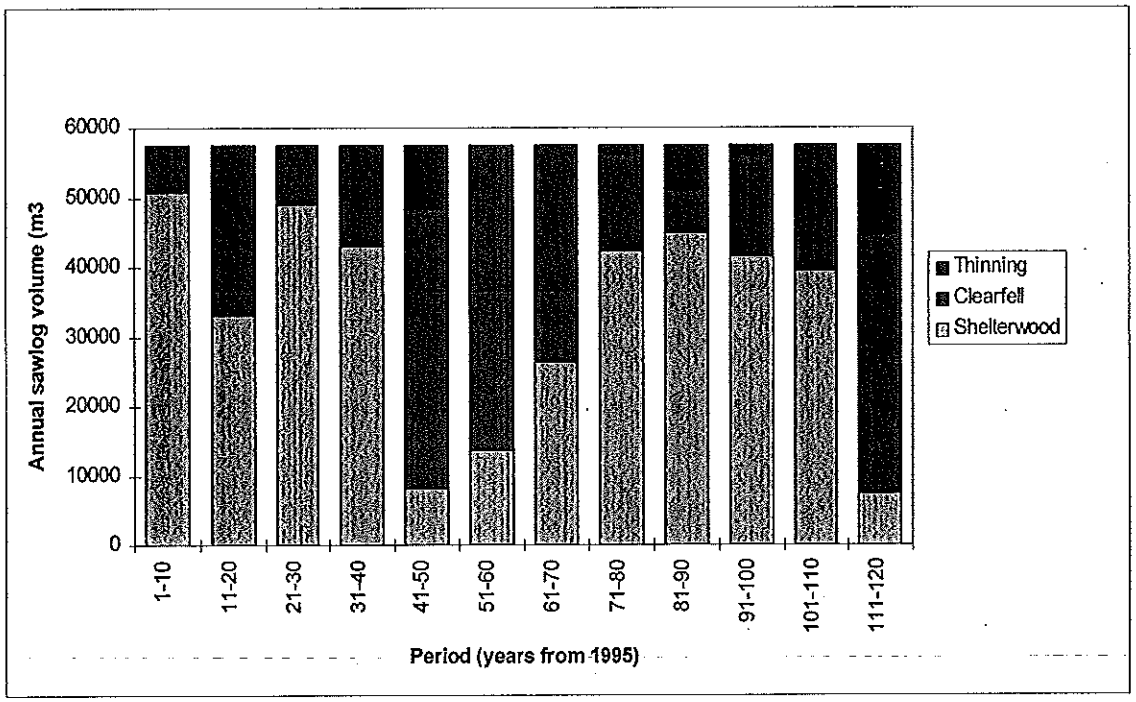
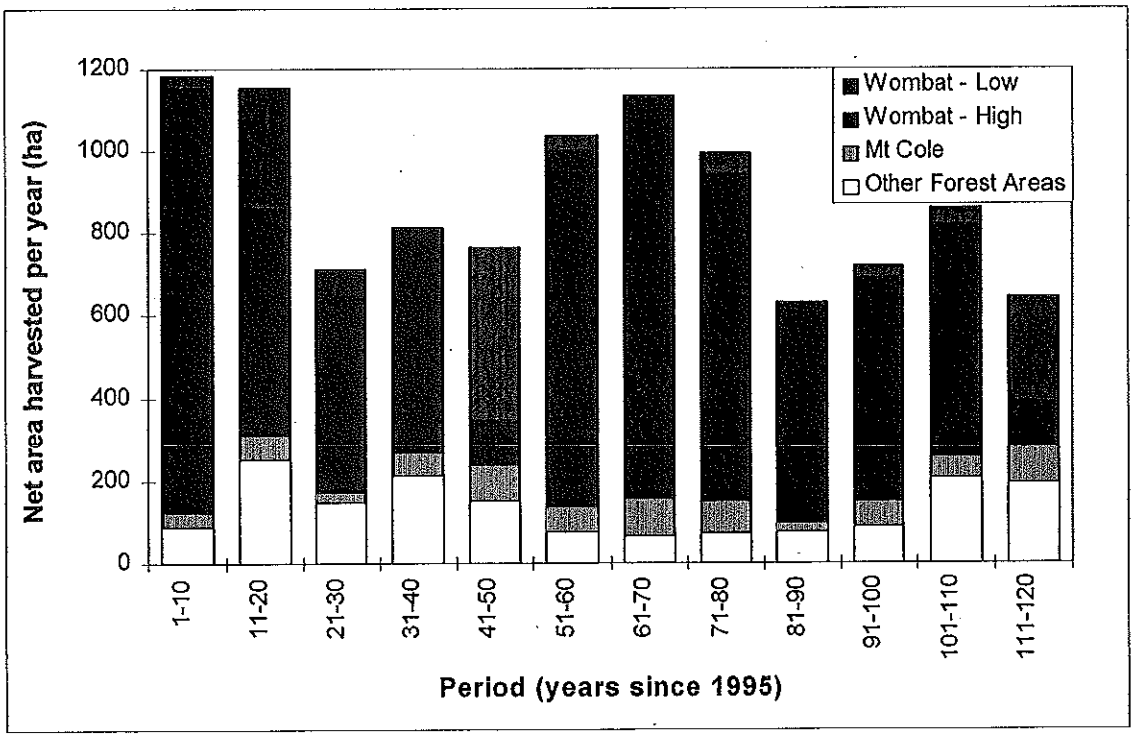


