

**MIDLANDS  
FOREST MANAGEMENT AREA**

**ESTIMATE OF SAWLOG RESOURCE**

**Department of Natural Resources and Environment  
Victoria**

**March 2002**

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## FOREWORD

In March 2001 the Minister for Environment and Conservation initiated a process to issue new sawlog licences at appropriate levels. This process culminated in the preparation and release of the *Our Forests Our Future* Statement in February 2002. This Government Statement announced wide ranging reforms to the management of Victoria's native forests and will result in a sustainable timber industry. In the short term a reduction of about 30% to the sawlog levels across the State is required.

This report describes the data and method used to calculate the appropriate sawlog level for the Midlands Forest Management Area. This level has been adopted in the *Our Forest Our Future* Statement.

The estimate of the sawlog levels in this report is based on the information that is known about our forests and a series of estimates about the future, the preferences of industry and the best way to analyse the data. These estimates may be improved in the future as new information becomes available and more measurements of actual performance are recorded. Consequently the sawlog resource available in the future may also change. The *Our Forests Our Future* Statement outlines how these changes will be managed.

An independent Expert Data Reference Group was commissioned to review the data and methodology used to determine this estimate. This group reported in October 2001. It made extensive recommendations on how the processes and data could be improved. This document has considered the advice of the group.

This report provides the opportunity for the timber industry and interested people to gain access to information on how sawlog resources are estimated for Victoria's native forests.

A handwritten signature in black ink that reads "Ken King". The signature is written in a cursive style and is positioned above a solid horizontal line.

**Ken King**  
Executive Director, Forests Service

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## 1 Introduction

This Estimate of Sawlog Resource (ESR) summarises current Midlands Forest Management Area timber resource volume, growth and area information, licence commitments and ten-year timber production history in public native forests. The level of forest timber resources available into the future is determined by scheduling future harvesting and growth. This estimate has been prepared as part of a process established by the Minister for Environment and Conservation in March 2001 to develop a strategy for the issue of sawlog licences following the expiry of current licences, which will occur from 2002. The information contained in this document has been reviewed by an independent Expert Data Reference Group and peak industry and union groups, and is intended to assist in identifying soundly based estimates for future sawlog availabilities for the timber industry.

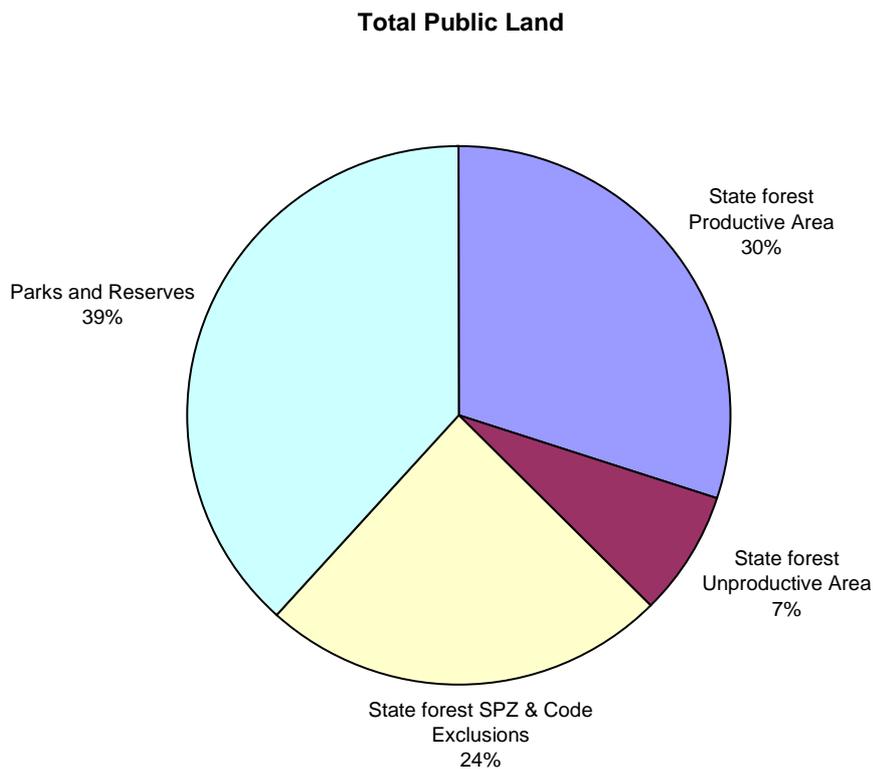
## 2 Background

Midlands Forest Management Area (FMA) occupies the central-west part of the State of Victoria, centred around Ballarat and stretching from Ararat in the west to Macedon in the east, and from Kyneton in the north to south of Geelong (see Map 1).

The Timber Industry Strategy (TIS) released in 1986 established the basis for regional sustainable harvesting of sawlogs from State forest in Victoria. Based on resource data available at the time, sustainable sawlog yield rates were determined for each one of 15 Forest Management Areas identified by the TIS in order to facilitate the proper planning, management, and administration of publicly owned native forest. The TIS also provided resource security to the timber industry through the introduction of fifteen year log licences, and flexibility to cope with market variations by allowing annual intake variation between 70% and 130% of annual licence volume. The concept of value adding was introduced with the establishment of four grades of sawlog and the allocation of the better grades of sawlog to those licensees with better value adding performance. It also provided a planning hierarchy of Forest Management Plans (FMPs), Wood Utilisation Plans and Coupe Plans.

As a result of the TIS, Schedule 3 of the *Forests Act* 1958, as amended by the *Forests (Timber Harvesting) Act* 1990, scheduled the sustainable yield for the Midlands at 70,000m<sup>3</sup> nett per year grade C and better (C+). Subsequent to the TIS, the Department negotiated a phase-down of harvesting with industry to what was believed to be a more sustainable level. Resource information available at the time indicated that a harvest level of 58,000m<sup>3</sup> nett per year of grade D and better sawlogs could be sustained in the Midlands Forest Management Area. This figure and the supporting documentation was published in the Midlands Forest Management Area Sustainable Yield Review (NRE 1995).

The Midlands Forest Management Plan (FMP) (NRE 1996) provided for the protection of all conservation values to agreed targets in the Special Protection Zone (SPZ) and allowed harvesting in General Management Zone (GMZ) and Special Management Zone (SMZ) under specific conditions (Figure 1).



**Figure 1. Public Land in the Midlands Forest Management Area**

Midlands Forest Management Area is covered by the West Victoria Regional Forest Agreement, established between the Commonwealth and Victorian Governments in March 2000. The Regional Forest Agreement formally accredits the Midlands Forest Management Plan as part of Victoria’s Ecologically Sustainable Forest Management system. This agreement also ratified the provision of a Comprehensive, Adequate and Representative reserve system. As a result of the additions to the reserve system, the area of GMZ and SMZ was reduced to 61,149ha. As a consequence of this reduction, revised resource estimates incorporating detailed spatially based analysis and further refinement of harvest scheduling within Special Management Zones, the allowable harvest rate was reduced to a volume of 40,000m<sup>3</sup> nett per year D+. To provide industry with time to adjust to the revised timber resource availability the West Victoria Regional Forest Agreement provided for the phase down to 40,000m<sup>3</sup> nett per year D+ volume over two years. The West Victoria Regional Forest Agreement also noted that when the Statewide Forest Resource Inventory (SFRI) data was available, resource availability was likely to change.

The timber resource information used in this Estimate of Sawlog Resource has been derived from preliminary data from the SFRI project in the Midlands Forest Management Area. The SFRI project used the latest sampling and inventory techniques to map species composition, management history, age, height and density of forest stands. Information was also collected from field inventory points, felling plots and nearby timber harvesting coupes to estimate stand volumes to confirm and corroborate SFRI data. The Midlands Forest Management Area SFRI information superseded previous assessments outlined in the 1996 Sustainable Yield Review and the West Victoria Regional Forest Agreement.

Current available productive resource age structure is predominately 28% mature, 27% post first-cut shelterwood, 5% uneven-aged, with 40% of the resource being logging and fire regrowth.

### 3 Licence Commitments

The status of current licence tenure and commitments as at 30<sup>th</sup> June 2001 for Midlands FMA are shown in Tables 1 and 2.

