

**CENTRAL  
FOREST MANAGEMENT AREA**

**ESTIMATE OF SAWLOG RESOURCE**

**Department of Natural Resources and Environment  
Victoria**

**March 2002**

© 2002 Victorian Department of Natural Resources and Environment

Published by the Department of Natural Resources and Environment  
PO Box 500, East Melbourne  
Victoria 3002, Australia

<http://www.nre.vic.gov.au>

This publication is subject to copyright law. Except as permitted under the *Copyright Act 1968*, no part of this publication may be reproduced by any process, electronic or otherwise, without the specific written permission of the Department of Natural Resources and Environment.

The National Library of Australia Cataloguing-in-Publication entry:

Victoria Dept. of Natural Resources and Environment.  
Central Forest Management Area  
Estimate of Sawlog Resource

Bibliography  
ISBN 0 7311 5178 X

1. Forest management – Victoria. 2. Sawlog resources – Victoria. 3. Forests and forestry – Victoria. I. Victoria Forests Service. II. Title. III. Title: Estimate of Sawlog Resource.

***Disclaimer***

*This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.*

This publication contains data that is, to the best of the Department's knowledge, current at the time of release. Over time, the data may be superseded or outdated, and newer versions will make this publication redundant. Information about the latest version of data is available on the NRE website at <http://www.nre.vic.gov.au/forests/index.html> or from the Executive Director, Forests Service.

## 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 Central 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

# CONTENTS

- FOREWORD..... 1**
- 1 INTRODUCTION..... 3**
- 2 BACKGROUND..... 3**
- 3 LICENCE COMMITMENTS..... 5**
- 4 HARVEST HISTORY ..... 6**
  - 4.1 TOTAL SAWLOG PRODUCTION..... 6
  - 4.2 SAWLOG GRADES..... 7
  - 4.3 SAWLOG SIZE CLASSES ..... 8
  - 4.4 AREA HARVESTED ..... 9
  - 4.5 SAWLOG YIELDS ..... 10
  - 4.6 RESIDUAL LOG SALES..... 11
- 5 VOLUME AND GROWTH INFORMATION ..... 12**
  - 5.1 STANDING VOLUME ..... 12
  - 5.2 GROWTH ..... 12
- 6 RESOURCE..... 13**
  - 6.1 WOOD FLOWS ..... 13
  - 6.2 RESOURCE PROFILE..... 14
  - 6.3 RESOURCE ELEMENTS..... 15
    - 6.3.1 Special Protection Zone and Proportion Special Management Zone..... 15
    - 6.3.2 Code Slope and Stream Buffer Exclusions..... 15
    - 6.3.3 Forest Management Plan Prescriptions..... 15
    - 6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions ..... 15
    - 6.3.5 Standard Statewide Forest Resource Inventory Unproductive Stands..... 15
    - 6.3.6 Further Unproductive Stands..... 15
    - 6.3.7 Slopes Additional to Code Exclusions..... 16
    - 6.3.8 Areas Not Harvested Near Stream Buffers..... 16
    - 6.3.9 Small and Isolated Areas ..... 16
    - 6.3.10 Rocky Areas ..... 17
    - 6.3.11 Harvesting losses ..... 17
    - 6.3.12 Landscape Buffers ..... 17
    - 6.3.13 Fire Losses..... 17
    - 6.3.14 Disease Losses..... 17
    - 6.3.15 New Flora and Fauna and Cultural Site Reservations ..... 17
    - 6.3.16 Temporal and Spatial Constraints..... 17
    - 6.3.17 Economically Accessible Resource ..... 17
    - 6.3.18 Changed Residual Log Markets..... 17
    - 6.3.19 Changed Minimum Log Diameter Specification..... 18
    - 6.3.20 Changed Silviculture System..... 18
    - 6.3.21 Addition to the Forest Estate ..... 18
    - 6.3.22 Reforestation of Unstocked Stands..... 18
- 7 RESOURCE OUTLOOK ..... 19**
- 8 DATA STANDARD..... 20**
- 9 CONCLUSION..... 20**
- 10 REFERENCES ..... 20**
- 11 GLOSSARY ..... 21**
- 12 MAP 1 – CENTRAL FMA ..... 27**

## 1 Introduction

This Estimate of Sawlog Resource (ESR) summarises current Central 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

Central Forest Management Area lies immediately to the north and east of the Melbourne metropolitan area and extends to Seymour and Lake Eildon in the north, Broadford in the west and Matlock in the east (see Map 1).