Figure N2 shows that most of the sawlog commitment will be met by shelterwood operations for the next 40 years; then clearfell will be the main source of supply for a number of periods. In about 2035, the main commercial thinning operations will begin and yield commercial quantities of small sawlog.

Figure N3: Forecast net area to be harvested in 10-year periods within grouped forest areas in the Midlands FMA



The Review stratified the net available area of the Midland FMA into four forest groups:

1. **Wombat - Low:** Wombat State Forest - low productivity area
2. **Wombat - High:** Wombat State Forest - medium to high productivity areas
3. **Mt Cole:** Mount Cole State Forest
4. **Other Forest Areas:** Enfield, Whipstick, Creswick, Cobaw and Pyrenees State Forest

Figure N3 details the area to be harvested within each forest group. The Wombat State Forest, because of its size and high relative productivity will always be the major source of logs in the FMA. However, all forest areas will contribute on a sustainable basis.

Figure N4: Forecast age class distribution of the net productive area in the Midlands FMA in years 1995, 2115 and 2185

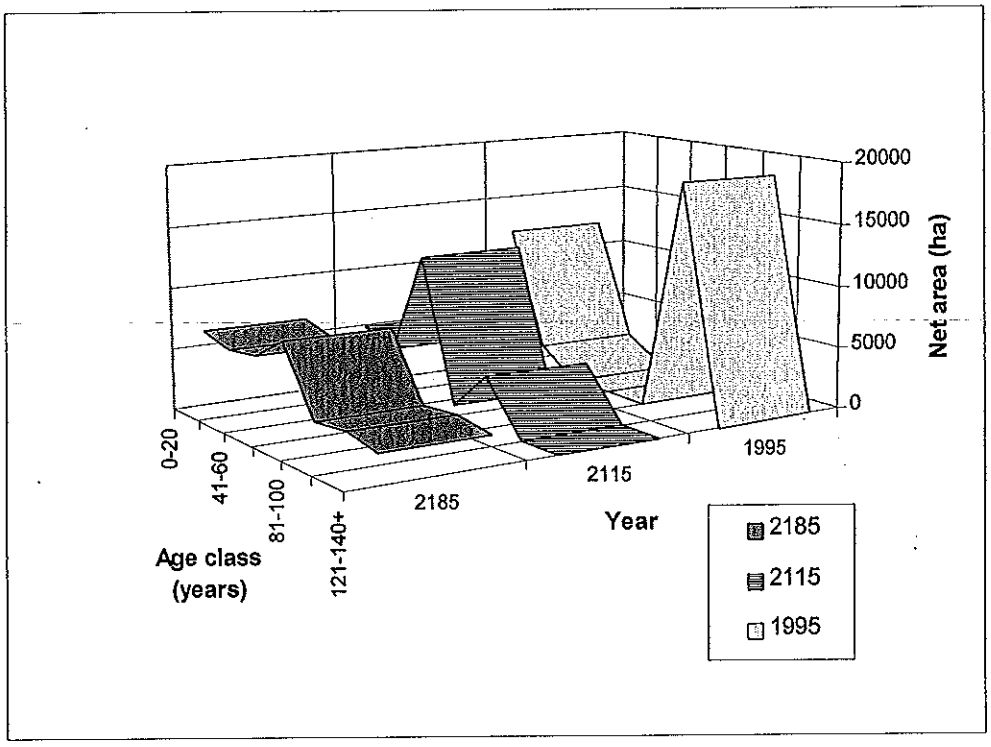


Figure N4 shows that the current net productive area in the FMA is either mature forest or young forest, and that this age class imbalance will persist for well over 100 years. The forecasts show that a more regulated age class distribution (of the net productive area) is achieved in about 200 years.

APPENDIX O

List of individuals and organisations making submissions on the Proposed Management Plan

Helen Adkins
Wombat Forest Society
Tim Anderson
Victorian National Parks Association
Land Conservation Council
The Department of Prime Minister and Cabinet
Epping Timber
Confederation of Australian Motor Sport
Creswick & District Development Association
Graeme Bufton
G F Adams
City of Ballarat
R Britten
Michael Corrigan
Doug Dean
Kristian Carter
R Flitcher