*Table 1. Current Midlands FMA Commitments by Licence Type and Expiry*

Licence Type	Product	Expiry Date	No. of Licences
Evergreen	Sawlog (D+)	30/06/2007	1
Evergreen	Sawlog (D+)	30/06/2008	3
Evergreen	Sawlog (D+)	30/06/2009	1
Standard	Sawlog (D+)	30/06/2002	5
<b>Total</b>			<b>10</b>
Standard	Residual Log	30/06/2002	2 <sup>1</sup>
Standard	Residual Log	30/06/2008	1 <sup>2</sup>
Standard	Residual Log	30/06/2010	1
<b>Total</b>			<b>4</b>

Note: 1. One licence shared with two other FMAs  
2. This licence shared with three other FMAs

*Table 2. Current Midlands FMA Commitments by Species and Grade*

Product / Grade	Annual Allocations
	Mixed Species
Sawlog (m <sup>3</sup> nett)	
B+	13,500
C	21,200
D	6,400
<b>Sawlog Total<sup>1</sup></b>	<b>41,100</b>
Residual Log (m <sup>3</sup> gross)	
E Grade Residual Log <sup>2</sup>	893
Residual Log/Thinnings	2,679
Residual Log	62,503
<b>Residual Log Total(m<sup>3</sup> gross)</b>	<b>66,075</b>

Note: 1. Following changes resulting from the West Victoria Regional Forest Agreement, the annual allocation of D+ sawlogs is to be reduced to 40,000m<sup>3</sup> nett per year by 30 June 2002  
2. E grade logs are better quality residual logs from which sawn timber can be produced

## 4 Harvest History

### 4.1 Total Sawlog Production

Figure 2 shows sawlog volume production by forest locality from 1989/90 to 1999/00. Average nett sawlog production over the last ten years is 60,500m<sup>3</sup> nett, with licence commitments reduced from 70,200m<sup>3</sup> nett to 58,6000m<sup>3</sup> nett with further reductions to 40,000m<sup>3</sup> nett by June 2002, in line with West Victoria Regional Forest Agreement. Remaining Areas include Ben Major, Berringa, Durham, Enfield, Glen Park, Lal Lal, Landsborough, Linton, Mt. Avoca, Ross Creek, Springmount, Trawalla and the Victorian School of Forestry, Creswick.

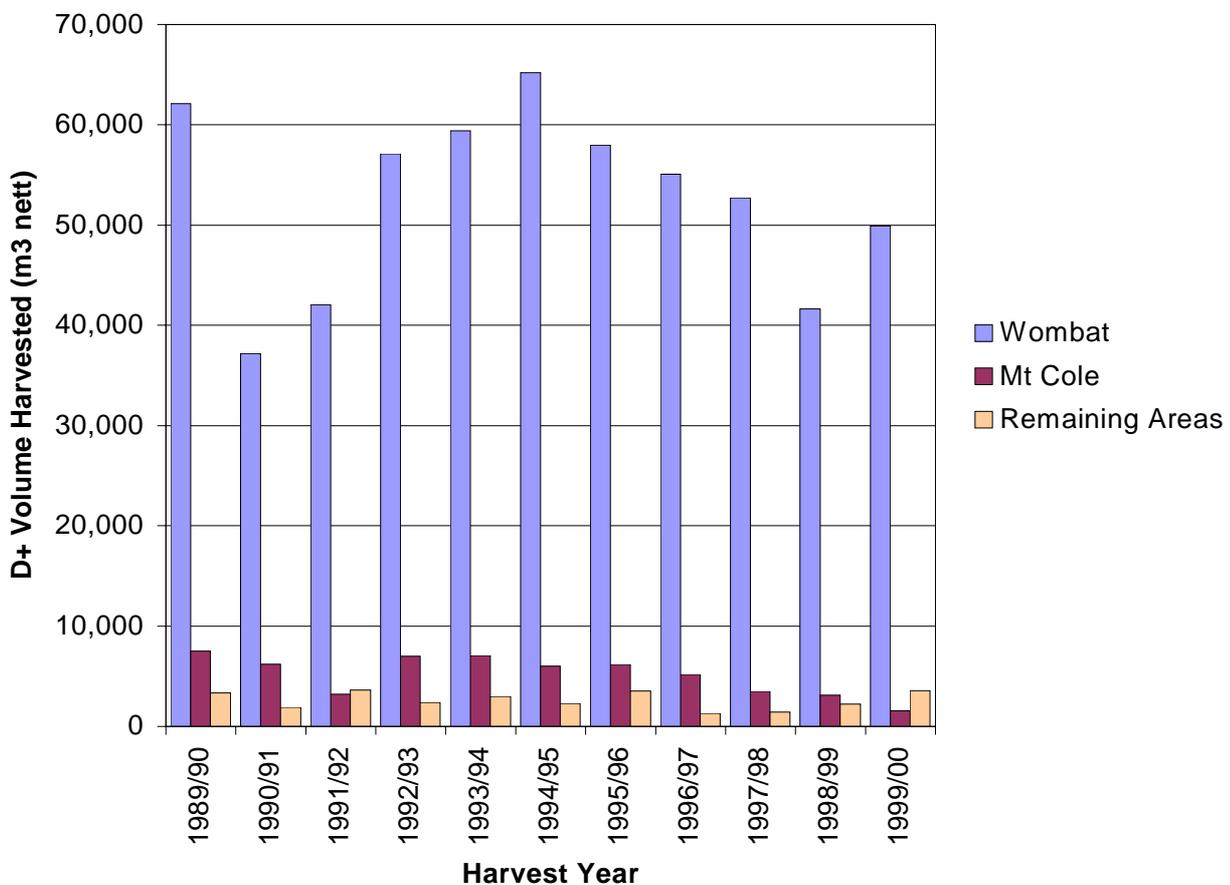


Figure 2. D+ Volume Produced by Forest Type by Year from 1989/90 to 1999/00

## 4.2 Sawlog Grades

Figure 3 shows sawlog grade proportions based on nett volumes from 1989/90 to 1999/00 displaying the fluctuation of sawlog grade proportions over the period. On average, production of each grade has been less than 1% A grade, 23% B grade, 60% C grade and 17% D grade. The percentage of B grade and better has remained constant at approximately 30% since 1995/96.

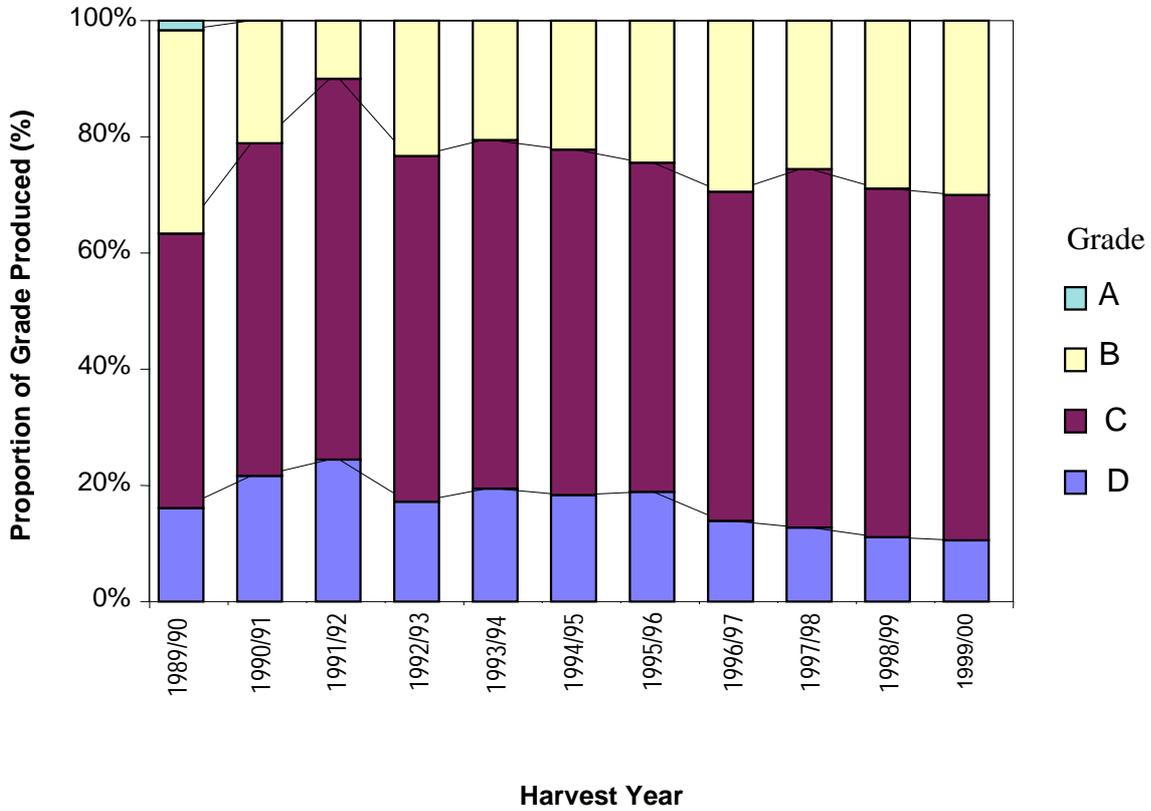


Figure 3. Sawlog Grade Proportions by Year from 1989/90 to 1999/00

### 4.3 Area Harvested

Figure 4 shows the area harvested by forest locality across the Midlands from 1989/90 to 1999/00. Areas can vary from year to year depending on the relative proportions of first and second-cut shelterwood system. First-cut yields are more than twice the volume of second-cut yields.