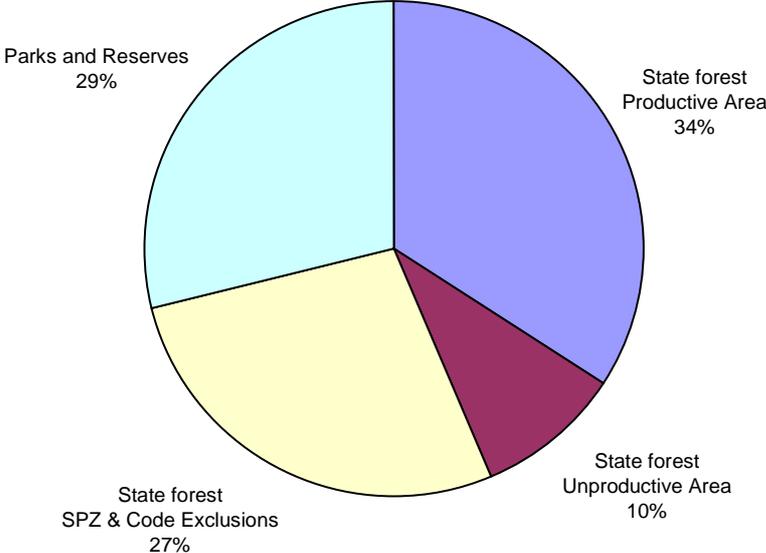
The Timber Industry Strategy (TIS) released in 1986 established the basis for regional sustainable harvesting of sawlogs from State forest in Victoria. Based on resource data available at the time, sustainable sawlog yield rates were determined for each one of 15 Forest Management Areas identified by 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 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 (FMP), 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, requires that the sustainable yield be regularly reviewed. In 1991, the legislated sustained yield for the Central Forest Management Area was set at 115,000m<sup>3</sup> nett per year of A, B and C grade sawlogs. This was reviewed in 1996 and the sustained yield adjusted to 144,000m<sup>3</sup> nett per year of D+ sawlogs. The 1996 review was limited to converting the existing legislated sustained yield to include all grades of sawlog.

Central Forest Management Area is covered by the Central Highlands Regional Forest Agreement (RFA), established between the Commonwealth and Victorian Governments in 1998. The Regional Forest Agreement formally accredits the Central Highlands Forest Management Plan (FMP) as part of Victoria's Ecologically Sustainable Forest Management system.

The Central Forest Management Area is covered by the Central Highlands Forest Management Plan (NRE, 1998) area. This Plan provided for the protection of all conservation values to agreed targets in Special Protection Zones (SPZ), and allowed harvesting in General Management Zone (GMZ) and Special Management Zone (SMZ) under specific conditions. (Figure 1).

**Total Public Land: 286,344 ha**



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

The current forest age structure by area is 51% mature, 26% 1939 regrowth, and 23% other fire regrowth and logging regrowth.

### 3 Licence Commitments

Current licence tenure and commitment by species and grade are shown in Tables 1 and 2. As most of the residual roundwood is licensed from more than one Forest Management Area, the annual harvest level from Central FMA varies, so that the residual roundwood commitment is based only on sales from recent years.

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

Licence Type	Product	Expiry Date	No of Licences
Evergreen	Sawlog	30/06/07	6
Evergreen	Sawlog	30/06/08	2
Standard	Sawlog	30/06/02	6
Standard	Sawlog	30/06/08	5
<b>Total</b>			<b>19</b>
Standard	Residual	30/06/06	1
Standard	Residual	30/06/08	3
<b>Total</b>			<b>4</b>

Note: Three of the residual licences also draw on resources from other FMAs.

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

Product / Grade	Annual Allocations		
	Species Type		
	Ash Species	Mixed Species	Total
<b>Sawlog (m<sup>3</sup> nett)<sup>1</sup></b>			
B+	33,143	5,107	<b>38,250</b>
C	57,891	8,395	<b>66,286</b>
D	21,340	3,209	<b>24,549</b>
<b>Sawlog Total</b>	<b>112,374</b>	<b>16,711</b>	<b>129,085</b>
<b>Residual Log (m<sup>3</sup> gross)</b>	90,294	23,302	<b>113,596</b>

Note: 1. This assumes current annexures

## 4 Harvest History

### 4.1 Total Sawlog Production

Figure 2 shows sawlog volumes produced by forest type from 1991/92 to 2000/2001.

Average nett sawlog production over the last ten years is 118,516m<sup>3</sup> nett, which is approximately 4,900m<sup>3</sup> nett below the level of licensed commitment. The lowest production year was 1991/92, and the highest production year was 1993/94.

The significant increase in Alpine Ash harvested since 1996/97 was due to rescheduling harvesting out of Mountain Ash and into Alpine Ash to comply with the volume mix available from the Central Highlands Forest Management Plan. The mixed species volume harvested has averaged 10,065m<sup>3</sup> nett since 1996/97.

