BENALLA-MANSFIELD
FOREST MANAGEMENT AREA

ESTIMATE OF SAWLOG RESOURCE

Department of Natural Resources and Environment
Victoria

March 2002

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

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

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

Victoria Dept. of Natural Resources and Environment.
Benalla-Mansfield Forest Management Area
Estimate of Sawlog Resource

Bibliography
ISBN 0 7311 5177 1

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.

FOREWORD

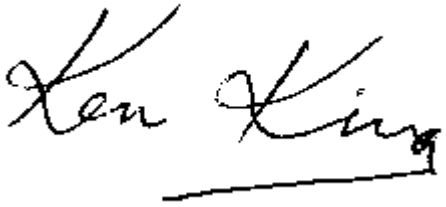
In March 2001 the Minister for Environment and Conservation initiated a process to issue new sawlog licences at appropriate levels. This process culminated in the preparation and release of the *Our Forests Our Future* Statement in February 2002. This Government Statement announced wide ranging reforms 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 Benalla-Mansfield 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.



Ken King
Executive Director, Forests Service

CONTENTS

1 Introduction

This Estimate of Sawlog Resource (ESR) summarises current Benalla-Mansfield 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 modelling future harvesting and growth. This Estimate of Sawlog Resource has been prepared as part of a licence renewal 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 options for future licensing arrangements with the timber industry.

2 Background

Benalla-Mansfield Forest Management Area (FMA) occupies the north-central part of the State of Victoria, centred around Mansfield and stretching from Benalla in the north to Woods Point in the south. It includes the Strathbogies and Toombullup Ranges in the north and headwaters of the King, Howqua, Jamieson and Goulburn Rivers in the south (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, requires that the sustainable yield be regularly reviewed. In 1992, the sustainable yield for the Benalla-Mansfield Forest Management Area was set at 2,500m^3 nett C grade and better sawlogs (C+) per year from mixed species forest and 8,400m^3 nett C+ sawlogs per year from Alpine Ash regrowth forests. Subsequent to the TIS in 1996, the sustainable yield was revised and adjusted to 13,500m^3 nett D grade and better (D+) sawlogs per year. This figure was published in the 1996 Benalla Mansfield FMA Sustainable Yield Review.

The North East Forest Management Plan (NRE 2001) covers the Benalla-Mansfield Forest Management Area and 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).

