

**OTWAY
FOREST MANAGEMENT AREA**

ESTIMATE OF SAWLOG RESOURCE

**Department of Natural Resources and Environment
Victoria**

March 2002

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FOREWORD

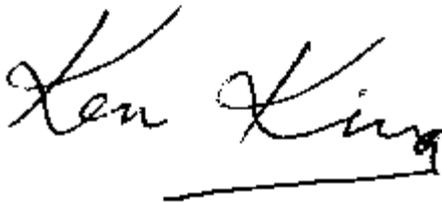
In March 2001 the Minister for Environment and Conservation initiated a process to issue new sawlog licences at appropriate levels. This process culminated in the preparation and release of the *Our Forests Our Future* Statement in February 2002. This Government Statement announced wide ranging reforms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

This report describes the data and method used to calculate the appropriate sawlog level for the Otway 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 underlined with a single horizontal line.

Ken King
Executive Director, Forests Service

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1 Introduction

This Estimate of Sawlog Resource (ESR) summarises current Otway 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

Otway Forest Management Area (FMA) occupies part of the south west coast of Victoria, from Peterborough to Aireys Inlet on the coast, to Skipton in the north (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.

The Otway Forest Management Plan, released in 1992, was the first Forest Management Plan completed in the State. It provided direction on the management and protection of the full range of forest values and uses in State forest. The Plan described the hardwood timber resources and provided a level of sustainable eucalypt sawlog supply level of 44,400m³ nett per year. This yield was calculated using the FORPLAN model, which was based on timber resource information compiled between 1982 and 1985.

The Otway Forest Management Area is covered by the West Victoria Regional Forest Agreement (RFA), established between the Commonwealth and Victorian State Governments in March 2000. The West Victoria Regional Forest Agreement formally accredits the Otway Forest Management Plan (NRE 1992) as part of Victoria's Ecologically Sustainable Forest Management System and established a Comprehensive, Adequate and Representative reserve system. The Regional Forest Agreement reviewed the available area using the Statewide Forest Resource Inventory (SFRI) spatial data set. This analysis identified that resource availability was approximately 27,000m³ nett per year D+ sawlog. The sustainable sawlog yield for the Otway Forest Management Area was reduced from 44,400m³ nett per year D+ sawlog to 27,000m³ nett per year of D+ sawlog.

The reserve system in the Otway Forest Management Area including parks, reserves and Special Protection Zone (SPZ) has provided for the protection of comprehensive, adequate and representative values to agreed targets. Harvesting can occur in the General Management Zones (GMZ) and Special Management Zones (SMZ) under specific conditions (Figure 1).

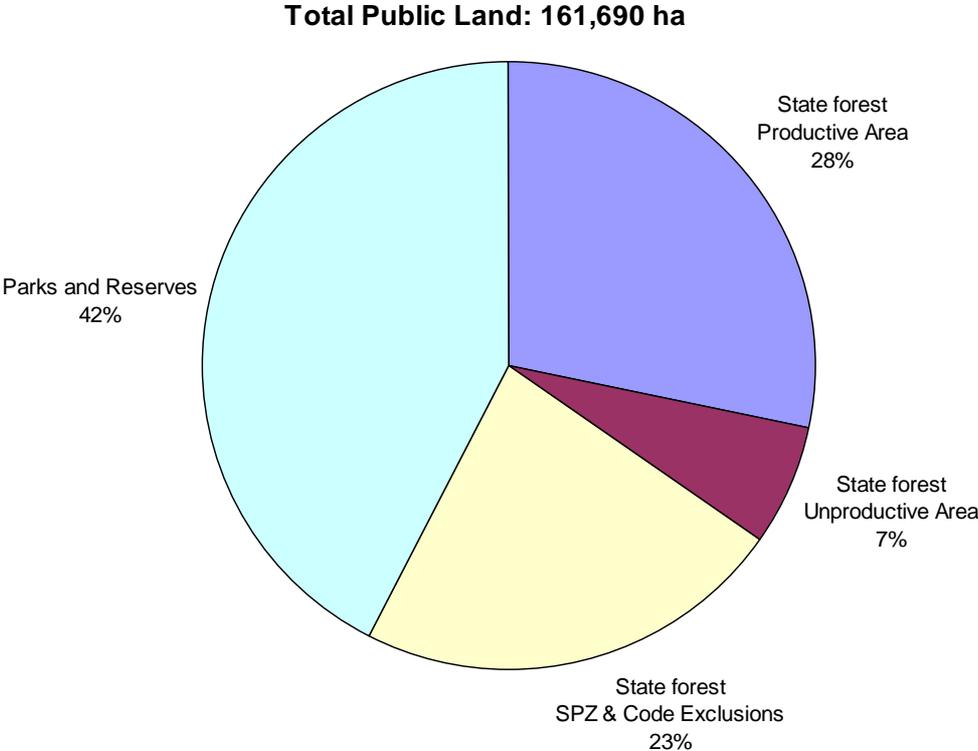


Figure 1. Public Land in the Otway Forest Management Area

The first stage of the Statewide Forest Resource Inventory (SFRI) program has been completed. The SFRI mapping has been completed for the Otway Forest Management Area but field inventory and analysis has not yet started. It is anticipated that a comprehensive set of data will become available in 2004.