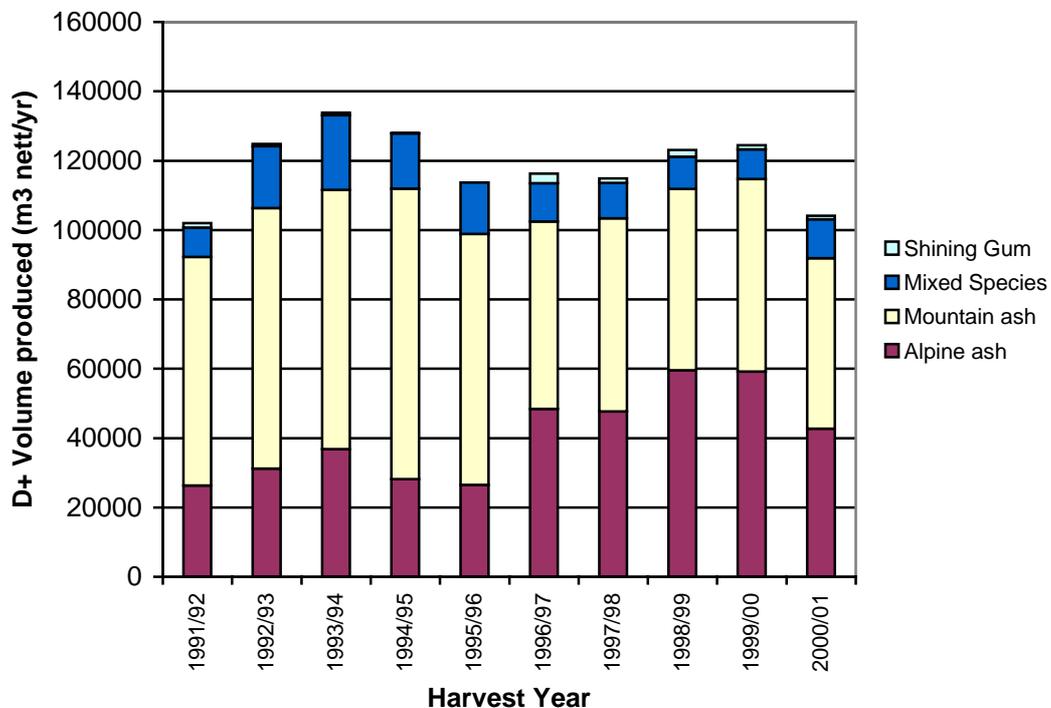


Figure 2. D+ Sawlog Produced by Forest Type by Year

## 4.2 Sawlog Grades

Figure 3 shows sawlog grade proportions from 1991/92 to 2000/01. The percentage of B grade and better has increased progressively, from 33% in 1991/92 to 55% in 2000/01.

The average proportion of each grade over the ten years is 0.2% A grade, 45.0% B grade, 40.4% C grade and 14.4% D grade. The significant increase in B grade in 1996/97 coincided with the increased proportion of Alpine Ash harvested.

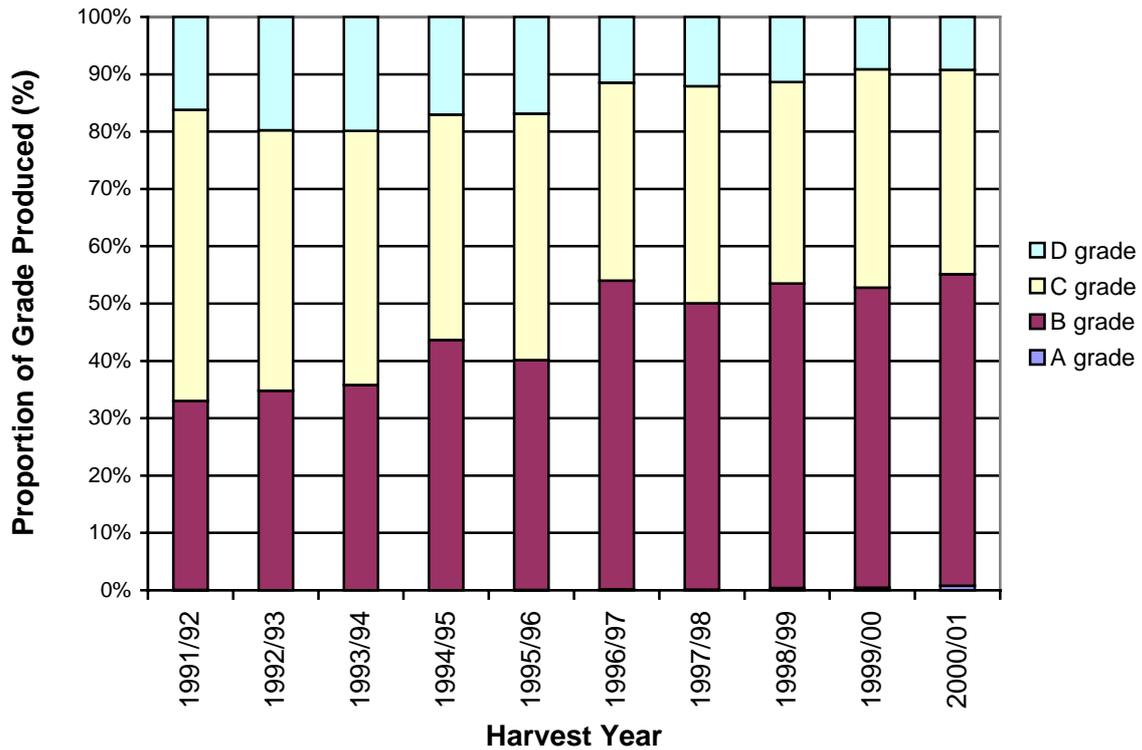
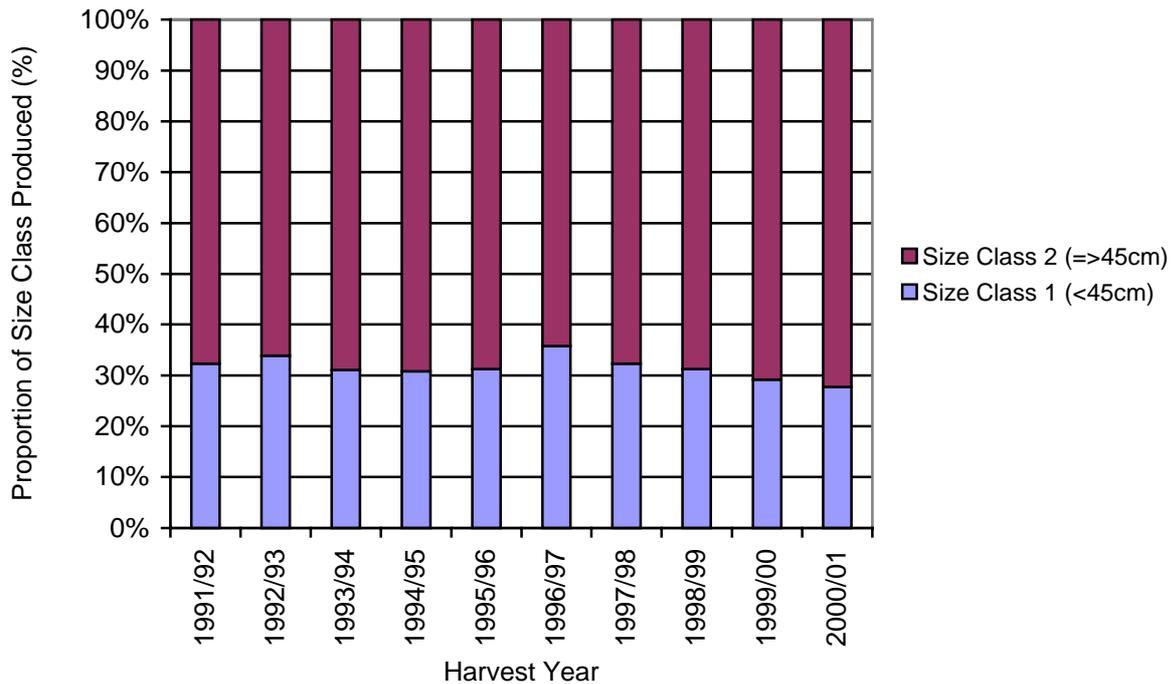