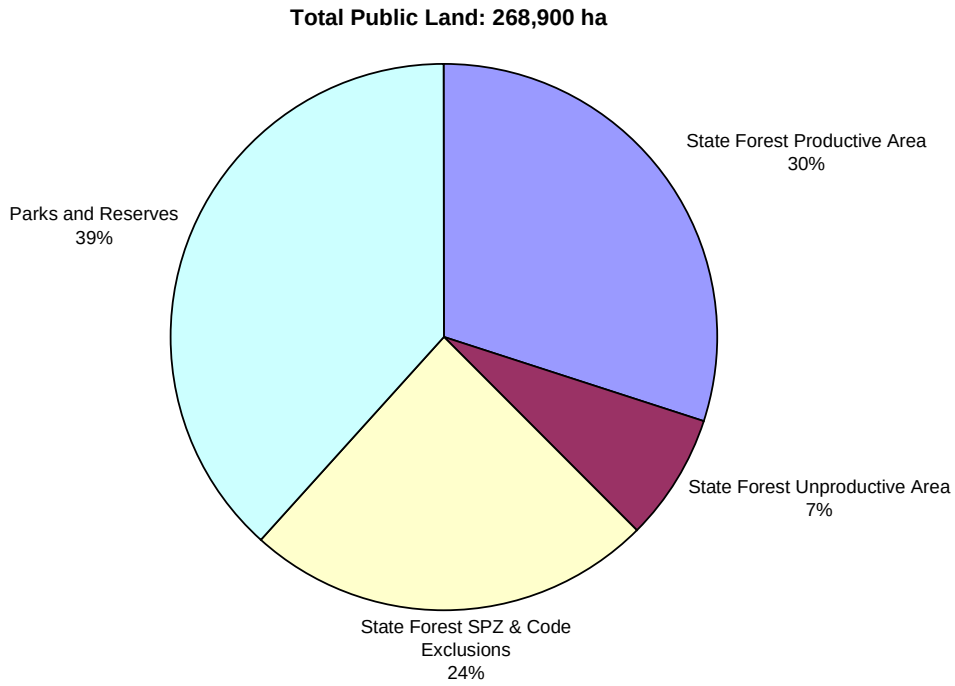


Figure 1. Public Land in the Benalla-Mansfield Forest Management Area

The Benalla-Mansfield Forest Management Area is covered by the North East Regional Forest Agreement, established between the Commonwealth and Victorian Governments in 1999. The Regional Forest Agreement formally accredits the Forest Management Plan for the North East as part of Victoria's Ecologically Sustainable Forest Management system.

The timber resource information used in this Estimate of Sawlog Resource has been derived from the North East Statewide Forest Resource Inventory (SFRI) project and is current to the benchmark year of 1997. 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 North East SFRI information superseded previous assessments outlined in the 1996 Sustainable Yield Review.

The proportion of Ash type forest in the Available Productive Area is 19%. Of this, 40% is high-elevation and 60% is low elevation. Mixed species forest make up 81% of the available productive forest resource, of which 43% is high elevation mixed species (HEMS) and 57% is low elevation mixed species (LEMS).

3 Licence Commitments

The status of current licence tenure and commitments as at 30th June 2001 for Benalla-Mansfield FMA is shown in Tables 1 and 2.

Table 1. Current Benalla-Mansfield FMA Commitments by Licence Type and Expiry

Licence Type	Product	Expiry Date	No. of Licences
Standard	Sawlog (D+)	30/06/2006	1
Standard	Sawlog (D+)	30/06/2007	3
Standard	Sawlog (D+)	30/06/2008	1
Total			**5**
Standard	Residual	30/06/2007	1
Standard	Residual	30/06/2008	1
Total			**2**

Table 2. Current Benalla-Mansfield FMA Commitments by Species and Grade

Product / Grade	Annual Allocations		
	Species Type		
	Ash Species	Mixed Species	Total
Sawlog (m^3 nett)			
B+	1,634	182	**1,816**
C	4,789	985	**5,774**
C+	637	3,351	**3,988**
D	1,718	1,906	**3,624**
Sawlog Total (m^3 nett)	**8,778**	**6,424**	**15,202**
Residual Log (m^3 gross)			
E Grade[1]	3,000	1,100	**4,100**
Residual Log	4,369		**4,369**
Residual Log Total	**7,369**	**1,100**	**8,469**

Note: [1]- E grade residual logs are better quality residual logs from which sawn timber can be produced.

4 Harvest History

4.1 Total Sawlog Production

Figure 2 shows the sawlog volume production by forest type from 1991/92 to 2000/01. Average sawlog production over the last ten years is 15,261m^3 nett. Following 1991/92, the year after which the current main ash licence commenced, production levels have cycled. Ignoring 1991/92, the lowest production year was 1998/99, 14% below the licensed level, and the highest production year was 1999/2000, 24% above the licensed level.