Current forest age structure is predominately 50% logging and fire regrowth, 44% mature forest, with 6% of the forest being uneven-aged and understocked forest type.

3 Licence Commitments

Current licence tenure and commitments by species and grade are shown in Tables 1 and 2.

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

Licence Type	Product	Expiry date	Number of Licences
Evergreen	Sawlog	30/06/08	3
Standard	Sawlog	30/06/02	1
Standard	Blackwood	30/06/02	1
Standard	Blackwood	30/06/05	1
Standard	Blackwood	30/06/08	1
Total			7
Standard	Thinning	30/06/02	1
Standard	Residual	30/06/06	1
Standard	Residual	30/06/08	1
Total			3

Table 2. Current Otway FMA Commitments by Species and Grade

Product / Grade	Annual Allocations
Sawlog (m³ nett)¹	
B+	3,530
C	19,085
D	4,485
Blackwood	1,500
Sawlog Total	28,600
Residual Log (m³ gross)	
Residual Log	67,860
Thinnings	10,715
Residual Log Total	78,575

Note: 1. This assumes current annexures

4 Harvest History

4.1 Total Sawlog Production

Figure 2 shows sawlog volumes by species from 1991/92 to 2000/01. Production levels cycled between approximately 30,000m³ nett per year and 46,000m³ nett per year, averaging 34,300m³ nett per year. During the 2000/2001 season only 18,053m³ nett was produced due to the recent reduction in licensed volumes resulting from the West Victoria Regional Forest Agreement and market variation.

Over the period 1991/92 to 2000/01, the volume of Other Species harvested has fluctuated. The average harvested volume is 18,400m³ nett per year. Ash volumes show a slow reduction over the ten year period, the 1998/1999 season being an exception. The decrease in Ash volumes around the 1994/95 season may in part be attributed to the implementation of the Otway Forest Management Plan.

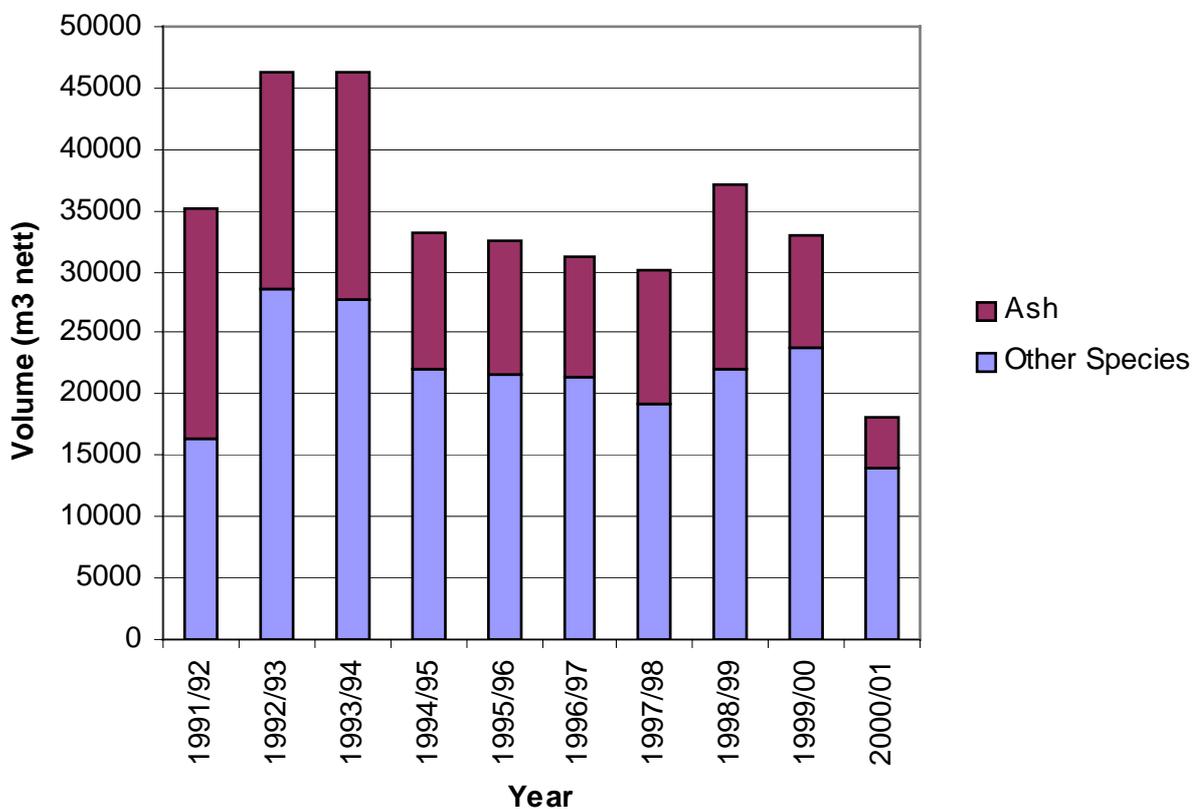


Figure 2. D+ Sawlog Produced by Species by Year from 1991/92 to 2000/01

4.2 Sawlog Grades

Figure 3 shows sawlog grade proportions from 1991/92 to 2000/01. A marked shift in grade ratios is evident in the mid 1990's with a significant increase in better grades being obtained. The move in 1995/96 within the Otway Forest Management Area to sample grading using a contract log grader explains some of the shift to higher grades.