Figure 3. D+ Sawlog Grade Proportions by Year

### 4.3 Sawlog Size Classes

Figure 4 shows the proportion of size class 1 (less than 45cm centre diameter underbark) and size class 2 (greater than or equal to 45cm centre diameter underbark), of sawlogs produced from 1991/92 to 2000/2001.

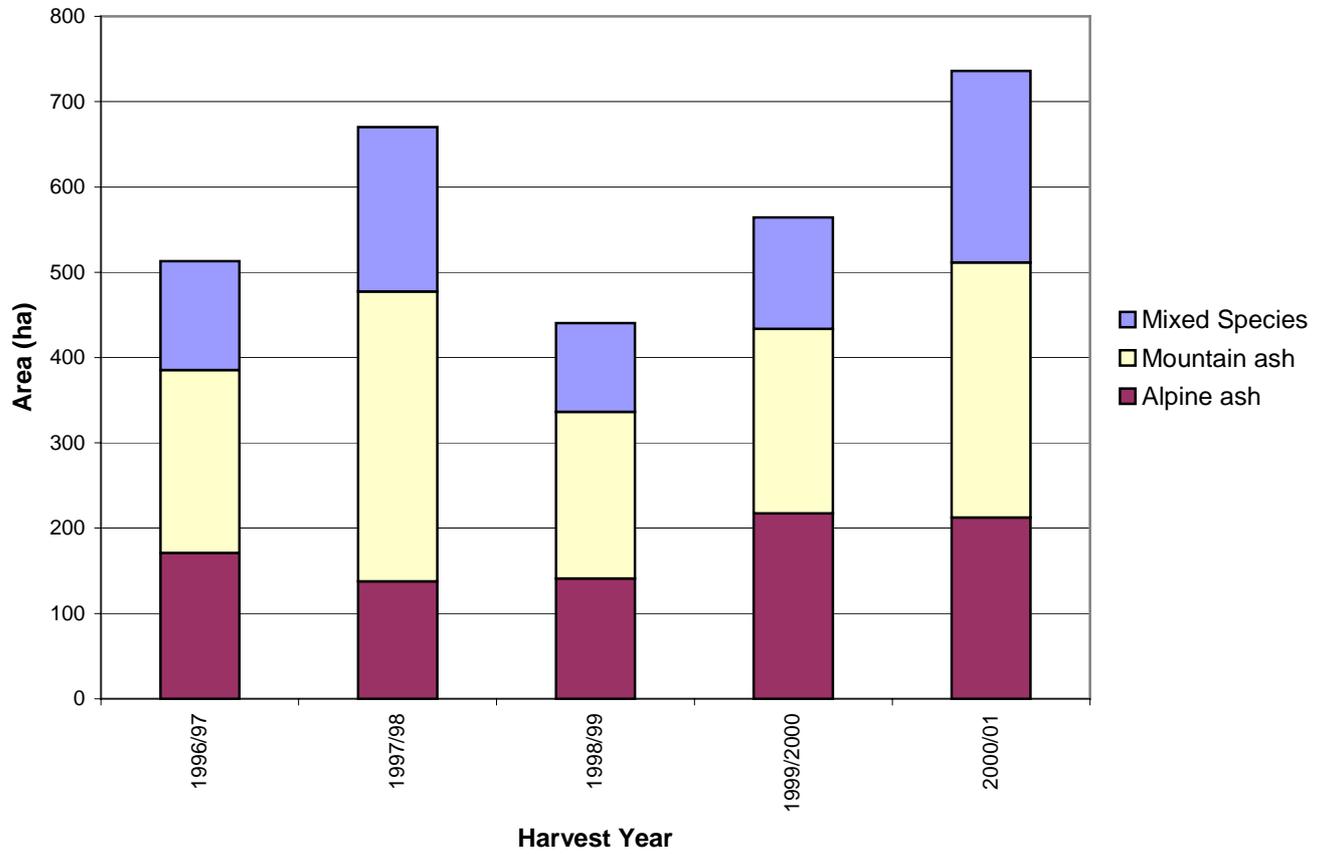
The proportion of size class 2 logs has increased over the decade from 68% in 1991/92 to 72% in 2000/2001 as the ash regrowth forests have grown. There was a slight increase in smaller logs in 1996/97 resulting from the increased harvest of Alpine Ash.