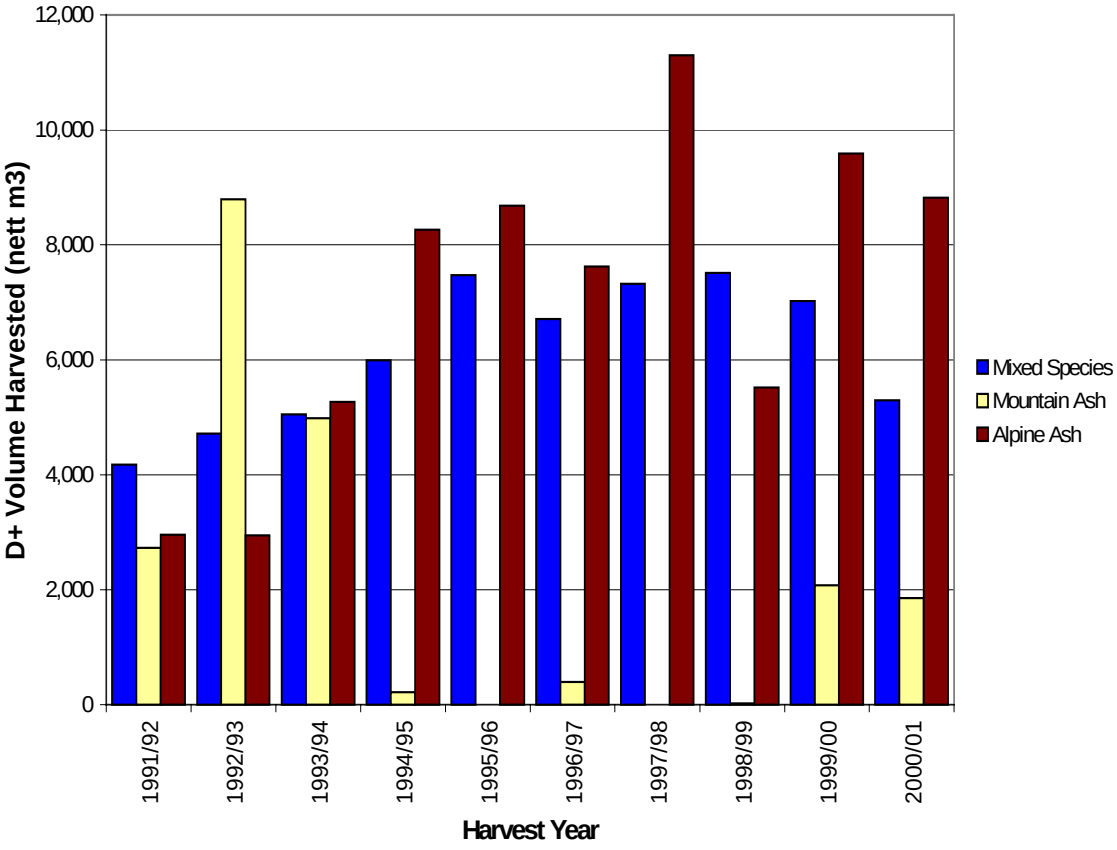


Figure 2. D+ Sawlog Produced by Forest Type by Year

4.2 Sawlog Grades

Figure 3 shows the sawlog grade proportions from 1991/92 to 2000/2001, displaying the fluctuation of sawlog grade proportions over the period. The percentage of B grade and better has increased progressively, from 17% in 1992/92 to 53% in 2000/01. The average proportion of each grade over the ten years is 0.3% A grade, 38.2% B grade, 40.1% C grade and 21.4% D grade.