R Henderson
J H Mercer
J&J Corrigan Nominees
Crick Brothers Sawmill Pty. Ltd.
Bruce Donaldson
Western District Timber
Victorian Apiarists' Association Inc.
David Endacott
Norman Endacott
The Australian National University - Department of Forestry
Frank Harrap
D Haywood
Cobaw Anti Shooting Range Association
Bendigo Field Naturalists Club Inc.
Barry Kentish
Dallas Kinnear
Rod Kirby
John Knowles
Victorian Association of Four Wheel Drive Clubs Inc.
Gary McIntosh
Kevin Muller
Pritchard Logging Pty. Ltd.
Black Forest Timbers Pty. Ltd.
Murray Ralph
Federation of Victorian Walking Clubs Inc.
Margaret Rowell
Midland Logging Company
Hepburn Shire Council
M& E Thiele Enterprises Pty. Ltd.
Northern Logging
Ian Tinetti
Barry Traill
Victorian Plantations Corporation
OC & MF Woodroffe Pty. Ltd.
Victorian Association of Forest Industries
Robert Yanner
Four submissions with unclear signatures

GLOSSARY

The following definitions apply to the interpretation of terms used in this Plan.

Basal area - the sum of the cross-sectional areas measured at breast height (1.3m from the ground) of the trees in a given stand. Usually expressed as square metres per hectare (m^2/ha).

Biodiversity - encompasses the diversity of indigenous species and communities occurring in a given region. Diversity includes *genetic* (genes/genotypes within each species), *species* (variety of living species) and *ecosystem* (different types of communities formed by living organisms and the relations between them).

Buffer (strip) - a protective margin of vegetation abutting a stream, spring, wetland, body of standing water, swampy ground or an area of rainforest, which protects it from potentially detrimental disturbances in the surrounding forest. Buffer width is defined as the horizontal distance from which various operations are excluded.

Clear-fell - a method of harvesting a coupe whereby all merchantable trees, apart from those to be retained for wildlife habitat, are removed.