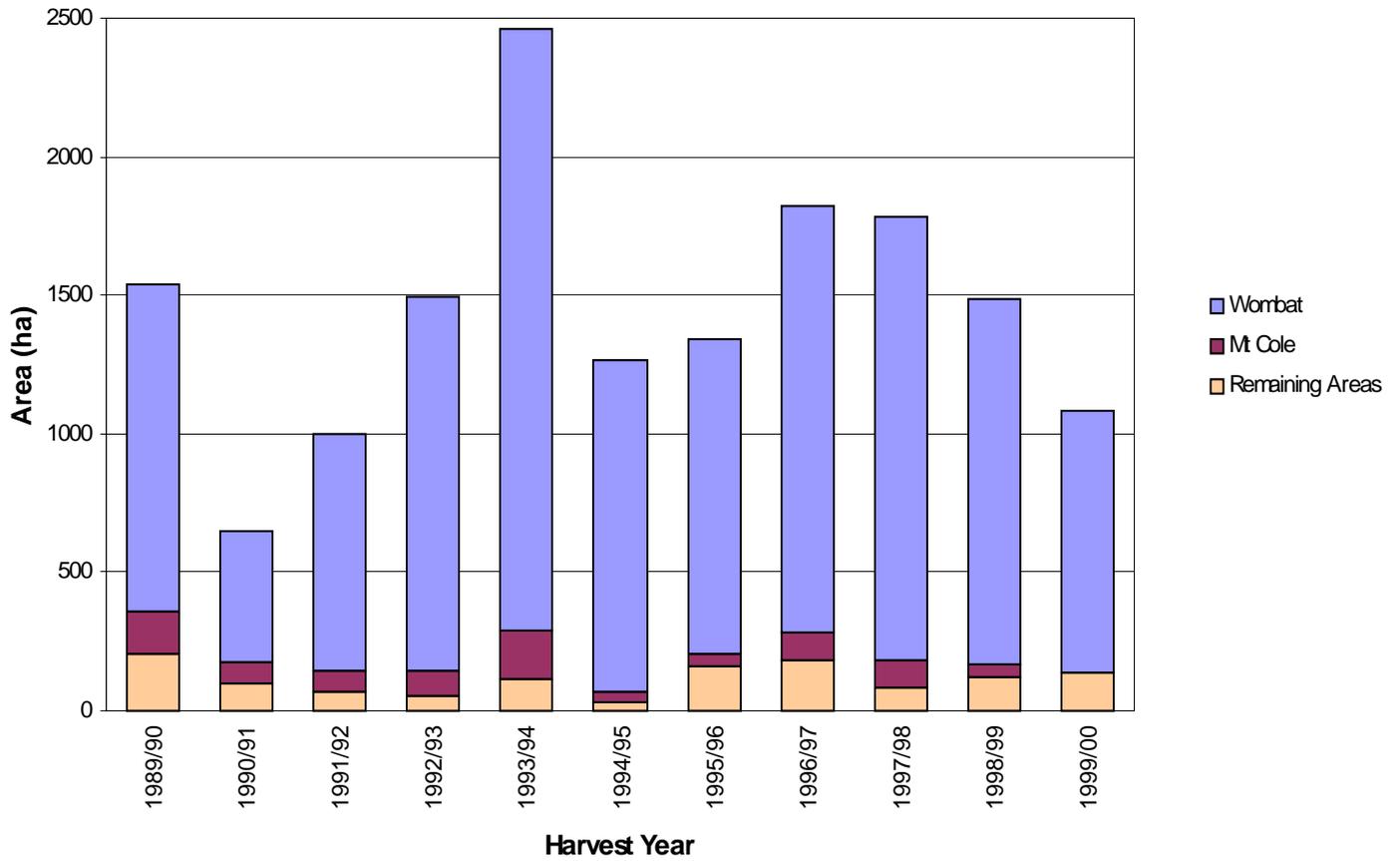


Figure 4. Area Harvested by Location from 1989/90 to 1999/00

#### 4.4 Sawlog Yields

Figure 5 shows sawlog yields by forest locality from 1989/90 to 1999/00. Average nett sawlog yield over the last ten years is 41.7m<sup>3</sup> nett/ha. Although not clearly apparent from the figure, yields have declined over the past decade and will continue to do so as the proportion of harvesting in second-cut shelterwood stands increases markedly.

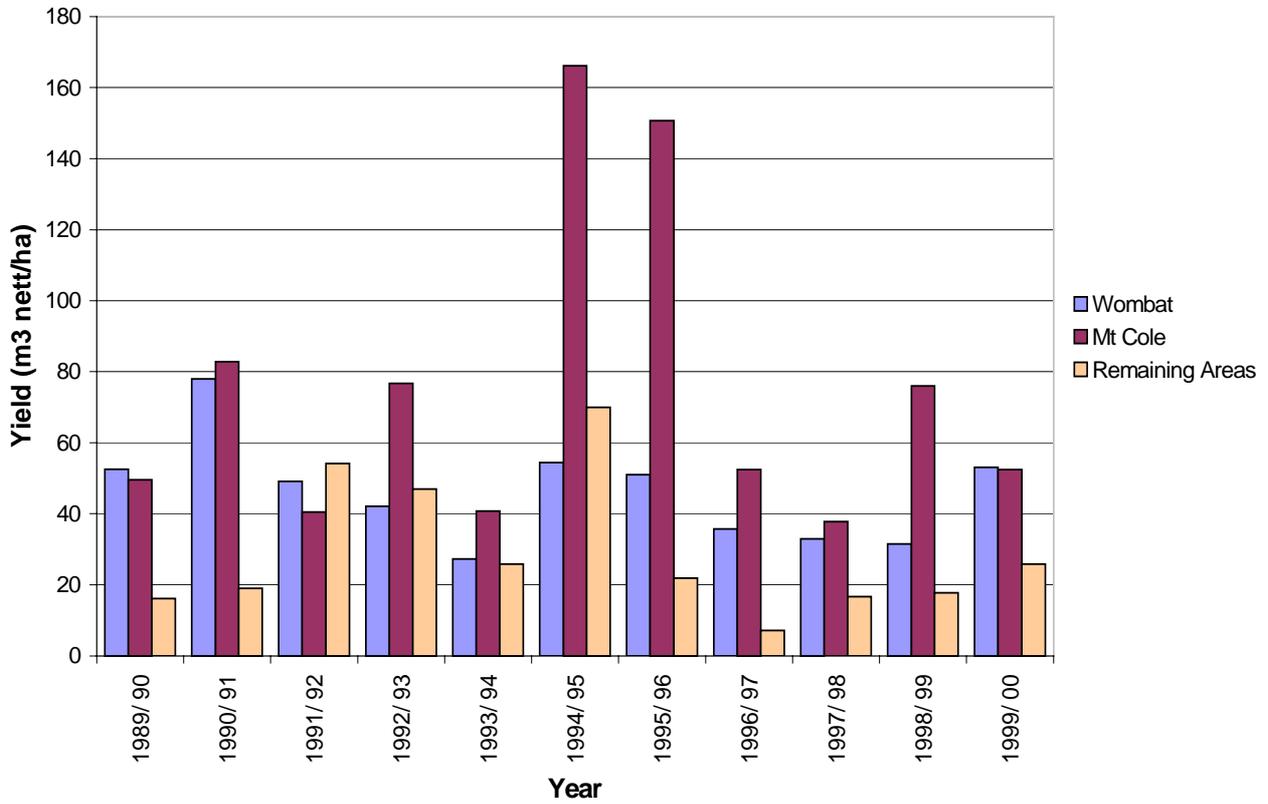


Figure 5. Sawlog Yields by Location

## 4.5 Residual Log Sales

Figure 6 shows the level of residual log (RL) production and sales from Midlands FMA from 1989/90 to 1999/00. Based on harvesting history, the average sawlog to residual log ratio in the 1989/90 to 1999/00 period was 1:1.27, however this ratio varies with the area harvested of first-cut Shelterwood, second-cut Shelterwood and Seed-tree coupes. Residual log sales were greater from 1992/93 onwards as markets were found for the entire residual log produced from sawlog harvesting and thinning operations.

Generally, all of the residual log produced has been sold since 1997/98.