*Figure 4. D+ Sawlog Size Class Distribution by Year*

#### 4.4 Area harvested

Figure 5 shows the annual area harvested in each forest type from 1996/97 to 2001/02. Before 1996 consolidated records do not exist for annual area harvested by species.



*Figure 5. Area Harvested by Forest Type by Year*

## 4.5 Sawlog Yields

Figure 6 shows sawlog yields from 1991/92 to 2000/01. The average D+ nett sawlog yield produced during the period 1991/92 to 2000/01 is 287m<sup>3</sup> nett/ha for Ash Species (Alpine Ash, Mountain Ash and Ash Mix) and 82m<sup>3</sup> nett/ha for Mixed Species. The sample size used to determine sawlog yield varied considerably between different years, leading to greater yield fluctuations and decreased accuracy in sawlog yields.

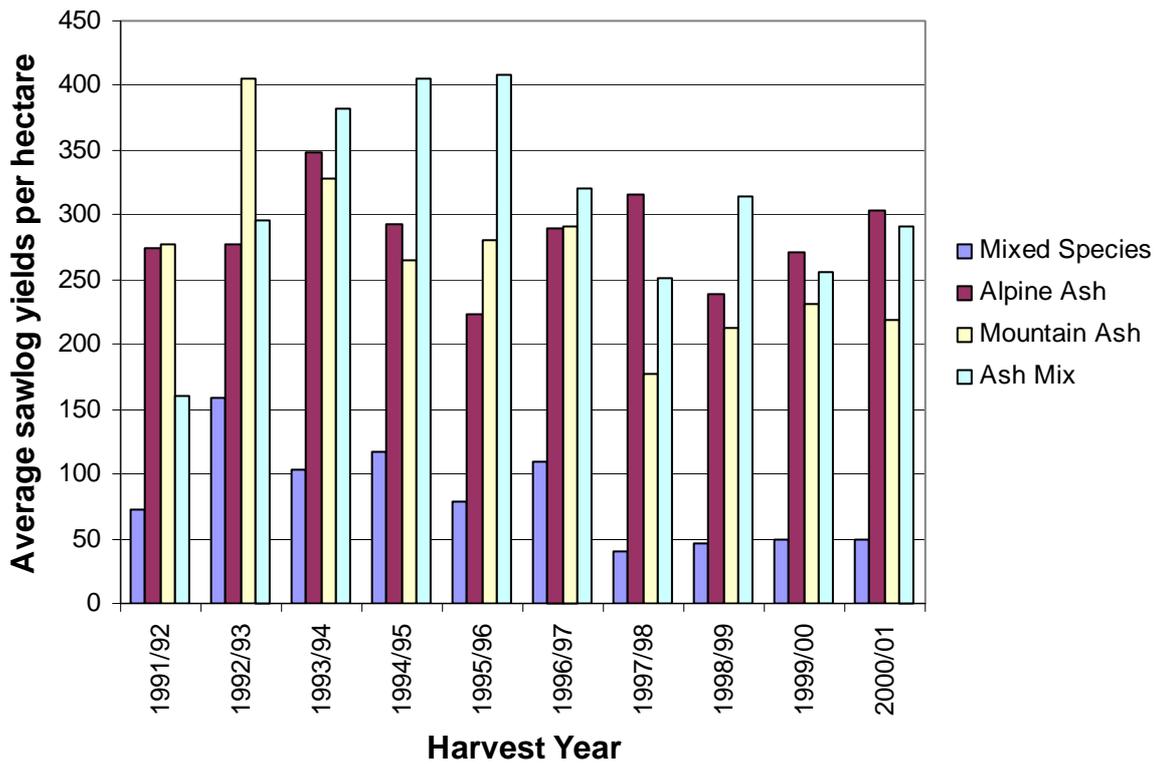


Figure 6. D+ Sawlog Yields by Forest Type by Year

## 4.6 Residual Log Sales

Figure 7 shows the quantity of residual logs produced and sold from 1991/92 to 2000/01. Residual log sales have increased from 128,270m<sup>3</sup> gross in 1991/92 to 280,110m<sup>3</sup> gross in 2000/01. On average over the period, 85% of residual log production was ash species, and 15% was mixed species.

In the past, significant quantities of residual log have been produced but not sold in this FMA.