Code of Forest Practices for Timber Production - a set of principles and, in some cases, minimum standards for the conduct of timber harvesting and associated works in forests in Victoria.

Competition - (in the context of forest growth) the relative growth of trees (stem and canopy) as a consequence of the limited availability of water, nutrient and light availability due to other neighbouring vegetation.

Continuous forest inventory (CFI) plots - plots established throughout the forest on which tree growth information is measured. The plots are measured periodically (at five- or ten-year intervals, for example), and growth on the plot can be determined from the difference between the measurements.

Coppice - shoots developing from a dormant bud of a trunk.

Coppice stems - regrowth stems originating from dormant buds on the stump, or the base of the trunk of a damaged eucalypt.

Coupe - an area of forest of variable size, shape and orientation from which logs for sawmilling or other industrial processing are harvested.

Developed recreation site - an area with well developed recreation facilities (including toilets and tables) designed for a high level of visitor use.

Disturbance - any range of factors affecting the condition of natural areas. Disturbance may be natural or human-induced. Natural disturbances includes wildfires and rainstorms, and is part of natural ecological processes. Human-induced or 'unnatural' disturbance includes timber harvesting, agricultural clearing, mining and grazing. The factors that are important when considering disturbance are the origin, duration, and intensity of the disturbance, and its impact on the environment.

Diversity - a measure of the physical or biological complexity of a system. It refers to a range of features from artefacts to species present.

Ecological Vegetation Classes (EVC) - the components of a vegetation classification system. They are groupings of vegetation communities based on floristic, structural and ecological features

Ecosystem - a functional system which includes the organisms of a natural community together with their environment.

Environmental weed - a naturalised non-indigenous plant species outside the agricultural or garden context which adversely affects the survival or regeneration of indigenous species in natural or partly natural vegetation communities.

Epicormic - a shoot arising from accessory bud in bark of stem or tree.

Erosion hazard, of the soil - the likelihood of erosion occurring because of the interrelationship of soil erodibility, rainfall erosivity, slope and soil disturbance.

Even-aged stand - a forest stand where all or most of the trees are of the same age. That is, they have regenerated from the same event (eg Ash Wednesday fires or a clear-felling harvesting operation).

Extensive management - management generally only involving the minimum silvicultural activities necessary to ensure regeneration.

Fabric - the physical material of a place. For example, the fabric of cultural places might be artefact scatter or hut.

Fauna - a general term for animals (including birds, reptiles, marsupials, and fish).

Filter strip - a narrow strip of ground retained either side of a drainage line or temporary stream. Trees in the strip may be felled subject to certain conditions and machinery entry is only permitted in certain circumstances.

Fire management - all activities associated with the management of fire-prone public land values, including the use of fire, to meet land management goals and objectives.

Fire prevention - all activities concerned with minimising the incidence and severity of wildfire, particularly those of human origin.

Fire protection - all activities designed to protect an area (including human life, property, assets and values) from damage by wildfire

Fire regime - the season, intensity and frequency of fire in a given area over a period of time.

Flora - a general term for plants of a particular area or time.

Flora reserves - areas set aside because of their special floristic conservation significance.

Forest coupe plan - a plan that must be prepared for each harvesting operation in public native forest. It contains a map identifying the area and a schedule incorporating the specifications and conditions under which the operation is to be administered and controlled.

Forest Management Areas - the basic units for forest planning and management in Victoria. Currently Victoria is divided into fifteen Forest Management Areas as defined in the *Forests Act* 1958.

Forest management plan - a plan developed to address the full range of values and uses in State forest by Forest Management Area.

Forest management zone - an area of similar physical capability or forest value to which a particular Departmental strategy and specific prescriptions may apply. There are three zones: the Special Protection Zone, Special Management Zone and the General Management Zone .

Forest type - a classification of forests according to their life form and height of the tallest stratum, and the projected foliage cover of the tallest stratum.