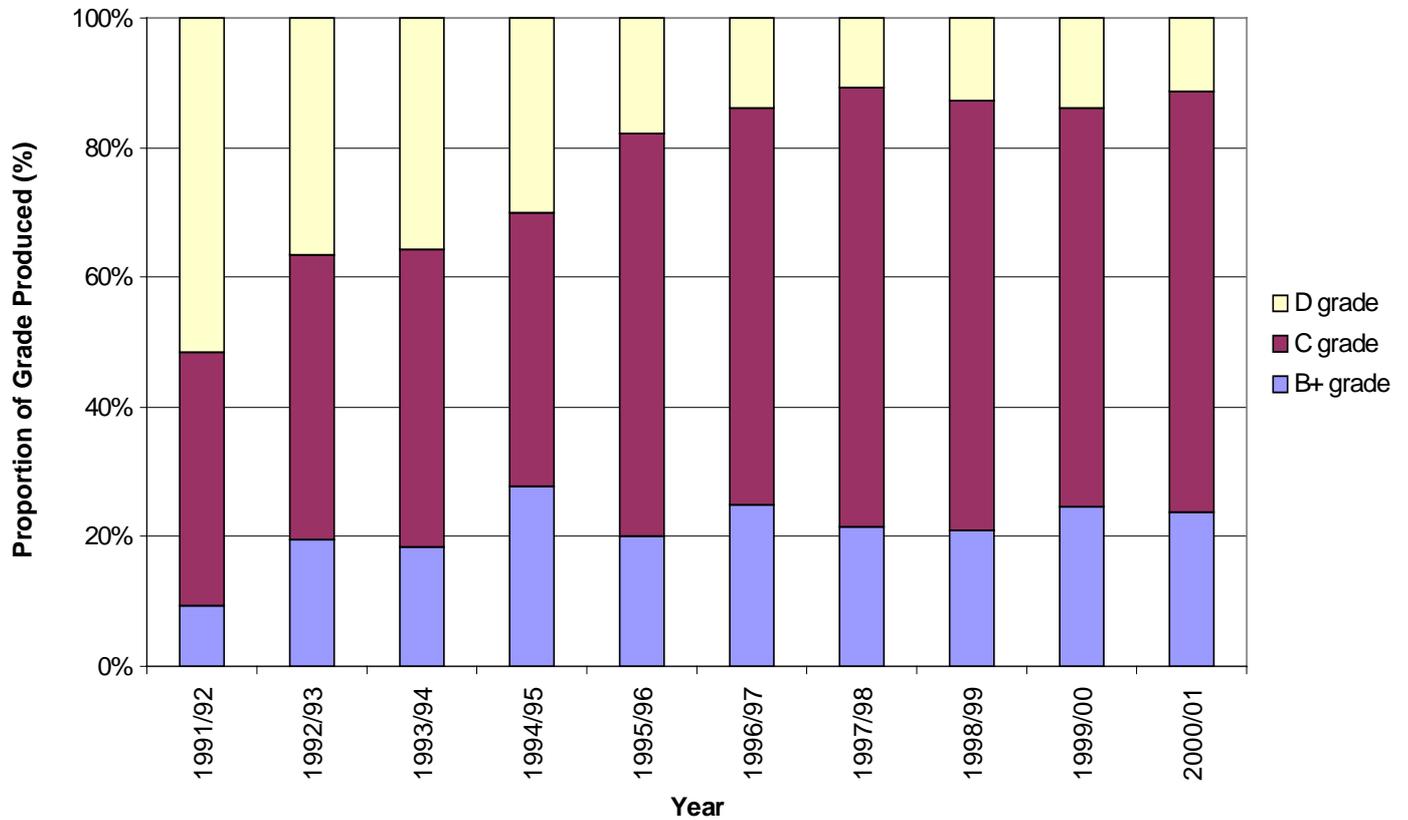


Figure 3. D+ Sawlog Grade Proportions by Year from 1991/92 to 2000/01

4.3 Sawlog Size Classes

Figure 4 shows the proportion size class 1 (less than 45cm centre diameter under bark) and size class 2 (greater than or equal to 45cm centre diameter under bark), of sawlogs produced from 1991/92 to 1999/00. Over the period, the majority of logs produced were in size class 2.