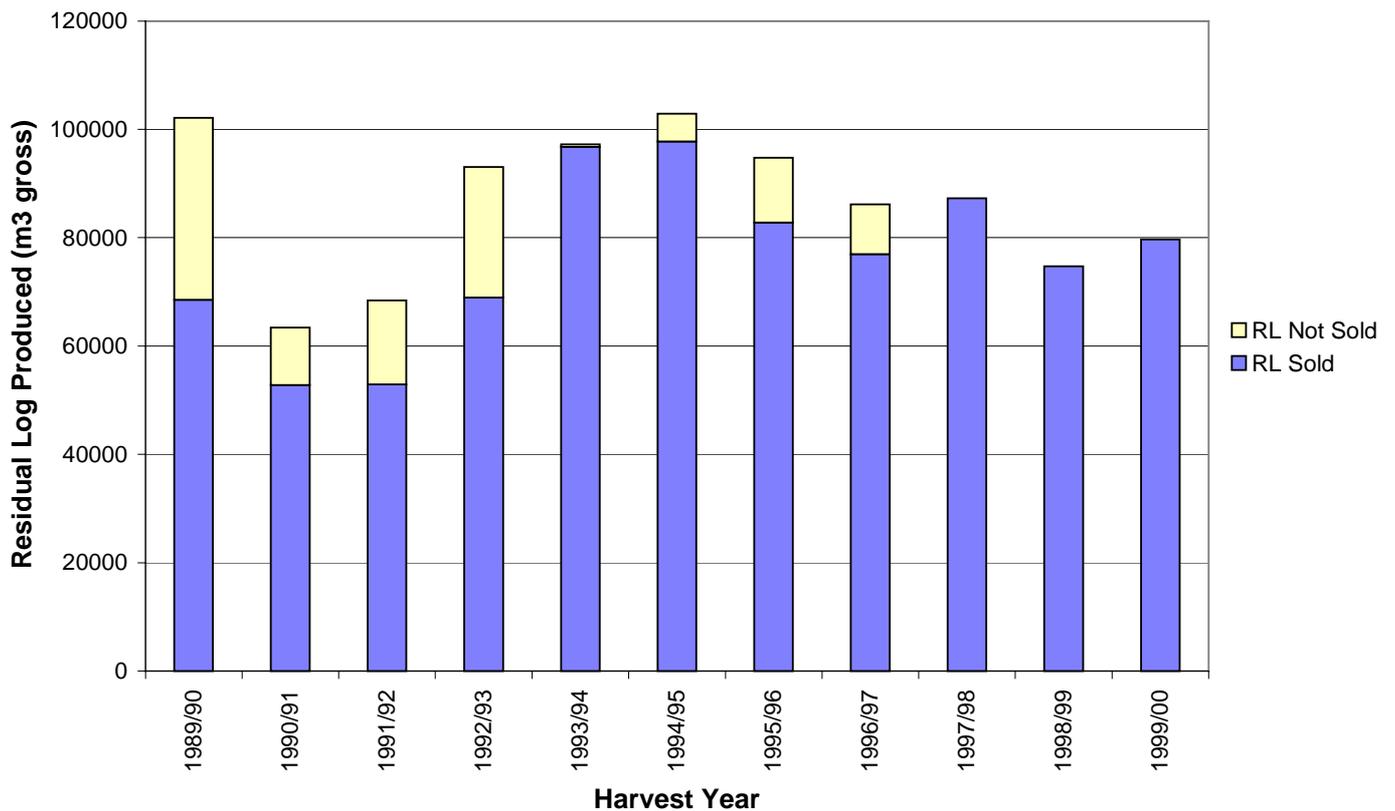


Figure 6. Residual Log Production from 1989/90 to 1999/00

## 5 Volume and Growth Information

### 5.1 Standing Volume

SFRI volume information has recently become available and yields used here have been calibrated with actual yields. The SFRI program sampled stands in the Midlands in 2000/2001. Trees were assessed for dimensions and external defects at each SFRI sampling point. This information was used, in combination with internal defect data, to develop estimates of nett D+ sawlog and residual volumes per hectare. These estimates were then calibrated with field data from felling plots. Models were then developed to relate this SFRI information to stand height and elevation for productive mature stands. These models provide estimates of current standing volume.

The modelled SFRI volume figures were checked against operational yields and were found to overestimate the harvested volume by 6% on average.

The SFRI program also collected data in the post-first-cut shelterwood areas, but analysis of this data is incomplete. An estimate of yield for these stands has been developed from the average yield of recent harvests, approximately 30m<sup>3</sup> nett/ha.

The SFRI program collected data from a limited number of samples in uneven-aged stands. This data has been used as a guide to estimate the harvestable yields from these stands.

Sample plots measured in advanced (1950s and 1960s) regrowth stands at Mt Cole, demonstrated that these areas carry a mix of regrowth and older stems. Further analysis will be needed to determine the volume of each component.

Post-harvest stocking surveys indicates that the retained basal area on seed-tree coupes in the Wombat and Mt Cole State Forest is 8.1m<sup>2</sup>. Analysis of seed-tree harvesting indicates that there is a 2:3 ratio between basal area and volume in the trees retained as seed trees. Using this ratio, it can be assumed that 6m<sup>3</sup> nett/ha are lost to seed trees in these areas, however, this basal area includes non-merchantable trees. Field information indicates that of this 8.1m<sup>2</sup>, on average only 4m<sup>2</sup> of these trees are merchantable seed trees. Remaining Areas and Uneven-aged stands are generally less productive than Wombat and Mt Cole stands, therefore these areas only have 2m<sup>3</sup> nett/ha lost to seed trees. Therefore, a reduction of 2m<sup>3</sup> nett/ha has been applied to stands undergoing seed-tree silviculture in these areas.

### 5.2 Growth

The SFRI growth models are still in preparation so growth data used in this analysis is derived from the 1996 Sustainable Yield Review, which was based on Continuous Forest Inventory (CFI) plot measurements. A single yield curve has been developed for the Wombat Forest, using a weighted average of the two yield curves used in that analysis. Future regrowth at Mt Cole has been assumed to also match the Wombat Forest curve. For the 1950's regrowth areas at Mt Cole a yield curve has been developed which reflects the contribution of the growth of the 1950s regrowth including the volume of present overmature stems. It assumes that these stands will eventually attain the same volume as the other regrowth areas at Mt Cole.

The uneven-aged stands have been assumed to yield a harvestable volume of 28m<sup>3</sup> nett/ha after 40 years.

## **6 Resources**

### **6.1 Wood flows**

In the Midlands FMA the predominant silvicultural systems used are seed tree, shelterwood and single tree selection silvicultural systems. They generally result in regrowth of a known age or a mixed aged stand. Trees are retained in shelterwood and seed-tree operations for growing stock, shelter, habitat, seed fall and in buffers along streams. The estimate of the availability of sawlogs into the future is based on the assumption that shelterwood and seed-tree will continue as the predominant silvicultural systems, with all new harvesting done as seed-tree.

To estimate the availability of sawlogs into the future a method of scheduling wood flows is required. This estimate uses a spreadsheet developed by NRE for this task. It uses the area of each forest type of known age and the yields for a range of ages. Areas of forest can then be scheduled at or near the nominal rotation age during periods into the future. The availability of sawlog has been called the Economically Accessible Resource and is based on the level that can be maintained or increased over the entire planning period, usually to 2100.

## 6.2 Resource Profile

Table 3 provides a simple representation of sawlog resource within a uniform statewide format. Volumes are indicative only. Percentages apply to nett volume and not area figures. This profile is to be read in conjunction with the accompanying comments on each resource element. Differences between previous estimates and areas and volumes in this estimate shown in Table 3 are explained further in the Appendix.

*Table 3. Profile of Resource Elements for Midlands FMA*

No.	RESOURCE ELEMENT	Note	Area (ha)	Annual Volume (m <sup>3</sup> nett/yr)
	<b>STATE FOREST (INCLUDING SOME HISTORIC AREAS)</b>		114,300	
	<b>Code and Forest Management Plan (FMP) elements:</b>			
1	SPZ & proportion SMZ		53,150	
2	Code slope & stream buffer exclusions		3,110	
3	FMP prescriptions		270	
4	Unmapped streams and soaks not considered in Code buffer exclusions		805	
5	Standard SFRI unproductive stands		25,460	
	<b>BIOLOGICALLY SUSTAINABLE YIELD</b>		31,505	10,500
	<b>Operational elements:</b>			
6	Further unproductive stands		0	0
7	Slopes additional to Code exclusions		1,370	425
8	Areas not harvested near stream buffers		0	0
9	Small and isolated areas		0	0
10	Rocky areas		693	170
11	Harvesting losses			430
	<b>Management elements:</b>			
12	Landscape buffers		915	260
13	Fire losses			15
14	Disease losses			170
15	New flora, fauna and cultural site reservations	1	0	0
16	Temporal and spatial constraints		1,700	430
	<b>Remaining element:</b>			
17	Economically Accessible Resource		26,827	8,600
	<b>Potential issue elements:</b>			
18	Changed residual log markets			
19	Changed minimum log diameter specification	2		
20	Changed silviculture system	2		
21	Additions to the forest estate			
22	Reforestation of unstocked stands			

Notes: Elements 6 to 16 and 18 to 22 may alter, increasing or decreasing the economically accessible resource element 17.

1. Powerful Owl and catchment prescriptions will affect the area available for scheduled harvesting.
2. See section 6.3.19 and 6.3.20 respectively for potential areas and volumes for this element.