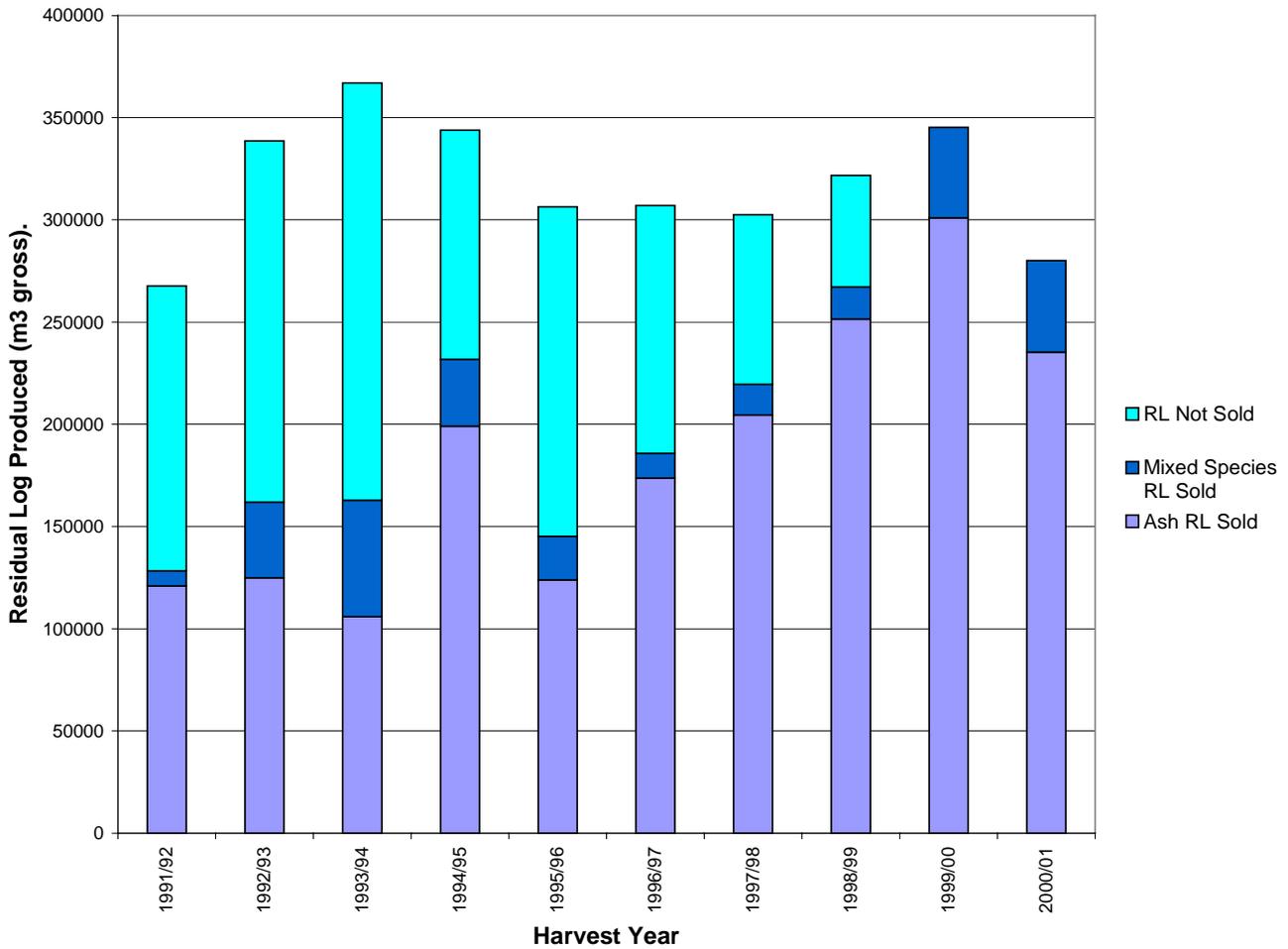


Figure 7. Residual Log Production by Year

## 5 Volume and Growth Information

### 5.1 Standing Volume

Statewide Forest Resource Inventory (SFRI) Volume and Growth data is not currently available specifically for Central FMA. Standing volume information was based on existing volume to age relationships. The SFRI area and age classes data available for this harvesting strategy has not yet been benchmarked and, as such, the stands do not have assigned ages. In addition, recently harvested coupes do not have a forest type assigned. Yield estimation requires an age for regrowth forests, so the ages of stands labelled as regrowth or early mature were obtained from a height-age relationship developed by determining the most common height classes in stands that had a known regeneration age. Mixed species stands identified in SFRI as uneven-aged were treated as mature.

Uneven-aged forests were assumed to be regrowth where the median regrowth proportion was 40% or more and were given a nominal 1970 origin. Stands with a lower proportion of regrowth were treated as mature. Approximately 30% of the Low Quality Mixed Species and the Ash Mix and 23% of the Medium Quality Mixed Species uneven-aged forests were treated as regrowth.

Many areas of mixed species forest, and some mature ash stands in the FMA, have had a history of low intensity selection harvesting, which has resulted in a reduction of the overall sawlog volume, as the remaining trees tend to have higher defect levels. Historical logging records are often incomplete and in many cases do not identify these areas.

### 5.2 Growth

The yield curves used were those developed as part of the Central Gippsland FMA Estimate of Sawlog Resource. They were modifications of the curves developed in 1996 for the Central Highlands Forest Management Plan. Yield curves were selected that matched the average yields from the FMA over the past three years (based on SFRI stand descriptions) or five years (FMA yield data). A comparison of the actual yields used in this estimate and those predicted by the 1996 yield curves are summarised in Table 3. The regrowth yields shown are those that would apply to 60 year old stands, which is the current age of the regrowth from the 1939 fires.

*Table 3. Yields used for recommended harvest rate (age 60, m<sup>3</sup> nett per ha)*

Forest Type	1996 Predicted Mature Yield (m <sup>3</sup> nett per ha)	Actual Yield <sup>1</sup> (m <sup>3</sup> nett per ha)	1996 Predicted Regrowth Yield (age 60, m <sup>3</sup> nett per ha)	Actual Yield <sup>2</sup> (m <sup>3</sup> nett per ha)
Alpine Ash	NA	NA	263	274
Mountain Ash	NA	NA	232	238
Ash Mix	160	160	83	
Medium Quality Mixed Species	25	33		
Low Quality Mixed Species	10	33		

<sup>1</sup>Yield based on FMA records. These may not be consistent with SFRI stand type descriptions

<sup>2</sup>Yields based on FMA records and SFRI stand descriptions.