FORPLAN - a computer program that can be used to apply forest values (including financial) to forest stands. It is currently used in conjunction with GIS and models for timber, water and wildlife to estimate the response of these values over time for the whole forest for various management strategies.

Fuel reduction burning - the planned use of fire to reduce fuel levels in a specified area.

General Management Zone (GMZ) - delineates the area to be managed for the broad range of forest values available in the area. The GMZ is divided into two sub-zones: 'Timber Production' where timber harvesting under standard conditions is one of the main uses and 'Other Uses' where the forest is unsuitable for sawlog production but where other activities are permitted.

Geographic Representation Units (GRU) - subdivisions created to help analyse the distribution of the reservation system across the region and the degree to which values are represented in that reserve system.

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.

Gross area - the area of a particular forest type which is capable of producing merchantable timber.

Group selection system - harvesting of small groups of trees so that new trees can replace them in the small to medium gaps created.

Growth stages - the different forms exhibited by trees at various stages in their development.

Guidelines - are the directing principles adopted to establish decisions (zoning, actions or prescriptions) for the protection and management of forest values. They are not necessarily mandatory, rather they are to be interpreted and applied on the basis of the information available, and in the context of the protection and management of other values in the forest.

Habitat tree - a tree that has been identified as providing important habitat for wildlife and which is given additional protection during forest operations

Heritage - all those things we have inherited from previous generations and which we value. It includes such things as places, objects and folklore.

Integrated logging - the harvesting of both sawlogs and residual logs in a single operation.

Intensive management - silvicultural intervention beyond the minimum required to ensure restocking. It can include some or all of site preparation, planting, fertilising, weed control, spacing and thinning.

Land system - a complex mapping unit that contains a pattern of land components each of which has little variation in climate, lithology, landform, soil and indigenous vegetation. The land system is regarded as a unit of management for broad-scale land use.

Land use - the primary level of public land classification in Victoria. It is determined by government through the Land Conservation Council process establishing National parks, State forest and other categories.

Landing - a place where trees or parts of trees are snigged for sorting, processing and loaded for transport from the forest. Conversion sites at which small amounts of produce are processed and which do not involve earthworks or clearing are not regarded as landings.

Landscape management zone - a composite landscape unit based upon distinct combinations of specific scenic quality classes, public sensitivity levels, and seen area disturbance zones.

Landscape sensitivity - areas identified as having a high scenic quality and visual sensitivity. They are usually areas that are readily visible from high-usage recreational facilities or routes such as look-outs, campsites, walking tracks, or tourist roads.

Light-demanding - (in the context of forest growth) a plant species requiring full sunlight to regenerate and/or grow vigorously – synonymous with shade-intolerant.

Lignotuber - swelling at the base of the stem on some eucalypts, at or below the soil level, bearing dormant buds. An adaptive survival feature. The development of the buds to suckers is stimulated by destruction or loss of the top growth.

Mature - a description of a forest stands and/or individual trees where the tree crowns are well foliated and rounded. The height and crown development of the trees has effectively ceased (compared with regrowth) but decline of the crown (loss of limbs, development of epicormic growth) has not yet significantly begun (as in the senescent or over-mature growth stage).

Merchantable - used to describe trees suitable for processing into forest produce and for which a market exists.

Multi-aged stand - a stand where the trees have originated from a limited number of discrete disturbance events.

Multiple use forests - forests managed for a combination of values and uses so that a wide range of community expectations are met (eg biodiversity conservation, timber and water production and recreation).

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 as well as the present community.

National park - land declared to be national park under Schedule 2 of the *National Parks Act* 1975. They largely contain substantial tracts of land of significance because of their outstanding natural environments and features, scenic landscapes and diverse land types.

Net available area - the area of forest both suitable and available for sawlog production, once exclusions are made for the *Code of Forest Practices for Timber Production*, SPZ, and land of low inherent productivity.