## **6.3 Resource Elements**

### **6.3.1 Special Protection Zone and Proportion of Special Management Zone**

All of the Special Protection Zone is excluded from harvesting and all of Special Management Zone is available for harvesting.

### **6.3.2 Code Slope and Stream Buffer Exclusions**

The *Code of Forest Practices for Timber Production* (NRE, 1996) requires exclusion of slopes steeper than 30 degrees, streamside and rainforest buffers.

### **6.3.3 Forest Management Plan Prescriptions**

During 2000/01 a new habitat prescription, based on retained patches, was introduced for the Wombat State forest area of the Midlands FMA. The document “Operational Guidelines for the Implementation of Prescriptions for Habitat Retention in the Wombat State Forest (draft)” outlines the methodology of this prescription. These prescriptions create islands of habitat that fauna can use as stepping stones between large areas of forest reserves. Habitat patches are required in only about 50% of instances, as the rest of the time buffers and other reserves are located in suitable positions. It is estimated that, on average, 1.0% of the productive area is lost due to the proposed habitat prescription.

### **6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions**

An allowance of 805ha has been made for the area unavailable for timber production due to unmapped streams and soaks.

### **6.3.5 Standard Statewide Forest Resource Inventory Unproductive Stands**

SFRI defines productive stands in the Midlands FMA as eucalypt forest where the mature stand height is greater than 28m, or between 22 – 28m if more than 60% of the eucalypt cover is, *Eucalyptus obliqua* (Messmate), *E. globulus* (Victorian Blue Gum), *E. viminalis* (Manna Gum) or *E. rubida* (Candlebark).

A SFRI class “Other eucalypt >22m”, which includes all areas with a height between 22m and 28m and is dominated by any species other than those listed as productive, was considered unproductive following field checking by members of the industry representative group and NRE staff. For this reason they have not been included in the available area for timber production.

The productive area statement produced by SFRI has been derived using a Geographic Information System, which stores data on roads as a linear feature effectively taking up no area on the ground. This results in an error in the productive area, so all roads in the State forest have been buffered to produce area features 6m wide. This road buffer reduces the productive area by 485ha.

### **6.3.6 Further Unproductive Stands**

Industry consultation indicates that there are no further non-preferred species in the Midlands and that the SFRI definition of productive stands is appropriate. No reduction has been made on the basis of non-preferred species.

### **6.3.7 Slopes Additional to Code Exclusions**

Harvesting history shows that in practical terms, not all slopes less than 30 degrees are harvested. The methodology applied to slope to reflect the operational situation is as follows:

- less than 25 degrees included in the timber resource as available;
- 25 degrees to 30 degrees included in the timber resource as available dependent on adjacent slopes (GIS analysis used);
  - available if adjacent slopes less than 25 degrees; and
  - unavailable if adjacent slopes greater than 30 degrees.

### **6.3.8 Areas Not Harvested Near Stream Buffers**

Operationally, stream buffers on slopes are often greater than the 20m minimum which is prescribed by the *Code*, since slopes often dictate that trees cannot be fallen without entering the buffer. As harvesting can continue right to the 20m stream buffer required by the *Code* where possible, no allowance for additional stream buffers has been made.

### **6.3.9 Small and Isolated Areas**

Several coupes harvested recently have been less than 10ha in size and have proved economically feasible which can be attributed to the extensive road network in the Midlands. Therefore, no small area filter has been applied in the Midlands FMA.

### **6.3.10 Rocky Areas**

An allowance of 693ha has been made for areas that may be unavailable for harvesting due to rocky outcrops. The introduction of new rubber tyred skidders has reduced the impact of these areas on the available resource.

### **6.3.11 Harvesting Losses**

A 430m<sup>3</sup> nett per year volume reduction is applied to allow for the losses in converting standing estimated volume to harvested and removed volume.

### **6.3.12 Landscape Buffers**

The visual impact constraints as outlined in the Midlands Forest Management Plan may have an impact on the silvicultural system used, which in turn would impact on the available volume for timber production. An extensive visual impact analysis has yet to be performed, but preliminary work indicated large areas of State forest could be effected. The area and volume statements have not been altered for these visual constraints as areas or trees retained to lessen visual impact should be able to be removed in a second cut, once the regeneration from the first cut has grown sufficiently. While this may alter the flow of volume off productive areas it should not impact the total volume available.

Given the increasing community concern regarding the visual impact of harvesting activities on State forest, a buffer is frequently left between the harvesting area and major roads. It is assumed that such buffers can be harvested later when regeneration is fully grown.

State forest within the Midlands FMA has a higher level of interface with private property than other FMAs. Many private property owners request a buffer to be placed along their boundary with State forest to reduce the visual impact created by harvesting activities. These requests are sometimes granted, particularly if the area along the boundary contains little D+ volume.

Analysis of the length of private land/General Management Zone and Special Management Zone boundary indicates that if a buffer of 20m were standard on 50% of the private property interface then there would be a 915ha area reduction.

### **6.3.13 Fire Losses**

In the 1996 Review of Sustainable Yield for the Midlands FMA the annual likelihood of wildfire is based on the probability of wildfire severe enough to convert any given hectare of forest back to age zero was derived to be 0.17%. A reduction factor of 15m<sup>3</sup> nett per year has therefore been applied to this volume of sawlog resources.

### **6.3.14 Disease Losses**

A 170m<sup>3</sup> nett per year volume reduction factor has been allowed for in the Mt Cole locality where the root disease Armillaria has been present since the 1970s. Salvage logging can be conducted on areas showing early signs of Armillaria infection. The volume currently available is not reduced, though the effect on future rotations on salvage sites is unknown.

### **6.3.15 New Flora, Fauna and Cultural Site Reservations**

Further Special Management Zones and Special Protection Zones may be created around future identified sites of cultural, historic, flora or fauna significance occurring in General Management Zone areas within the Midlands FMA. Under the West Victoria Regional Forest Agreement if additional Special Protection Zones are required over areas that were previously General Management Zone or Special Management Zone, land of equal value can be swapped from the current reserve system, so there is no nett loss of productive area.

The Midlands Forest Management Plan outlines a number of guidelines for the management of designated catchments and Powerful Owl Management Areas which impact upon scheduling of the harvestable area. While harvesting is not excluded from these Special Management Zones, there are restrictions on the area of forest that can be harvested over a given period. Catchment and Powerful Owl guidelines from the Midlands Forest Management Plan have been modelled based on the following assumptions:

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

**Powerful Owls:** A minimum of 500ha 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 Special Protection Zone. A further 500ha of mature forest, or regrowth forest of a minimum age of 30 years, will be maintained through appropriate scheduling of timber harvesting.

### **6.3.16 Temporal and Spatial Constraints**

Given the significant decrease in timber availability after licences expire in 2009, an allowance of 1700ha is made for the expected difficulty in resolving temporal and likely additional Forest Management Plan and Wood Utilisation Plan (WUP) constraints. No allowance has been made for the aggregation of several coupes to a maximum area of 120ha over five years as specified in the *Code*.

### **6.3.17 Economically Accessible Resource**

The area of the economically accessible resource reflects current harvesting practices and management. Elements 18 to 22 could potentially increase or decrease the economically accessible resource. The annual volume of this element is that available now under a non-declining yield scenario.

### **6.3.18 Changed Residual Log Markets**

This element is not relevant or significant in this estimate for this FMA.

### **6.3.19 Changed Minimum Log Diameter Specification**

The issue of smaller D grade sawlogs was discussed with industry. These sawlogs were not preferred unless provided in multiples of 3.6m, making them more attractive. Changes to the grading card may result in small D grade logs becoming more attractive to industry, but may also impact the available volume. Shorter sections of better quality logs could be utilised by industry, which may improve the available resource in the Midlands FMA. This situation was not explored in detail given that changes to the grading system would be required.

### **6.3.20 Changed Silviculture Systems**

Silvicultural stand improvement may have a positive impact on stands making them economically viable for timber production, but because of the prohibitive cost of stand improvement they have been excluded from this analysis. There is the potential for the SFRI productive area to rise by 4,983ha if stand improvement works were undertaken.

Over recent years an extensive pre-commercial thinning program has been implemented, particularly in the Wombat State forest, focusing on East Trentham 1983 fire regrowth. It is believed that thinning in this area will bring the yields more in line with yields from productive areas rather than enhanced yields. Thinning is now moving into shelterwood regrowth and should provide enhanced yields in these areas.

Discussions with industry have raised the possibility of commercial thinning at a later age. If this occurred it may provide some sawlog material earlier than the minimum harvest age, but any potential sawlog volume from later age commercial thinning has not been included.

### **6.3.21 Additions to the Forest Estate**

This element is not relevant or significant in this estimate for this FMA.

### **6.3.22 Reforestation of Unstocked Stands**

This element is not relevant or significant in this estimate for this FMA.