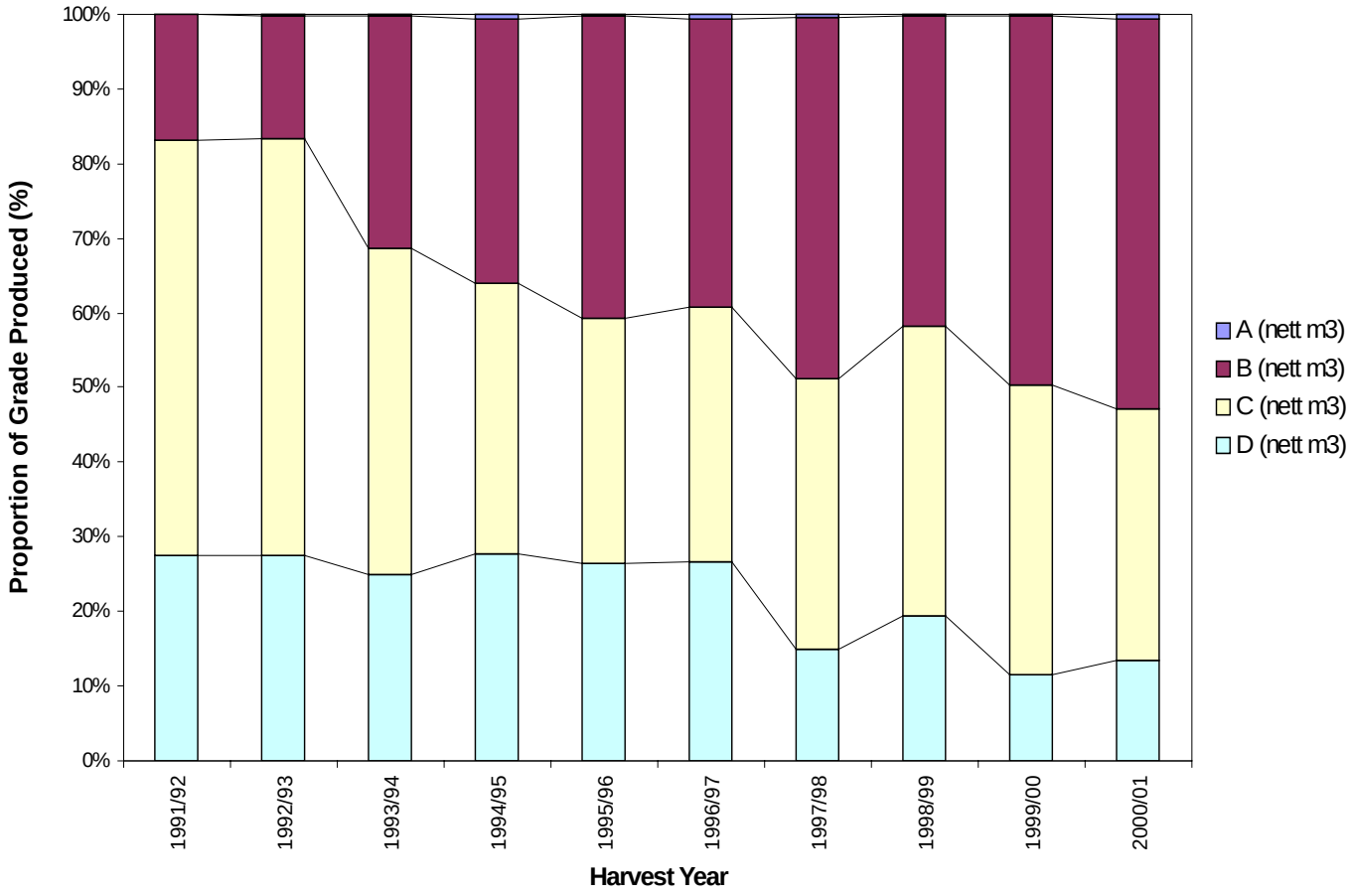


Figure 3. D+ Sawlog Grade Proportions by Year

4.3 Sawlog Size Class

Figure 4 shows the proportion of size class 1 sawlogs (less than 45cm centre diameter under bark) and size class 2 sawlogs (45cm and greater centre diameter under bark), of sawlogs produced in the Benalla-Mansfield FMA from 1991/92 to 2000/01. The proportion has remained relatively constant over the period, averaging 36.1% in size class 1 and 63.9% in size class 2.