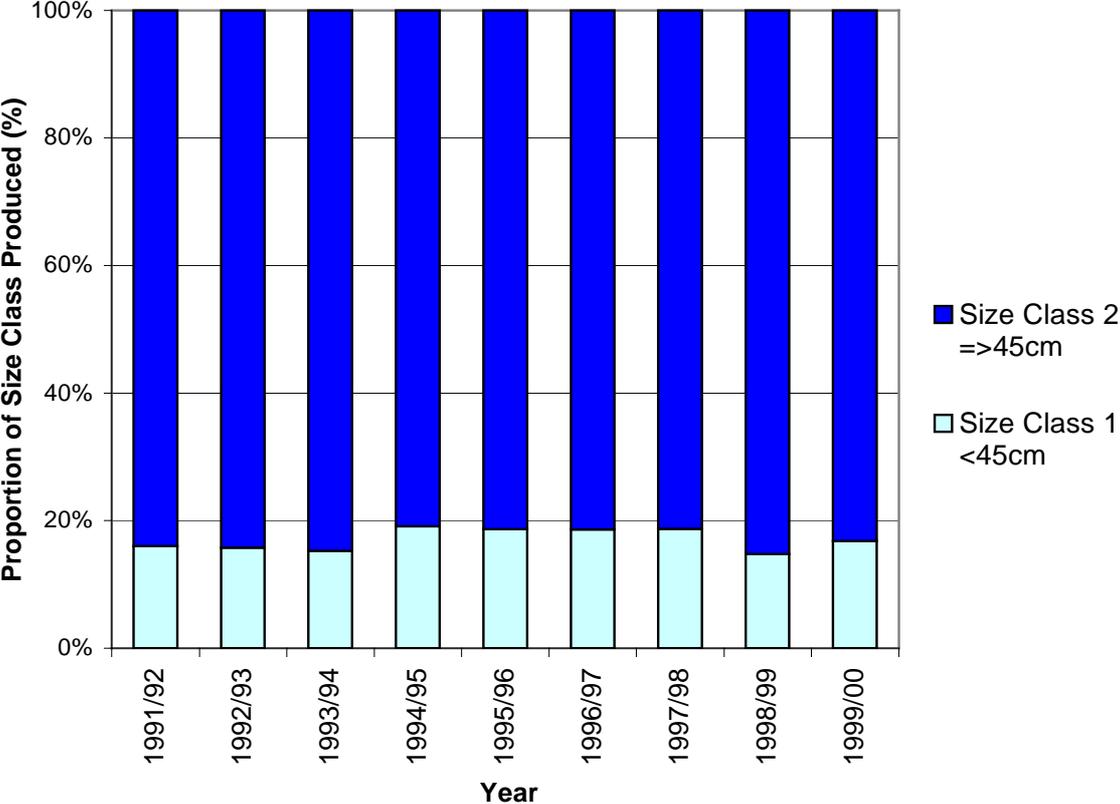


Figure 4. D+ Sawlog Size Class Distribution by Year from 1991/92 to 1999/00

4.4 Area Harvested

Figure 5 shows the percentage of annual area harvested by forest type from 1992/93 to 2000/01. Areas harvested in the Foothill Mixed species (FMS) and Mountain Mixed species (MMS) forest types represent 36% and 51% respectively of the total area, 12% of the area is in Mountain Ash (MAS), and 1% Blackwood (WAT).