## 7 Resource Outlook

A sawlog level of 8,600m<sup>3</sup> nett per year could be supplied until 2047. Following this there is a steady increase in the available volume to 38,000m<sup>3</sup> nett per year after 2127.

The TIS sets a nominal rotation age of 120 years for mixed species stands. The TIS permits harvesting above or below the nominal rotation age in order to regulate age classes and to provide for smooth timber flows.

For the purposes of future availability modelling, the current non-declining yield modelling, an optimum rotation length of 100 years is set for Wombat and Mt Cole, and 110 years for remaining areas. A minimum harvest age of 80 years was applied to existing mature, fire-regrowth and logging-regrowth mixed species stands in the Wombat and Mt Cole areas, and 90 years in remaining areas.

Low quality mixed species forests are generally harvested using a single-tree selection system. For modelling of mixed species stands, it has been assumed that where single-tree selection silviculture is applied over an area that a regeneration cut would still be required after about 90 years, making it equivalent to a multi-stage cut rather than a true selection system. This multi-stage cut has been modelled as a single harvest event between the minimum harvest age and the rotation age, with regeneration occurring after this operation.

The volume and proportion for individual forest areas for this scenario is shown in Table 5

*Table 5. Volume available by forest area for Midlands FMA*

<b>Forest Area</b>	<b>Volume (m<sup>3</sup> nett per year)</b>	<b>Proportion of Total (%)</b>
Wombat	7,000	81
Mt. Cole	800	9.5
Remaining Areas	800	9.5
<b>Total</b>	<b>8,600</b>	<b>100</b>

## 8 Data Standard

The Expert Data Reference Group (EDRG) has provided an independent assessment of data and methods used in the development of Estimates of Sawlog Resource. The EDRG has used a one to five star rating to classify data quality and methodological rigour in terms of three fundamental parameters and their relationship to forecasting long term allocation levels:

- area,
- woodflows, and
- yield.

One star indicates data inadequacy and five stars indicate data excellence for the basis of issuing long term licences at the proposed allocation level. An overall score is also given, based on the weakest of the three fundamental parameters.

In the Midlands Forest Management Area, area was given three stars, yield, four stars, woodflows, three stars resulting in an overall three star rating.

This rating will be considered in determining future licensing arrangements within a risk management framework.

## 9 Conclusion

The forests of the Midlands FMA are mixed species forests where the productive resource age structure is 28% mature, 27% post-first-cut shelterwood, 5% uneven-aged, and 40% logging and fire regrowth. The area available for harvesting has been reduced from previous estimates due to improved estimates of the area of mature forest, better descriptions of stand age and improved definitions of productive stands through SFRI data and the inclusion of operational constraints not previously measured. The data used in the development of the Midlands Estimate of Sawlog Resource was considered to be fair to good earning an overall three star rating by the Expert Data Reference Group. A sawlog level of 8,600m<sup>3</sup> nett per year is estimated.

## 10 References

NRE (2000) *Midlands FMA Timber Resource Analysis*. Department of Natural Resources and Environment, Melbourne.

NRE (1996) *Code of Forest Practices for Timber Production, Revision No. 2*. Department of Natural Resources and Environment, Melbourne.

NRE (1996) *Forest Management Plan for the Midlands*. Department of Natural Resources and Environment, East Melbourne.

NRE (1995) Forest Service Technical Report 95-5, *Review of Sustainable Sawlog Yield: Midlands Forest Management Area*. Department of Natural Resources and Environment, East Melbourne.

## 11 Glossary

**“A” Grade Sawlog** A sawlog with a minimum small end diameter underbark of 50cm which has no defective quarters and maximum defects on exposed end of: one-quarter diameter lengths of all gum vein or gum pockets, light stain, and maximum angle of sloping grain of 1:10 along the length of the sawlog.

**Advance Growth** (Advance Regeneration) Any established seedlings, saplings or poles which are present in a forest when some form of forest treatment is planned to obtain regeneration.

**Age Classes** Stands of timber originating at a defined time ie. wildfire or harvesting disturbance.

**Agreement** An arrangement for harvesting and removal of forest produce authorised by specific legislation.

**Annexures** Additions to licences that specify target volumes for sawlog grade or species.

**Annual Allocation** The annual quantity of timber specified in schedule 1 of a Long Term Licence, and which the Secretary is to make available from time to time under Condition 11 of the Licence Conditions.

**“B” Grade Sawlog** A sawlog with a minimum small end diameter under bark of 35cm which has maximum allowable defects on exposed ends of: one-quarter diameter length of loose gum veins/pockets and shakes, one diameter length of tight gum vein more than 3mm in width, two diameters length of tight gum vein less than 3mm in width, light stain, 1:10 angle of sloping grain along the sawlog axis, and a maximum of 105cm squared of pipe in an exposed end.

**Block** A major division of a forest, delineated for management purposes and bounded by natural features such as ridges and streams. Usually comprises a number of compartments.

**Buffer** A protective margin of vegetation abutting a stream, spring, wetland, body of standing water, swampy ground, private property, road, landscape feature, valued area or an area of rainforest, which protects it from potentially detrimental disturbances in the surrounding forest. Buffer width is defined as horizontal distance from which various operations are excluded.

**“C” Grade Sawlog** A “C” grade sawlog is considered to be any sawlog with a minimum small end diameter under bark of 30 cm which has maximum allowable defects on exposed ends of: one diameter length of loose gum veins/pockets and shakes, seven diameters length of tight gum vein more than 3 mm width, unlimited lengths of tight gum veins less than 3 mm width, dark stain, maximum sloping grain angle of 1:8 along the length of the sawlog, maximum of two defective quarters, and maximum of 112 cm square pipe on exposed end.

**Code of Forest Practices for Timber Production** A set of operational principles and, in some cases, minimum performance standards for the conduct of timber harvesting and associated works in forests in Victoria, referred to as the Code.

**Comprehensive, Adequate and Representative Reserve System** A reserve system to conserve all native forest types as well as the plants and animals that depend on them. Comprehensive: the full range of forest communities recognised by an agreed national scientific classification at appropriate hierarchical levels; Adequate: the maintenance of the ecological viability and integrity of populations, species communities; Representative: those sample areas of the forest that are selected for inclusion reserves which should reasonably reflect the biological diversity of the communities.

**Continuous Forest Inventory Plots** (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 measurements.

**Coupe** An area of forest of variable size, shape and orientation from which logs for sawmilling or other industrial processing are harvested.

**“D” Grade Sawlog** A “D” grade sawlog is considered to be any sawlog with a minimum small end diameter under bark of 25cm which has maximum allowable defects on exposed ends of: two diameters length of loose gum veins/pockets or shakes, 10 diameters length of tight gum vein more than 3mm width, unlimited length of tight gum vein less than 3mm width, dark stain, maximum sloping grain angle of 1:8 along the length of the sawlog, maximum of three defective quarters, and maximum of 120cm square of pipe defect on exposed ends.

**D+ Sawlog** Sawlogs of grade D and better ie. Including C, B, and A grades.

**DBHOB** Diameter breast height over bark (breast height = 1.3m).

**Ecologically Sustainable Forest Management** The management of forests on all land tenures to maintain the overall capacity of forests to provide goods, protect biodiversity, and protect the full suite of forest values at the regional level.

**Even-aged forest/stand** Forest predominantly of the one age. Usually originating as a result of an intense burn or harvesting activity.

**Evergreen Licence** A sawlog licence with a provision for renewal before the fifth year of the licence, if the licensee has proposals for significant capital expenditure.

**Expert Data Reference Group (EDRG)** A group appointed by the Minister to review the data used to estimate the available volumes. Consist of Professor J. VanClay (Southern Cross University), Professor B. Turner (ANU).

**Fauna** A general term for animals (including reptiles, birds, marsupials and fish).

**Fuel Management Zone** Modification of fuels by prescribed burning or other means. (There are 5 Fuel Management Zones).

**Flora** A general term for plants of a particular area or time.

**Foothill Mixed Species Forest** Forest with a mature stand height of less than 40m and generally occurring on mid range elevations.

**Forest 25** A GIS spatial data set at 1:25000 scale derived from detailed aerial photography interpretation assessments of ash and mixed species forests, and broad structural vegetation mapping for other mixed species forests.

**Forest Coupe Plan** A Forest Coupe Plan is a plan that must be prepared for each harvesting operation in public native forest and will contain a map identifying the area and a schedule incorporating the specifications and conditions under which the operation is to be administered and controlled. The Forest Coupe Plan will be prepared prior to the commencement of utilisation and will specify the matters set out in Section 2.3.1 of the Code of Practice.

**Forest Management Area (FMA)** The basic units for forest planning and management in Victoria. Currently Victoria is divided into 15 Forest Management Areas as defined in the *Forests (Timber Harvesting) Act 1990*, however, the Wangaratta and Wodonga FMAs are managed as the North East FMA.