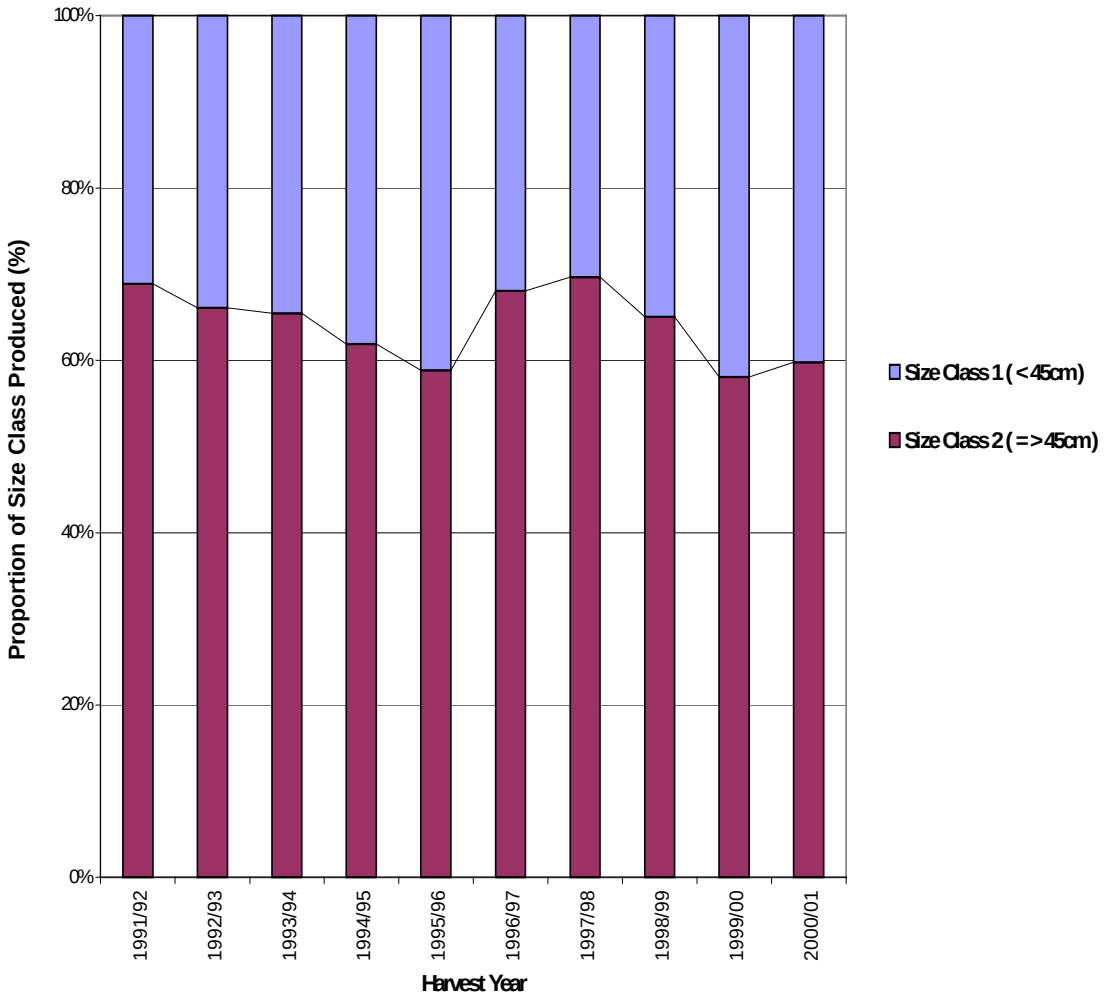


Figure 4. D+ Sawlog Size Class Distribution by Year

4.4 Residual Log Sales

Figure 5 shows the quantity of residual logs produced and sold in the Benalla-Mansfield FMA from 1991/92 to 2000/01. Residual log sales have increased from 2,080m^3 gross in 1991/92 (all 'E grade') to 17,700m^3 in 2000/01 (36% E grade and 64% residual log). On average, 79.2% of residual log sales was ash species, and 20.8% was mixed species. Significant quantities of residual logs have been produced, but not sold before 1997 in this FMA. Some quantities of mixed species residual log continue to be produced from sawlog harvesting operations and not sold.