Old-growth forest - forest which contains significant amounts of its oldest growth stage in the upper stratum - usually senescent trees - and has been subjected to any disturbance, the effect of which is now negligible.

Overwood - trees left after harvesting that compete with regeneration for light, water and nutrient.

Overmature - a growth stage of a forest stand or individual tree that is characterised by declining crown leaf area and irregular crown shape due to the loss of branches and epicormic growth.

Permanent road - generally a high standard road permanently required for the ongoing management of the forest.

Prescribed burning - the planned application of fire under selected weather and fuel conditions so that the fire is confined to a pre-determined area and burns with the intensity and rate of spread necessary to achieve the objects of management

Prescription - the standards specified according to the principles of the *Code of Forest Practices for Timber Production* and the guidelines of the forest management plan which prescribe acceptable practices.

Public land - unalienated land of the Crown managed and controlled by the Minister for Conservation and Land Management, the Minister for Agriculture and Natural Resources, or the Secretary of Natural Resources and Environment, whether or not occupied under a licence or other right (but not including land occupied under a lease, or land vested or leased by the Victorian Plantations Corporation or its successor in law).

Pulpwood - see Residual log

Recreational Opportunity Spectrum - the range of opportunities for a person to participate in specific recreational *activities* in specific *settings* in order to realise predictable recreational *experiences*.

Reforestation - the re-establishment of a stand of trees by planting or sowing with species native to the locality on previously cleared or poorly forested land.

Regeneration (noun) - the young regrowth of forest plants following disturbance of the forest such as timber harvesting or fire.

Regeneration (verb) - the renewal of forest by natural or artificial means.

Regrowth - (a) forest stands regenerated either naturally or by seeding following death or removal of the forest overstorey.

(b) a growth stage of a forest stand or individual tree in which the crowns have a narrow conical form and where the trees are actively growing.

Rehabilitation - restoration and revegetation of a site of disturbance usually associated with fire damage, forest road-works, landings and mining.

Reserved Forest - land proclaimed under Section 42(1) of the *Forests Act* 1958 and shown on plans deposited with the clerk of the Parliament.

Residual log - produced as a by-product of sawlog harvesting operations; include those low-quality logs suitable for conversion into sawn products or pulpwood. **Pulpwood** logs (those logs which cannot be economically converted into sawn products) are supplied for conversion into hardboard.

Retained trees - trees retained on a coupe during a harvesting to serve as seed trees or wildlife habitat trees, or have been selected to grow on after thinning.

Richness - a measure of the abundance of individual elements within a particular place. For instance, the species richness of an ecological vegetation class (EVC) is the number of species which typically occur within that EVC.

Riparian - of, or located on, the banks of rivers.

Riparian vegetation - vegetation that requires free or unbound water, or conditions that are noticeably moist along the margins of streams, drainage lines, and lakes.

Rotation - planned number of years between the regeneration of a forest stand and its final harvesting for forest produce. Actual rotations will vary to suit local conditions.

Sawlog - any length of a log of merchantable species which is at least 2.7 metres in length, has a small-end diameter of 25 centimetres or greater, does not have a sweep or crook which exceeds 1/5 diameter from a 2.4-metre straight edge and is of grade D or better.

Sclerophyll - of trees: hard-leaved (eg members of the genera *Eucalyptus* and *Acacia*).

Seed trees - trees retained on harvested coupes to provide seed for natural regeneration of that coupe.

Seed-tree system - a harvesting and regeneration system used for particular forest types. All merchantable trees are harvested apart from those specifically retained for regenerating the coupe by natural or artificial seedfall and for habitat purposes.

Selection systems - a harvesting and regeneration system applied to particular forest types in which the trees are harvested either singly or in groups at relatively short intervals indefinitely. By this means regeneration is established continually and an uneven-aged stand is maintained.