## **6 Resource**

### **6.1 Wood Flows**

In the Central FMA the predominant silvicultural systems used are clearfelling and seed-tree. They result in even aged regrowth of a known age. Trees are retained in clearfelling and seed-tree operations for habitat, seed fall and in buffers along streams. The estimate of the availability of sawlogs into the future is based on the assumption that clearfelling and seed-tree will continue as the predominant silvicultural systems.

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 4 provides a simple representation of sawlog resource within a uniform statewide format. Volumes are indicative only. This profile is to be read in conjunction with the accompanying comments on each resource element.

*Table 4. Profile of Resource Elements for Central FMA*

No.	RESOURCE ELEMENT	Note	Area (ha)	Annual Volume (m <sup>3</sup> nett/yr)
	<b>STATE FOREST (INCLUDING SOME HISTORIC AREAS)</b>		203,244	
	<b>Code and Forest Management Plan (FMP) elements:</b>			
1	SPZ & proportion SMZ		67,453	
2	Code slope & stream buffer exclusions		3,203	
3	FMP prescriptions		7,615	
4	Unmapped streams and soaks not considered in Code buffer exclusions	1		
5	Standard SFRI unproductive stands		13,333	
	<b>BIOLOGICALLY SUSTAINABLE YIELD</b>		111,640	144,000
	<b>Operational elements:</b>			
6	Further unproductive stands		27,252	0
7	Slopes additional to Code exclusions		2,763	3,000
8	Areas not harvested near stream buffers		7,033	6,000
9	Small and isolated areas		1,924	2,000
10	Rocky areas	2		
11	Harvesting losses			
	<b>Management elements:</b>			
12	Landscape buffers		1,256	2,000
13	Fire losses			2,000
14	Disease losses			
15	New flora, fauna and cultural site reservations	3		
16	Temporal and spatial constraints			
	<b>Remaining element:</b>			
17	Economically Accessible Resource		71,412	129,000
	<b>Potential issue elements:</b>			
18	Changed residual log markets			
19	Changed minimum log diameter specification			
20	Changed silviculture system			
21	Additions to the forest estate			
22	Reforestation of unstocked stands			

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

1. Part of streams buffers additional to Code exclusions (element 8)
2. Part of slopes additional to Code exclusions (element 7)
3. Part of Landscape buffers (element 12) includes research and cultural sites.

## **6.3 Resource Elements**

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

All Special Protection Zones are excluded from harvesting and all of the Special Management Zones are available for harvesting.

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

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

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

All ash eucalypts originating before 1900 are to be retained to assist in providing hollows for hollow-dependent wildlife in this FMA. Allowance for this impact has been made by discounting some stands from the productive area. The discounts include the areas of Alpine Ash, Mountain Ash and Shining gum stands described by the SFRI as mature, late mature, senescent and uneven-aged. In practice some mature stands may be partially harvested where regrowth ash can be removed while retaining the older trees. Ash Mix stands are assumed to be available, regardless of crown form.

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

Refer to element eight where analysis of actual area harvested was used to estimate the impact of additional stream exclusions and unmapped streams and soaks on the area harvested.

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

The area of productive State forest is defined by SFRI and is determined by excluding forest of inherently low productivity. The forest stands which are excluded in the Central FMA on the basis of being non-productive are *Eucalyptus gonicalyx* (Long-leaved Box), *E. pauciflora* (Snow Gum), *E. albens* (White Box) *E. cephalocarpa* (Mealy Stringybark), *E. chapmaniana* (Bogong Gum) and *E. ovata* (Swamp Gum) species and other non-productive stands that are not capable of attaining heights greater than 28 metres.

### **6.3.6 Further Unproductive Stands**

Various species combinations, in addition to those defined as unproductive by SFRI, are generally considered unproductive. Various mixed species stand combinations were evaluated to determine their suitability for sawlog production, in particular, *Eucalyptus radiata* (Narrow Leaved Peppermint) stand combinations.

As a result, the following species/stands are considered unproductive in addition to those species and forest types identified by SFRI:

- Narrow Leaved Peppermint, unless growing with ash species, Messmate or Manna Gum.
- Broad Leaved Peppermint.
- Mountain Gum unless growing with ash, Shining Gum or Messmate.
- Red Stringybark

- Candlebark
- Silvertop (small area and only in this FMA)

Stand form is also important in determining merchantability. Senescent and late mature stands were not considered as productive due to high levels of defect and low sawlog recovery. In addition stands with less than 50% crown cover were also treated as unproductive. Stands that were classified by SFRI as undefined were also removed at this stage, except for 3,443ha that could be identified as recent harvesting regeneration.

Removing these additional unproductive stands reduced the productive area by around 24%, as shown below.

Senescent, low cover	6,381ha
Undefined (excluding recent harvesting and regeneration)	12,616ha
Unproductive species	8,255ha
<b>Total</b>	<b>27,252ha</b>

### 6.3.7 Slopes Additional to Code Exclusions

Harvesting history shows that not all slopes less than 30 degrees are harvested. To evaluate the extent of productive forest that could be operationally unavailable to industry analysis of actual area harvested was used. Harvesting over the last 10 years has concentrated on the flatter sites. The amount of moderate slopes harvested doubled in the latter half of the decade but was still below the level required. Given the low level of harvesting on slopes greater than 25 degrees, it was not possible to reliably allow for areas between 25-30 degrees that would not be accessed. Technology such as cable logging may be required to harvest this resource. Almost 10% of the ash resource grow on steeper slopes between 25-30 degrees and these areas tend to occur in large consolidated blocks.