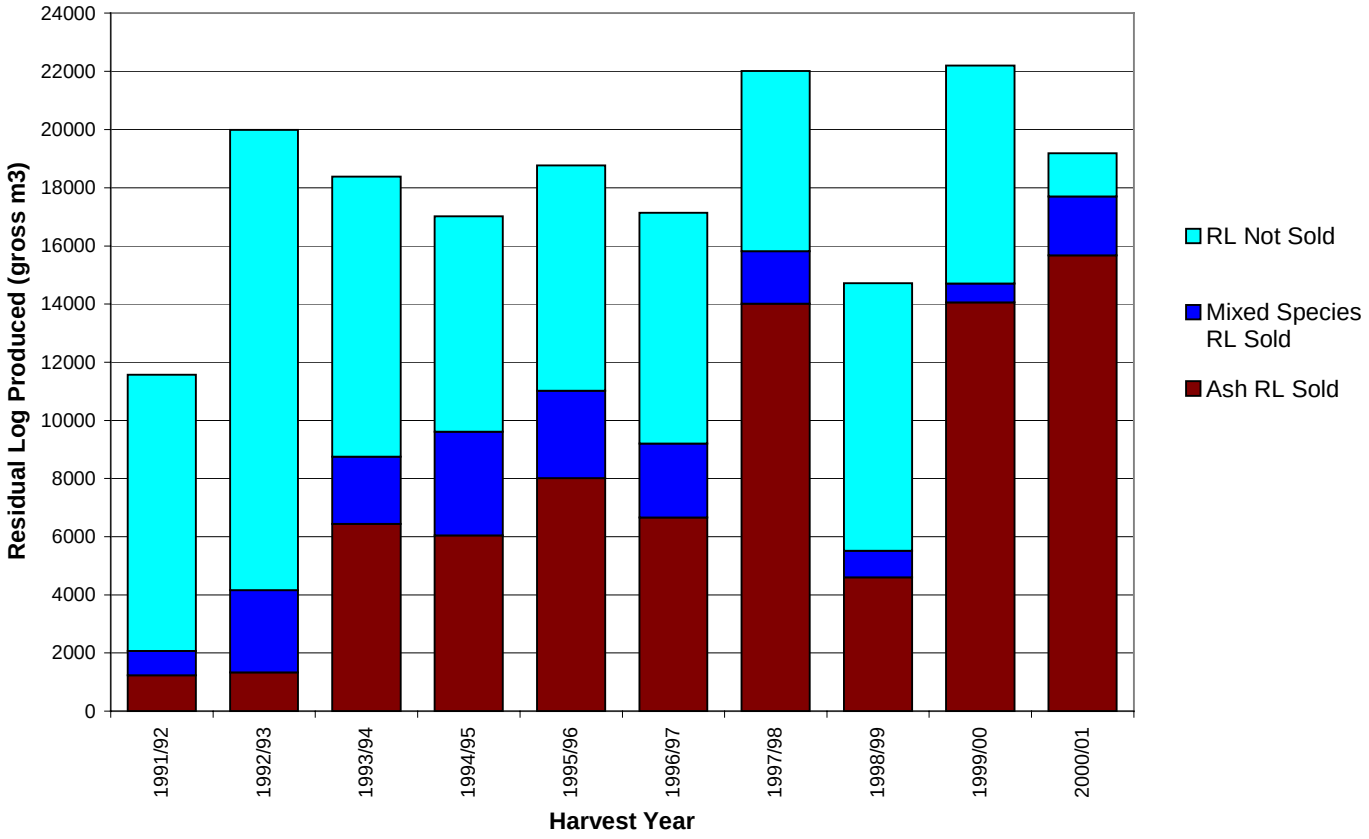


Figure 5. Residual Log Produced and Sold by Year

5 Volume and Growth Information

5.1 Standing Volume

Full Statewide Forest Resource Inventory (SFRI) volume information has recently become available and yields used here have been calibrated with actual yields. Standing D+ sawlog and total merchantable volumes per hectare were assessed for dimensions and external defects at each SFRI sampling point. This information was used for the subsequent development of current volume estimates. The current specifications for D+ sawlog were applied. Volume information for sawlog grades within D+ was not available from SFRI, however, indicative volumes by grade may be estimated based on recent harvesting history.

As part of the SFRI project, estimates of standing volume were adjusted to an estimate of available volume by making allowances for logging waste and unmerchantable timber. A 20% reduction of the standing volume was based on information recorded in sample points in the TREEMAP trees. This information was provided as a series of yield tables from the SFRI project.

Many areas of mixed species forest, and some mature ash stands in the Benalla-Mansfield 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 are not able to identify these areas. As the SFRI volume estimates are based on stand parameters assessed from aerial photographs, many of these areas are assumed to be carrying full sawlog volume.

An estimate of the proportion of mature ash stands subject in the past to selection harvesting was made, and a commensurate allowance in standing sawlog volumes was applied.

As a follow-up to the SFRI project, a number of coupes in mixed species forest types were assessed to compare the actual sawlog yield with the volume predicted by SFRI and a commensurate allowance in standing sawlog volume was applied.

5.2 Growth Data

As part of the SFRI project, yield curves were developed for each of the forest type, elevation, height and stand development classes. A total of 144 yield curves were developed.

The North East SFRI data were used a basis for predicting growth and yield of productive ash and mixed species forests. The STANDSIM model was used to develop a regrowth yield curve for ash type forests, using SFRI estimates of stand age, basal area, site quality, diameter distribution and stem quality information.

Data on stand volumes and age distribution for mixed species are limited. There is not an equivalent growth model to STANDSIM which can be applied to the mixed species forests. The SFRI produced estimates of standing volumes for mature stands, but the age of much of this forest is unknown. Assumptions of stand age for different stand classes of mixed species were developed from the data collected in the tree ring analysis. Using an existing function previously developed from limited permanent growth plot data, SFRI data were fitted to produce a family of yield curves as an indicator of average growth under current stand conditions.