Senescent - a growth stage of a forest stand or individual tree that is characterised by declining leaf area in the crown and an irregular crown shape due to the loss of branches and epicormic growth. This term is interchangeable with 'overmature'.

Seral stage - a plant community that occurs at a particular stage of succession, which is the gradual change in the species composition of a community until it reaches a stable state composition if left undisturbed.

Shelterwood system - used for harvesting and regenerating particular forest types that may not be suited to a clearfell regime. It consists of the removal of a proportion of the mature trees to allow the establishment of essentially even-aged regeneration under sheltered conditions, followed by later felling of the remainder of the mature (seed) trees.

Silviculture - the theory and practice of managing forest establishment, composition and growth, to achieve specified objectives.

Single tree selection system - used for harvesting of single trees so that new trees can replace them in the small gaps created.

Site preparation - preparation of the ground to provide conditions suitable for regeneration from seed or by planting seedlings.

Snigging - the towing or winching of a log from the stump to the landing site.

Snig-track - track along which a log is snigged.

Special Management Zone - delineates an area to be 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 - delineates an area to be managed for the conservation of natural or cultural values and timber harvesting will be excluded.

Stand - a group of trees in a forest that can be distinguished from other groups on the basis of age, species composition, condition etc.

Stand condition - the health, age and size class distribution, and stocking of a forest stand.

State forest - as defined in section 3 of the *Forests Act* 1958.

State park - land declared by the government to be State park through the Land Conservation Council land use decision-making process. Largely because it is a tract of land containing natural environments and features, scenic landscapes, and one or more land types complementing those found in national parks to provide a system representing the major land types of the State.

Stocking - density of any given forest stand, usually expressed in terms of the number of trees per hectare.

Streamside reserve - a strip of vegetation retained along a stream and extending out at least 20m (measured horizontally) from its bank. The actual width of the reserve will be determined by the width of the saturated stream flat, the nature of the forest operation to be undertaken in the adjacent forest, and the ground slope.

Succession - the progressive change of species composition within a stand over time. If left undisturbed this succession will continue to a climax where the species composition will remain largely unchanged.

Sustainable Yield - rate of harvest that can be maintained for a defined period in the future (usually ten years). This figure may increase in the future if the condition of the forest is improved but should not decrease except in the case of a catastrophic event such as fire.

Long-term Sustainable Yield - the theoretical rate of harvest that can be maintained in perpetuity. That is, when the condition of the available forest is equal to the theoretical yield of the normal forest. It represents a general goal for forest managers to work towards.

Temporary road - a road constructed specifically for use during forest operations and closed at their completion. Generally a short length of road leading from a permanent road.

Threatened (fauna) - a collective term used to denote taxa that are Extinct, Endangered, Vulnerable, Rare or Insufficiently Known, or have Restricted Colonial Breeding or Roosting Sites.

Thinning - the removal of trees in a forest stand for a given silvicultural objective.

Timber harvesting - processes which include tree felling, snigging, and the marking, sorting, loading and carting of forest produce within a forest.

Timber production - growing and harvesting of timber from native forests.

Uneven-aged stand - forest stand which contains a continuum of age classes as a result of more or less continuous regeneration within the stand over a number of years.

Unstocked sites - sites previously well forested with timber-producing eucalypt species which have been disturbed by natural or artificial agencies and, as a result, the eucalypts have been replaced with non-eucalypt tree and/or scrub species of little or no value for timber production.

Value adding - the further processing of commodities into higher-quality, high-value goods.

Vigour, of trees - the health and vitality of growth of trees.

Water Basin - a geographical unit, defined by the physical boundaries of its watershed, it provides a natural division for assessing the environmental impact of human activities.

Wilderness - a large tract of land remote at its core from access and settlement, substantially unmodified by modern technological society or capable of being restored to that state and of sufficient size to make practical the long-term protection of its natural systems.

Wildfire - an unplanned fire.

Wood Utilisation Plan - details the area to be harvested and the type 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.