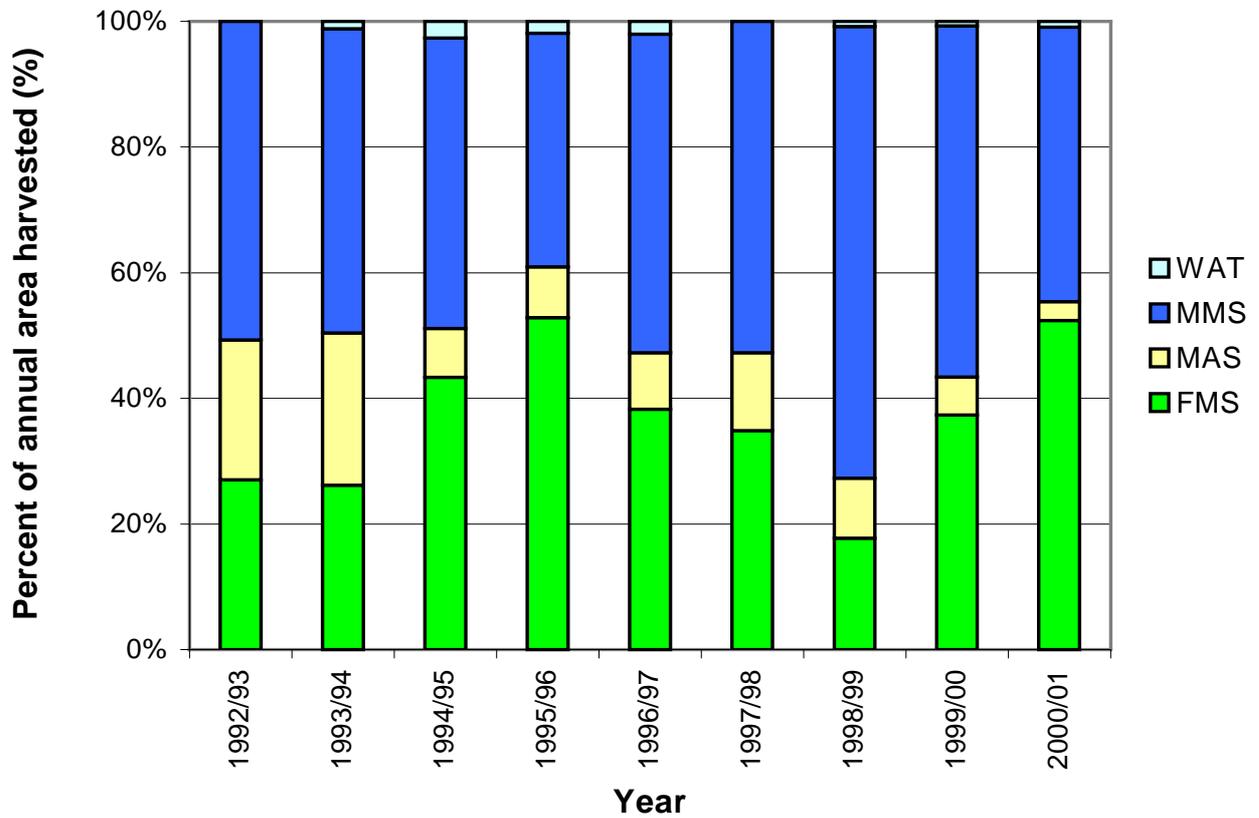


Figure 5. Area Harvested by Forest Type by Year from 1992/93 to 2000/01

4.5 Sawlog Yields

Figure 6 shows the average sawlog yields from 1990/91 to 1999/00. The average yield produced during this period is 110m³/ha. The D+ nett yield decreased from an average 130m³/ha in the early 1990s to an average around 100m³/ha in recent years.

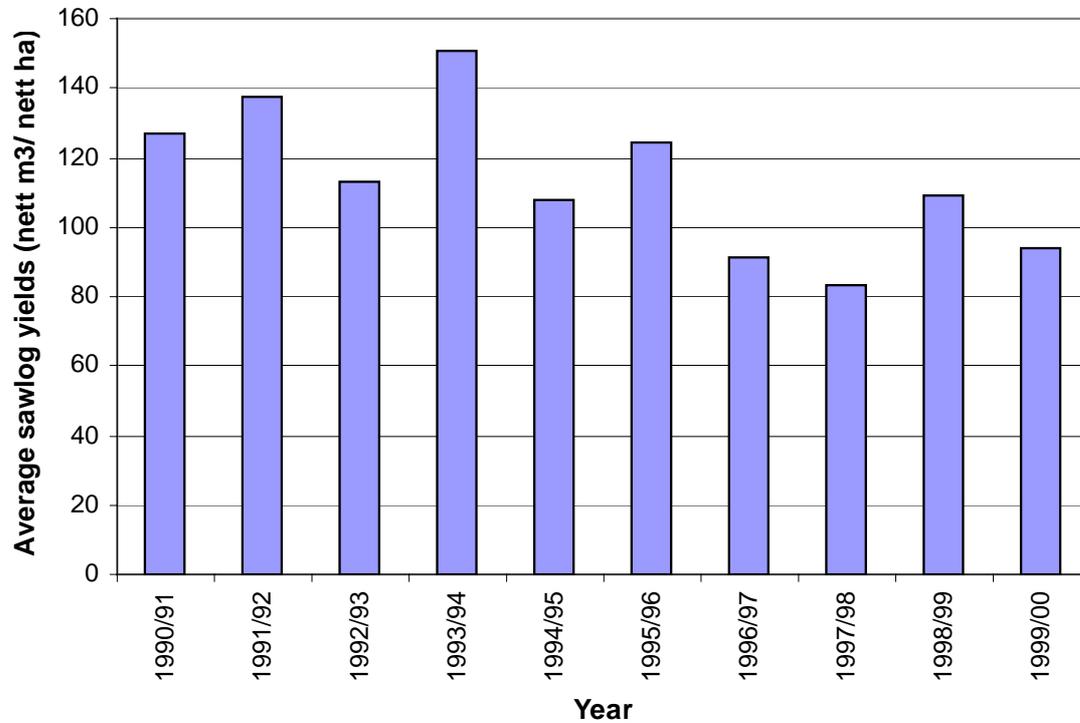


Figure 6. D+ Sawlog Yields by Year from 1990/91 to 1999/00

4.6 Residual Log Sales

Figure 7 shows residual log production and sales from 1991/92 to 2000/01. Residual logs have been sold since the implementation of the Otway Forest Management Plan. Prior to this, only a small part of the residual log resource was sold.