**Forest Management Plan** Forest management plans are developed by the Department of Natural Resources and Environment to address the full range of values and uses in Forest Management Areas which have been designated as the units for planning forest management activities. Forest Management Plans will be prepared according to the guidelines set out in Section 2.1 of the Code of Forest Practices for Timber Production.

**Forest Management Zone** An area of similar physical capability or forest value to which particular Departmental strategy and specific prescriptions may apply. There are three types of zones: the Special Protection Zone, Special Management Zone and General Management Zone.

**Forest Product Licence** Authority to harvest and remove Forest Produce issued under section 52 of the *Forests Act 1958*. Document giving official permission to remove Forest Produce from designated areas of Public Land in the State of Victoria. Licences are issued in various forms depending on the type and quantity of produce, period of licence and method of payment (eg. The Forest Produce Licence and Receipt form is used for small quantities of produce with payment made in advance of removal).

**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.

**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 Information System (GIS)** A system which holds spatially referenced data which can be classified, overlaid, analysed and presented in map, tabular or graphic form.

**Grade** A measure of the quality of a hardwood log. The grade of a sawlog can be A, B, C, D, E or ungraded. The grade is determined using the Hardwood Sawlog Grading Card. Logsales also uses grade to identify product groups such as residual logs, pulpwood and firewood.

**Gross Area** The total estimated area of a coupe, forest or block.

**Gross Volume** The volume of a log inclusive of all defect i.e based only on the external dimensions.

**Group Selection System** All trees in a small patch are felled, with the gaps created scattered over the forest compartment. Gap size is no more than about two tree-heights in diameter, so that natural (or induced) seedfall from surrounding trees can be used. An uneven-aged system, as the fellings are done every 10-15 years.

**Habitat Tree** A tree that has been identified as providing important habitat for wildlife and which is given additional protection during forest operations.

**HARIS** (Hardwood Resource Information System) This system has been in operation since the late 1970's and forms the Statewide timber resource database for native forest on public land in Victoria.

**Height Class** Height class refers to a specified range of tree heights. The height classes used by the Statewide Forest Resource Inventory are:

Height Class 1a: 60m<	Height Class 1b: 51.1-60m
Height Class 2a: 46-51m	Height Class 2b: 40-45.9m
Height Class 3a: 34-39.9m	Height Class 3b: 28-33.9m
Height Class 4a: 22-27.9m	Height Class 4b: 15-21.9m
Height Class 5a: 10-14.9m	Height Class 5b: 5-9.9m
Height Class 6: <5m	

**High Elevation Mixed Species (HEMS)** Mixed species forests above 750m elevation but also some forests in frost hollows and on wetter aspects greater than 600m act as HEMS. Successful regeneration generally occurs from spring germination.

**Integrated Forest Planning System (IFPS)** Victoria has developed a system of linked computer-based tools collectively called the Integrated Forest Planning System (IFPS). The IFPS provides a means of modelling the growth, development and harvesting of forest stands as well as a range of other forest values.

**Log Grading** Assessment of the quality of a sawlog.

**Log Length** The length of a log is the shortest distance from end to end along the log. This is measured to the backward 0.1m but is normally considered in multiples of the backward 0.3m when discussing log lengths for grading purposes.

**Long Term Licence** A licence issued under the *Forests Act* 1958 for a period of more than 3 years and up to 15 years.

**Long Term Sustainable Yield (LTSY)** The theoretical rate of harvest that can be maintained in perpetuity.

**Low Elevation Mixed Species (LEMS)** These forests are usually below 750m elevation except for some forests in frost hollows and on wetter aspects between 600-750m which act as High Elevation Mixed Species. Most successful regeneration occurs from autumn germination.

**Management Prescriptions** Management Prescriptions detail specific conditions or standards that are to apply to forest operations in the vicinity of certain threatened flora or fauna. More detailed prescriptions are established at the local level and are reflected in Wood Utilisation Plans.

**Mature Forest** Forest at or beyond nominal rotation age but before it reaches the overmature stage. (Generally 60-150 years).

**Mean Annual Increment (MAI)** The total increment up to a given age divided by that age; average annual increment to that age (m<sup>3</sup>/ha).

**Merchantable** Trees, which are suitable for processing into, forest products and for which a market exists.

**MESSIM** (Messmate Simulator) A computer model developed to forecast the growth of messmate forests at Portland.

**Minor Forest Produce** Produce harvested from State forest other than sawlogs or residual logs. Minor Forest Produce is often collected by small operators or individuals and includes products such as sleepers, posts and poles, craftwood, firewood, honey, extractives, and eucalyptus oil.

**Mixed Species Forest** Forest, which has two or more eucalypt species commonly found within the canopy. Generally consisting of peppermint, messmate, gum or stringybark species. Does not include ash, red gum or box ironbark forests.

**Nett Area** The total estimated area of the coupe (to the nearest hectare). This area is to be determined from the calculated gross area less exclusion areas.

**Nett Volume** The volume of a log which can be converted to sawn timber. It is equal to the gross volume less the defect volume. Accounts are no longer issued in terms of nett volume however some licences are monitored in nett volume and sustainable yields are usually calculated in nett volume.

**Non-declining** Volumes, which do not decline over time, but may increase.

**Old-growth Forest** Forest which contains significant amounts of its oldest growth stage - usually senescent trees - in the upper stratum and has been subjected to any disturbance, the effect of which is now negligible.

**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 loss of branches and epicormic growth.

**Overwood** Standing mature trees remaining after harvesting. Can refer to seed trees, habitat trees, culls or retained merchantable trees.

**Periodic Annual Increment (PAI)** The average annual increment for any defined short period, such as five years.

**Productivity Class** An area of forest that is considered for the purposes of yield estimation to be relatively uniform.

**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** Timber sold for the purpose of conversion to paper, pulp or other product which requires it to be chipped.

**Reforestation** The re-establishment of a stand of trees by planting or sowing with species native to the locality (unless an adverse microclimate requires the use of alternative native species for survival and growth) on previously cleared or poorly forested land.

**Regional Forest Agreement (RFA)** An agreement about the long-term management and use of forests in a particular region between the Commonwealth and a State Government.

**Regrowth Forest** Forest stands regenerated either naturally or by seeding following death or removal of the forest overstorey. A growth stage of a forest stand or individual tree in which the crowns have a narrow conical form and where trees are actively growing. A forest originating from fire, disturbance or harvesting actively below the nominal rotation age (Generally 1-60 years).

**Residual Log (RL)** Logs, not of sawlog quality, produced as a consequence of a sawlog harvesting operation. Unlike pulpwood the end-use of a residual log is not specified.

**Retained Trees** Trees retained on a coupe during a harvesting operation because they are unmerchantable, are to serve as seed trees or wildlife habitat trees, or have been selected to grow on after thinning.

**Roundwood** A log before it has been cut to produce sawn timber, veneer or woodchips.

**Salvage Logging** Logging to recover a resource that would otherwise be lost through damage by fire, pests or disease.

**Sawlog** Any length of merchantable log suitable for conversion to sawn timber which: is at least 2.7m in length, has a small end diameter under bark of 25cm or greater, does not have a sweep or crook which exceeds 1/5 of the diameter from a 2.4m straight edge, is of Grade D standard or better. Log suitable for conversion to sawn timber.

**Seed Tree System** All live trees are felled apart from a number of uniformly distributed trees retained to provide seed, and those required for environmental purposes. The seed trees would comprise 10-15% of the basal area of the original stand. An even-aged system.

**Seed Tree** A tree left standing following harvesting to regenerate the site by release of seed contained in the crown.

**Selection System** Silvicultural systems used to harvest and regenerate particular forest types. Trees are harvested either singly or in small groups at relatively short intervals indefinitely. Regeneration is established continually in the gaps produced and an uneven-aged stand is maintained.

**Senescent** See Overmature.

**Statewide Forest Resource Inventory (SFRI)** A strategic level inventory of forest resources on State Forest Victoria.

**Shake** A shake is a partial or complete longitudinal separation between adjoining layers of wood due to causes other than drying.

**Shelterwood System** A silvicultural system used for harvesting and regenerating particular forest types. 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** The felling of scattered mature individual trees, at intervals (generally 10-15 years) over the rotation. Regeneration is largely from lignotubers and coppice.

**Site Index** The relationship between the heights and ages of the dominant and co-dominant trees in a stand at a particular age, used as a measure of the amount of timber that could be produced from the stand.

**Site Quality** The potential of the site to grow timber. A function of soil quality, rainfall and aspect.

**Size Class** A range of log diameters. One product can have many size classes (or none). Size classes are used mainly for the application of royalty rates.

**Small End Diameter Under Bark (SEDUB)** The diameter is measured by averaging two diameter measurements taken at right angles to each other across the small end of the log, or by using a diameter tape placed around the circumference of the small end of the log. Bark thickness must be allowed for if using a diameter tape on an unbarked log. Diameter is expressed as the backward whole centimetre.