6 Resources

6.1 Wood Flows

In the Benalla-Mansfield FMA the predominant silvicultural systems used are clearfelling and seed-tree in the ash forests and selection harvesting in the mixed species. 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, seed-tree and selection 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 linear programming model 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 are then scheduled at or near the nominal rotation age during periods into the future. The availability in the first period 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. This profile is to be read in conjunction with the accompanying comments on each resource element.

Table 3. Profile of Resource Elements for Benalla-Mansfield FMA

No.	RESOURCE ELEMENT	Area (ha)	Annual Volume (m^3 nett/yr)
	STATE FOREST (INCLUDING SOME HISTORIC AREAS)	171,530	
	Code and Forest Management Plan (FMP) elements:		
1	SPZ & proportion SMZ	32,000	
2	*Code* slope & stream buffer exclusions	25,800	
3	FMP prescriptions	6,500	
4	Unmapped streams and soaks not considered in *Code* buffer exclusions	1,200	
5	Standard SFRI unproductive stands	52,060	
	BIOLOGICAL SUSTAINABLE YIELD	53,970	24,100
	Operational elements:		
6	Further unproductive stands	10,300	0
7	Slopes additional to *Code* exclusions	2,800	1,100
8	Areas not harvested near stream buffers	8,500	3,300
9	Small and isolated areas	8,200	3,200
10	Rocky areas		300
11	Harvesting losses		800
	Management elements:		
12	Landscape buffers	0	0
13	Fire losses		200
14	Disease losses		0
15	New flora, fauna and cultural site reservations	0	0
16	Temporal and spatial constraints	0	0
	Remaining element:		
17	Economically Accessible Resource	24,170	15,200
	Potential issue elements:		
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		

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

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

Benalla-Mansfield Forest Management Plan has established prescriptions that limit harvesting in designated water catchments.

6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions

An allowance of 1200ha 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

The area of productive State forest is defined by Statewide Forest Resource Inventory and is determined by excluding forest of inherently low productivity. The forest stands which are excluded in the Benalla-Mansfield FMA on the basis of being non-productive are, *Eucalyptus goniocalyx* (Long-leaved Box), *E. mannifera* (Brittle Gum) and, *E. pauciflora* (Snow Gum) and other non-productive stands that are not capable of attaining heights greater than 28 metres.

6.3.6 Further Unproductive Stands

In the Benalla-Mansfield FMA, logging history, field checking and industry feedback has identified that various species combinations, in addition to those defined as unproductive by SFRI, are generally unproductive. Various mixed species stand combinations were evaluated to determine their suitability for sawlog production, in particular, *E. robertsonii* (Narrow-leaved Peppermint) stand combinations across three elevation bands and in various locations.

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

- Mountain Gum stands with an elevation less than 600m and greater than 1000m
- Broad Leaved Peppermint
- Blue Gum with Narrow Leaved Peppermint (except Strathbogie and Toombullup State Forests)
- Red Stringybark
- Candlebark sub-dominant to Narrow Leaved Peppermint
- Narrow-leaved Peppermint in pure stands Peppermint (except Strathbogie and Toombullup State Forests)

The following species/stands are considered productive:

- Alpine Ash;
- Mountain Ash;
- Mountain Gum 600-1000m;
- Blue Gum (except when with Narrow-leaved Peppermint);

- Messmate;
- Candlebark (except when with Narrow-leaved Peppermint);
- Manna Gum.

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, a 25-30 degree slope availability model has been developed.

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;
  - unavailable if adjacent slopes greater than 30 degrees.
- greater than 30 degree excluded from the timber resource.

6.3.8 Areas Not Harvested Near Stream Buffers

Operationally, stream buffers are often greater than the minimum 20m prescribed by the *Code*, since slopes often dictate that trees cannot be fallen without entering the buffer.

To evaluate the extent of productive forest that could be operationally unavailable to industry, a variable width stream buffering system has been developed and analysed.