The introduction of Departmental harvesting in 1995/96 and the consequent influx of modern equipment and improved techniques resulted in an increase in the volume of residual logs that could be recovered and sold from sawlog operations. A commercial thinning program to improve sawlog growth rates in selected regrowth stands started in 1997/1998. This program also produces residual log material. Generally, all of the residual log produced is sold

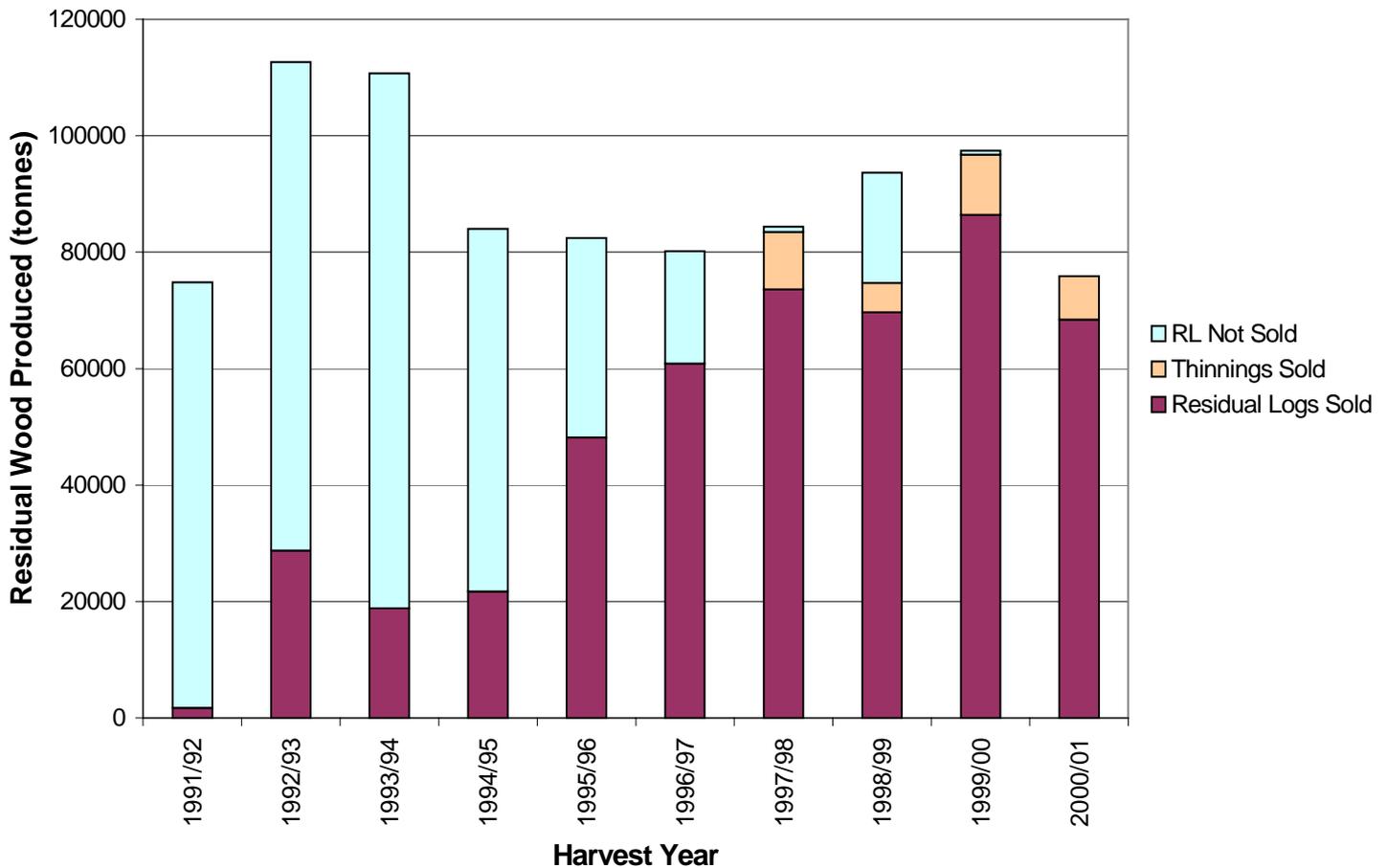


Figure 7. Residual Log Sales by Year from 1991/92 to 2000/01

5 Volume and Growth Information

The information prepared for the Timber Resource Analysis as part of the West Victoria Regional Forest Agreement has been used in this report. SFRI spatial coverage data with forest type and age class information was used in the Timber Resource Analysis with the data set updated with fire and harvesting history to 30th June 1998. This Estimate of Sawlog Resource uses the growth and yield information from the Timber Resource Analysis.

5.1 Standing Volume

Estimates of standing volume for some mature and over-mature stands were derived from HARIS while others were derived from historical harvest figures.

The SFRI data was aggregated into broad forest types based on species composition and stand height. The forest types defined are Mountain Ash, Mountain Mixed Species (mixed species stands greater than 40m in height) and Foothill Mixed Species (mixed species between 22-40m in height). Two productivity strata were defined in each of the ash and mountain mixed species forest types and three productivity strata were defined for the foothill mixed species.