**Smash** That proportion of sawlogs that is lost due to damage that occurs when trees are harvested.

**Soaks** Springs and wet areas where the ground water table intersects with ground surface.

**Special Management Zone (SMZ)** The Special Management Zone will be managed to conserve specific features, while catering for timber production under certain conditions. These include areas where timber must be harvested in a different manner than is normal to protect particular values; for example in areas where accelerated tree senescence is being induced.

**Special Protection Zone (SPZ)** The Special Protection Zone will be managed for conservation, and timber harvesting will be excluded. It will include areas of special significance of flora and/or fauna, areas for protection of water quality and other values (such as rainforest, riparian vegetation), and other areas of special significance (like special landscape and historic value). Such areas will be linked to the parks and reserves system where appropriate.

**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.

**Standard Licence** A sawlog licence that is renewable within five years of its expiry date.

**STANDSIM** A computer model developed to forecast the growth of even-aged stands of Ash, Silvertop and Messmate.

**Stumpage** The value of timber as it stands in the forest.

**Sub-dominant** A sub-dominant crown is one where the area occupied by the tree crowns of the upper stratum occupies 11%-30% of the total crown cover of the stand.

**Sustainable Yield** The sustainable yield of a forest is the maximum level of commercial timber which can be maintained in perpetuity under a given management regime. In Victoria sustainable yield is specified in legislation as the rate of harvest that can be maintained for a defined period (usually 10 years).

**SYSS (Sustainable Yield Spreadsheet)** A computer model developed to schedule woodflows and determine yields of sawlogs into the future.

**Thinning** The removal of part of a forest stand or crop, with the aim of increasing the growth rate and/or health of retained trees.

**Thinning From Above (THA)** Removing the larger and well developed stems from a stand allowing the smaller stems to increase their growth.

**Thinning From Below (THB)** Removing the smaller and poorly formed stems from a stand and allowing the larger better formed stems to increase their growth.

**Timber Resource Analysis** An analysis of the timber availability prepared for the RFA process.

**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.

**Unmerchantable** Trees which are not suitable for processing into forest products and for which market exists.

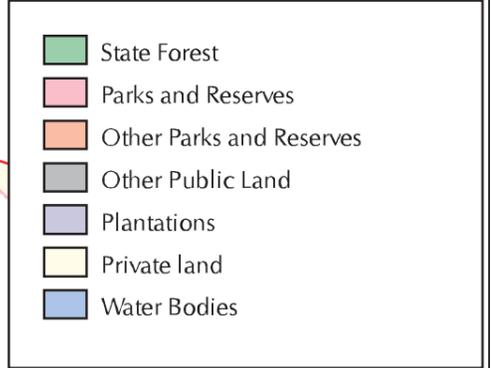
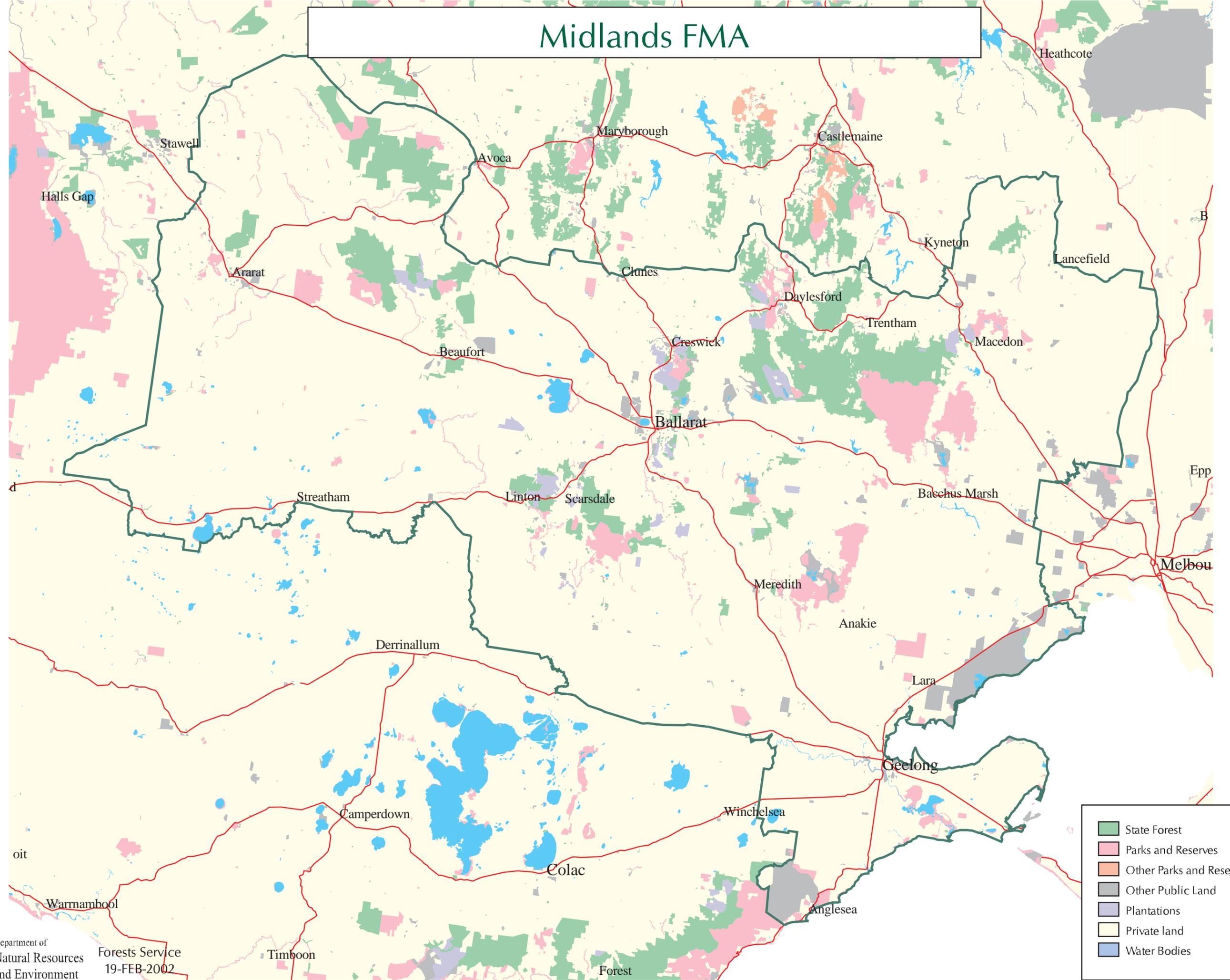
**Value Adding** An economic term which describes how a raw product is processed into a product which is of more value than the material in its raw state. In the forest and wood industry context, examples of this include the kiln-drying of sawn timber and the manufacturing of wood veneers.

**Waste** See Smash.

**Yield Curves** A yield curve defines the volumes of logs available (in a particular forest type and productivity class) at different ages for a particular silvicultural regime.

**12 Map 1 – Midlands FMA**

# Midlands FMA



## Appendix - Changes in Area and Volume Estimates

The Timber Resource Availability analysis carried out in February 2000 for the West Victoria Regional Forest Agreement used spatial data from the 1996 Sustainable Yield Review to calculate the available area and associated volume for the Mount Cole and Wombat areas. SFRI data was used for the analysis of area available for the Remaining Areas but SFRI volume information was not available at the time. This ESR has used the latest spatial and volumetric information provided by the SFRI. Table 1 summarises the differences in area from the development of the Timber Resource Availability analysis to the ESR.

*Table 1. Area Summary between Resource Assessments*

Forest type/Area	Nett Available Area (ha) <sup>1</sup>		SFRI Available Productive Area (2001)
	SY Model (1996)	TRA (2000)	
Wombat	34,470	32,290	23,573
Mt. Cole	4,550	3,790	4,446
Remaining Areas	11,430	6,350	4,237
Total	50,450	42,430	32,255

Note: 1. The Timber Resource Availability analysis nett available area is equivalent to the SFRI available productive area.

The reduction in area and volume can be attributed to:

- the area of mature forest in the Wombat and Mt Cole forests is much less than previous estimates –largely as a consequence of lower than expected yields leading to the need to harvest larger areas than predicted to meet the previous 58,000 cubic metre per year supply levels;
- harvesting has occurred at more than the sustainable yield rate for a number of years since 1979/80;
- improved descriptions of stand age from SFRI have reduced the area available in catchments and owl zones, in line with management prescriptions defined in the Forest Management Plan;
- the definition of productive forest in earlier assessments included stand heights down to 18m. The SFRI definition of suitable stands incorporates species information and stand heights down to 28m, and down to 22m in some areas;
- 4425ha of the forest is considered to be impractical to harvest due to operational and management constraints; and
- yields from the second phase of shelterwood harvesting used in this Estimate have proven to be lower than the volumes predicted from earlier forest inventories.