### 6.3.8 Areas Not Harvested Near Stream Buffers

Field checking shows that many streams are unmapped and stream buffers are often greater than the minimum prescribed by the *Code*. Conversely, some areas mapped in the Forest Management Plan as unavailable were actually harvested due to the inaccurate mapping of streams.

Analysis of actual area harvested was used to estimate the area of stream buffers in addition to that required by the *Code*.

### 6.3.9 Small and Isolated Areas

Small areas are isolated patches of available productive forest, below a minimum size that are considered uneconomic to harvest. These were defined as stands of less than seven hectares, which were surrounded by unproductive, economically unviable or unavailable forests.

An allowance of 1,924ha has been used to compensate for the loss due to small, isolated areas of productive forest.

### **6.3.10 Rocky Areas**

An allowance for rocky areas is included with the allowance for steep areas in element seven where analysis of harvesting areas was used to estimate the impact of rocky outcrops on the area available for harvesting.

### **6.3.11 Harvesting losses**

Harvesting loss is accounted for by the use of yields based on actual coupe harvesting yields.

### **6.3.12 Landscape Buffers**

Analysis of actual area harvested was used to estimate the impact of landscape, cultural site buffers and research site buffers in the General Management Zone.

### **6.3.13 Fire Losses**

The annual probability of wildfire is based on the average area of State forest burned within a 25 year period. This has been estimated to be approximately 1.3%. A volume reduction factor of 2000m<sup>3</sup> nett per year has therefore been applied.

### **6.3.14 Disease Losses**

The level of infestation by the insect pest psyllid (*Cardiaspina bilobata*) was assessed as part of SFRI. Volumes and yield curves have been adjusted for losses due to psyllid infestation.

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

An allowance for cultural site buffers is included in element twelve where analysis of the actual area harvested was used to estimate the impact of cultural site buffers on the actual area available for harvesting.

The Forest Management Plan discusses a review of the Leadbeaters Possum reserve system, based on a habitat model. If the reserve system was increased to include some regrowth forests to provide links and consolidated boundaries, the volume of sawlog available under this harvesting strategy would be reduced.

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

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

### **6.3.17 Economically Accessible Resource**

The area of economically accessible resource is estimated based on current harvesting practices and management. The volume of this element is the proposed level for licensing.

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

This harvesting strategy is based on full residual log markets. If residual log markets were not available it is likely that the Low Quality Mixed Species and about half the Medium

Quality Mixed Species would become uneconomic to harvest. This would reduce the annual sawlog volume by about 9,000m<sup>3</sup>.

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

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

#### **6.3.20 Changed Silviculture System**

The impact of regrowth thinning has been investigated, and shows that there is an annual volume of potential thinning from ash harvesting regeneration of 11,650m<sup>3</sup> and a current backlog volume of 101,000m<sup>3</sup>. The potential improvement in sawlog production resulting from thinning was not factored into resource availability, as thinning has not yet been proven operationally in the FMA.

Yield modelling has been based on the assumption that a clearfelling silvicultural system will be applied in even-aged ash forests. Clearfelling or seed tree systems may also be applied in high quality even-aged mixed species forests.

#### **6.3.21 Addition 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 steady supply of 129,000m<sup>3</sup> nett per year is possible until about 2072 when volumes start to increase to over 150,000m<sup>3</sup> nett per year with increased harvesting of the mixed species. This level would require harvesting some areas of mixed species regrowth at age 70 years.

The TIS sets a nominal rotation age of 80 years for ash species and 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 the current recommended harvest rate, a minimum harvest age of 50 years was applied to existing mature, fire regrowth and harvesting regrowth ash stands, and 70 years for existing mature, fire regrowth and harvesting regrowth mixed species stands.

The Mountain Ash resource at Matlock has different characteristics to the remainder of the FMA. For modelling purposes harvesting in 1939 regrowth was assumed to commence in 2032 and continue for 30 years. Harvesting in the subsequent rotation commences at age 80 and continues for 70 years.

The volume and proportion for individual forest types for this level are shown in Table 5.

*Table 5. Volume available by forest types for Central FMA*

<b>Forest Type</b>	<b>Volume (m<sup>3</sup> nett per year)</b>	<b>Proportion of Total (%)</b>
Mountain Ash	61,100	48
Alpine Ash	50,700	39
Ash Mix	4,000	3
Mixed Species (Medium Quality)	6,600	5
Mixed Species (Low Quality)	6,600	5
<b>Total</b>	<b>129,000</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 Central Forest Management Area, area was given two stars, yield, three stars, woodflows, three stars. This has resulted in an overall two star rating.

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

## 9 Conclusion

The forests of Central FMA are predominantly Mountain Ash, resulting from the 1939 wildfire. These forests are very productive and grow on good soils in a band of high rainfall. There are smaller areas of poorer quality mixed species forest as well. In higher elevation areas the forests are dominated by Alpine Ash. The current licence levels of 129,000m<sup>3</sup> nett per year can be maintained. This resource level takes into account operational and economic factors that have been included in the estimate for the first time.

## 10 References

NRE (1996) *Code of Forest Practices for Timber Production, Revision 2*. Department of Natural Resources and Environment, Melbourne.

NRE (1998) *Forest Management Plan for the Central Highlands*. 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 30cm 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 3mm width, unlimited lengths of tight gum veins less than 3mm width, dark stain, maximum sloping grain angle of 1:8 along the length of the sawlog, maximum of two defective quarters, and maximum of 112cm 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 SFRI 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 ( $m^3/ha$ ).

**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 – Central FMA**

# Central FMA