Information on Blackwood availability is limited, therefore no volume has been calculated. Blackwood will continue to be produced as a by product of harvesting eucalypt stands.

5.2 Growth

Growth and yield information from the original forest planning model (FORPLAN) developed for the Otway Forest Management Plan were used for the Timber Resource Analysis for the 2000 Regional Forest Agreement. This growth and yield data is the latest information available until the SFRI project is completed for the Otway FMA in 2004.

6 Resources

6.1 Wood Flows

In the Otway 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 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 Otway FMA

No.	RESOURCE ELEMENT	Area (ha)	Annual Volume (m ³ nett/yr)
	STATE FOREST (INCLUDING SOME HISTORIC AREAS)	92,900	
	<i>Code and Forest Management Plan (FMP) elements:</i>		
1	SPZ & proportion SMZ	26,510	
2	<i>Code</i> slope & stream buffer exclusions	10,070	
3	FMP prescriptions		
4	Unmapped streams and soaks not considered in <i>Code</i> buffer exclusions		
5	Standard SFRI unproductive stands	8,340	
	BIOLOGICALLY SUSTAINABLE YIELD	47,980	28,000
	<i>Operational elements:</i>		
6	Further unproductive stands	1,760	0
7	Slopes additional to <i>Code</i> exclusions	4,308	200
8	Areas not harvested near stream buffers	4,308	200
9	Small and isolated areas	2,360	100
10	Rocky areas		
11	Harvesting losses		
	<i>Management elements:</i>		
12	Landscape buffers		
13	Fire losses		400
14	Disease losses		
15	New flora, fauna and cultural site reservations		
16	Temporal and spatial constraints		
	<i>Remaining element:</i>		
17	Economically Accessible Resource	35,243	27,100
	<i>Potential issue elements:</i>		
18	Changed residual log markets		
19	Changed minimum log diameter specification		
20	Changed silviculture system		
26	Additions to the forest estate		
27	Reforestation of unstocked stands		

Note: 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 Special Management Zone

All Special Protection Zone is excluded from harvesting and some parts of the Special Management Zone 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, streamside and rainforest buffers.

6.3.3 Forest Management Plan Prescriptions

The slope prescriptions for water catchments detailed in the Otway Forest Management Plan have been incorporated and areas excluded from harvesting.

6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions

The Timber Resource Analysis (TRA) conducted for the West Victoria Regional Forest Agreement (2000) did not consider operational factors such as unmapped streams, soaks and steep areas. Field studies conducted for the Estimate of Sawlog Resource, using a Geographic Information System (GIS) approach, examined 34 coupes from the period 1994/95 to 1999/00 and determined that the harvestable area was less than the area predicted in the Timber Resource Analysis.

This revised harvestable area was used in the analysis in combination with harvesting yield data (refer to Section 5.2). The analysis found that the volume was similar to that estimated by the TRA. These operational considerations have been factored into the estimate of available area for elements 7 & 8 (see sections 6.3.7 and 6.3.8 respectively).

6.3.5 Standard Statewide Forest Resource Inventory Unproductive Stands

The forest stands which are excluded in the Otway FMA on the basis of being non-productive are stands not capable of attaining heights greater than approximately 22 metres, and includes species such as *Eucalyptus willisii* (Shining Peppermint), *E. ovata* (Swamp Gum) and *E. radiata* (Narrow-leaved Peppermint).

6.3.6 Further Unproductive Stands

A stand of *Pinus radiata* (Radiata Pine) that was inadvertently included in the area statement of the Timber Resource Analysis was removed for this analysis.

6.3.7 Slopes Additional to Code Exclusions

The Timber Resource Analysis did not analyse operational factors that may limit the area harvested. Analyses of actual areas harvested were used to estimate the area of slopes less than 30 degrees currently not harvested. An allowance has been made based on the study for the area unavailable due to unmapped streams and soaks (Refer to section 6.3.4).

6.3.8 Areas not harvested near stream buffers

Part of the available area study allowance (Refer to section 6.3.4).

6.3.9 Small and Isolated Areas

The Timber Resource Availability analysis applied a small area filter to eliminate small areas of productive forest, which were surrounded by unproductive or unavailable stands. The threshold applied was equivalent to 5ha for Ash, 8ha for Mountain Mixed Species and 15ha for Foothill Mixed Species. These stands were considered uneconomic to harvest. The same approach was applied for this resource estimate.

6.3.10 Rocky Areas

This element is not considered to be significant in this resource estimate for this FMA.

6.3.11 Harvesting Losses

Harvesting losses were considered as not being significant in this FMA. Therefore, they have not been incorporated into this analysis.

6.3.12 Landscape Buffers

The impact of an increasing expectation for visual buffers to be incorporated to protect short distance (roadside) and longer distance (panorama) visual experiences was difficult to estimate. It is considered that buffers placed on visually sensitive ridgelines or roads or private property boundaries in the General Management Zone can be managed temporally and as such does not result in reducing the forest area for analysis purposes.

6.3.13 Fire Losses

A reduction factor of 1.62% was used for all forest types in the FMA (based on MIRA analysis 1992).