The methodology applied to stream buffers to reflect the operational situation utilises a variable-width buffering system (using GIS digital terrain model), based on stream/slope interaction and on-site mature tree height (from SFRI), to produce the following:

- slope into stream 0 to 15 degrees, 25m buffer applied (Additional 5m takes into consideration that Code 20m is from edge of saturated zone);
- slope into stream 15 to 20 degrees, 40m buffer applied;
- slope into stream 20 to 25 degrees, 60m buffer applied;
- slope into stream 25 to 30 degrees, 60m buffer applied;

These parameters were discussed with sawmilling and harvesting representatives who indicated that the current practical constraints to harvesting were reflected by this approach. Future improvements to harvesting technology may change current harvesting constraints.

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 less than 40 hectares in area and with a potential total harvestable volume of less than $800m^3$ nett D+ sawlog. These stands are surrounded by unproductive or unavailable forests and are considered uneconomic to harvest. These small areas have been identified and excluded from the analysis.

6.3.10 Rocky Areas

An allowance of $300m^3$ nett 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.

6.3.11 Harvesting Losses

A 800m³ nett volume reduction is applied to allow for the losses in converting standing estimated volume to harvested and removed volume.

6.3.12 Landscape Buffers

It is considered that buffers placed on visually sensitive ridgelines, roads or private property boundaries in the General Management Zone can be managed temporally, or are not significant.

6.3.13 Fire Losses

Potential loss of growth due to wildfire has been estimated for ash and high elevation mixed species. Fire loss in low elevation mixed species was not estimated due to the high variability in the resource and the low volume of D+ sawlogs currently sourced from this forest type. The basic assumptions made in this estimate are:

- standing volumes of D+ sawlog greater than 15m^3 nett/ha for ash species and 20m^3 nett/ha for high elevation mixed species can be salvaged.
- fires after the rotation age of 80 years for ash species do not result in any loss of production because sawlogs can be salvaged.

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%. An allowance of 200m³ nett has therefore been applied.

6.3.14 Disease Losses

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

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 Benalla-Mansfield FMA. Under the North East 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.

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

6.3.18 Changed Residual Log Markets

Sawlog estimates have been based on an assumption of residual log markets continuing at current levels. New residual log markets could improve harvest yields from productive stands and make current further unproductive stands economic to harvest and thereby increasing the availability of sawlogs in the future.

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 Systems

An ash thinning strategy is currently in preparation which will include an analysis of the area suitable for thinning, likely yields from operations and some appraisal of the operational factors that will need consideration. At this stage, the potential improvement in sawlog production resulting from thinning has not been 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 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

The current licensed commitment levels of 15,200m^3 nett per year can be maintained. The ash mixed species ratio during the next licensing period will remain constant at 58% ash and 42% for mixed species.

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 Estimate of Sawlog Resource, a minimum rotation age of 65 years was applied to existing mature, fire-regrowth and logging-regrowth ash stands, and 100 years for existing mature, fire-regrowth and logging-regrowth mixed species stands. For subsequent rotations, a minimum rotation age of 80 years for ash species and 120 years for mixed species were used, in accordance with the Timber Industry Strategy recommendations.

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 Benalla-Mansfield Forest Management Area, area was given four stars, yield, three stars, and woodflows, four stars. This resulted 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 Benalla-Mansfield FMA are dominated by mature and early mature forests. The area available for harvesting has been reduced from previous estimates due to the inclusion of operational constraints not previously measured. With an overall three star rating, the area, growth and yield data are considered adequate by the Expert Data Reference Group. There are sufficient sawlog resources to maintain current licence levels.

10 References

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

NRE (2001). *Forest Management Plan for the North East.* Department of Natural Resources and Environment, East Melbourne.

NRE (2001, in preparation). Forest Service Technical Report, *Review of Sustainable Sawlog Yield: Benalla-Mansfield 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 then 3mm in width, two diameters length of tight gum vein less then 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. Van Clay (Southern Cross University) and 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^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 exits.

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 – Benalla-Mansfield FMA

Benalla-Mansfield FMA

Benalla
Myrtleford
Moyhu
Euroa
Nagambie
eymour
Mansfield
Alexandra
Yea
Eildon
Jamieson
Pheasant Creek
Marysville
Toolangi

State Government Victoria
Department of Natural Resources and Environment
Forests Service
19-FEB-2002

- State Forest
- Parks and Reserves
- Other Parks and Reserves
- Other Public Land
- Plantations
- Private land
- Water Bodies