6.3.14 Disease Losses

This element is not considered to be applicable to this FMA.

6.3.15 New Flora and Fauna and Cultural Site Reservations

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

6.3.16 Temporal and Spatial Constraints

The impact on timber availability of Special Management Zone with temporal or spatial constraints is not expected to be significant and no adjustment has been made.

6.3.17 Economically Accessible Resource

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

6.3.18 Changed Residual Log Markets

This element is not considered to be a significant factor in this estimate of sawlog resources for this FMA.

6.3.19 Changed Minimum Log Diameter Specification

This element is not considered to be a significant factor in this estimate of sawlog resources for this FMA.

6.3.20 Changed Silviculture System

There is currently a thinning program taking place (commercial and non-commercial) in the Otway FMA in selected stands of regrowth. The thinning program is intended to promote sawlog growth, however, at this stage as the monitoring of these stands is not yet able to provide sufficient information regarding the stand responses, no additional volume has been included. .

6.3.21 Additions to the Forest Estate

The contribution of land (previously owned by Victree Forests) recently incorporated into the public land base has not been included in the estimate of sawlog resources. These lands total approximately 1,370ha.

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 supply commitment of 27,100m³ nett per year is possible with the volumes then increasing after 2008 to a level over 35,000m³ nett per year.

The Estimate of Sawlog Resource adopted the same rotation ages used during the Timber Resource Analysis, which separated the resource into existing, and regrowth stages. Table 4 shows existing and regrowth rotations.

Table 4. Existing and Regrowth Rotation Ages

Forest Type	Rotation Age
<i>Existing Rotation</i>	
Foothill (greater than 28m higher productivity)	80 years
Foothill (greater than 28m lower productivity)	90 years
Foothill (22-28m)	120 years
Mountain Mixed Species	60 years (minimum)
Mountain Ash	60 years (minimum)
<i>Regrowth Rotation</i>	
Foothill (greater than 28m higher productivity)	120 years
Foothill (greater than 28m lower productivity)	120 years
Foothill (22-28m)	120 years
Mountain Mixed Species	100 years
Mountain Ash	80 years

Many areas of Foothill Mixed Species forest in the FMA have had a history of low intensity selection harvesting, which has resulted in uneven-aged stands. The Otway Forest Management Plan states that group (gap) selection is to apply to uneven-aged stands of Foothill forest with a felling cycle of 30 years. For a 90 year rotation one third of the stand is removed in each periodic felling and one quarter for a 120 year rotation.

However, both in this analysis and the Timber Resource Analysis applied a seedtree silvicultural system to these uneven-aged stands, as limited volume information was available. Yields were proportionally reduced to reflect the current mature standing volume. A seedtree cut was then modelled to harvest the standing mature volume, producing even aged regrowth.

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

Table 5. Volume available by forest type for Otway FMA

Forest Type	Volume (m³ nett per year)	Proportion of Total (%)
Mountain Ash	6,200	23
Mixed Species	13,600	50
Foothill Species	7,300	27
Total	27,100	100

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 Otway Forest Management Area, areas were rated two stars, yields, one star, and woodflows, four stars. This has resulted in an overall one star rating.

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

9 Conclusion

The productive forest types of the Otway FMA include Mountain Ash, Mountain Mixed species forest (mixed species stands greater than 40m in height) and Foothill Mixed Species (mixed species between 22-40m in height). The current licence levels can be maintained at 27,100 m³ nett per year. This resource level takes into account operational and economic factors that have been included in the estimate for the first time. Over time, the licence level may vary depending upon improvements in new harvesting and sawing technology, new timber products being developed, the completion of the SFRI data collection, and further analysis using the IFPS.

10 References

NRE (1992). *Forest Management Plan, Otway Forest Management Area*. Department of Natural Resources and Environment, East Melbourne.

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

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11 Glossary

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

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

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

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

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

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

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

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

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

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

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

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

Continuous Forest Inventory Plots (CFI Plots) Plots established throughout the forest on which tree growth information is measured. The plots are measured periodically (at five- or ten-year intervals, for example), and growth on the plot can be determined from the difference between measurements.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Forest Type A classification of forests according to their life form and height of the tallest stratum, and the projected foliage cover of the tallest stratum.

FORPLAN A computer program that can be used to apply forest values (including financial) to forest stands. It is currently used in conjunction with GIS and models for timber, water and wildlife to estimate the response of these values over time for the whole forest for various management strategies.

General Management Zone (GMZ) Delineates the area to be managed for the broad range of forest values available in the area. The GMZ is divided into two sub-zones: 'Timber Production' where timber harvesting under standard conditions is one of the main uses and 'Other Uses' where the forest is unsuitable for sawlog production but where other activities are permitted.

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

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

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

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

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

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

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

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

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

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

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

Log Grading Assessment of the quality of a sawlog.

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

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

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

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

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

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

Mean Annual Increment (MAI) The total increment up to a given age divided by that age; average annual increment to that age (m³/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 Otway FMA

Otways FMA

