

**NORTH EAST
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 North East Forest Management Area. This level has been adopted in the *Our Forest Our Future* Statement.

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

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

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

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

Ken King

Executive Director, Forests Service

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1 Introduction

This Estimate of Sawlog Resources (ESR) summarises current North East 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 ESR 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

The North East Forest Management Area (FMA) is located in north eastern Victoria. It is bounded by the divide between the Broken and King Rivers to the west, the New South Wales border to the north and the Great Dividing Range to the south. Operationally the North East Forest Management Area is an amalgamation of the Wangaratta Forest Management Area and most of the Wodonga Forest Management Area. There are eleven blocks within the Wodonga Forest Management Area managed by Tambo Forest Management area that are consequently not considered in this document unless stated otherwise (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 of the 15 FMAs 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 (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. The legislated sustainable yield rate for North East FMA (including the eleven Wodonga FMA blocks managed by Tambo FMA) was set in 1991 at 44,000m³ nett per year of grade C and better sawlogs (C+). This was reviewed in 1996 and adjusted to 53,000m³ nett per year for grade D and better sawlogs (D+).

The North East Forest Management Plan (FMP) was completed in 2001(NRE 2001). It provided for the protection of all conservation values to agreed targets in the

Special Protection Zone (SPZ) and allowed for harvesting in General Management Zone (GMZ) and Special Management Zone (SMZ) under specific conditions (Figure 1).

North East FMA is covered by the North East Regional Forest Agreement (RFA), established between the Commonwealth and Victorian Governments in 1999. The RFA formally accredits the North East Forest Management Plan (FMP) as part of Victoria's Ecologically Sustainable Forest Management System.

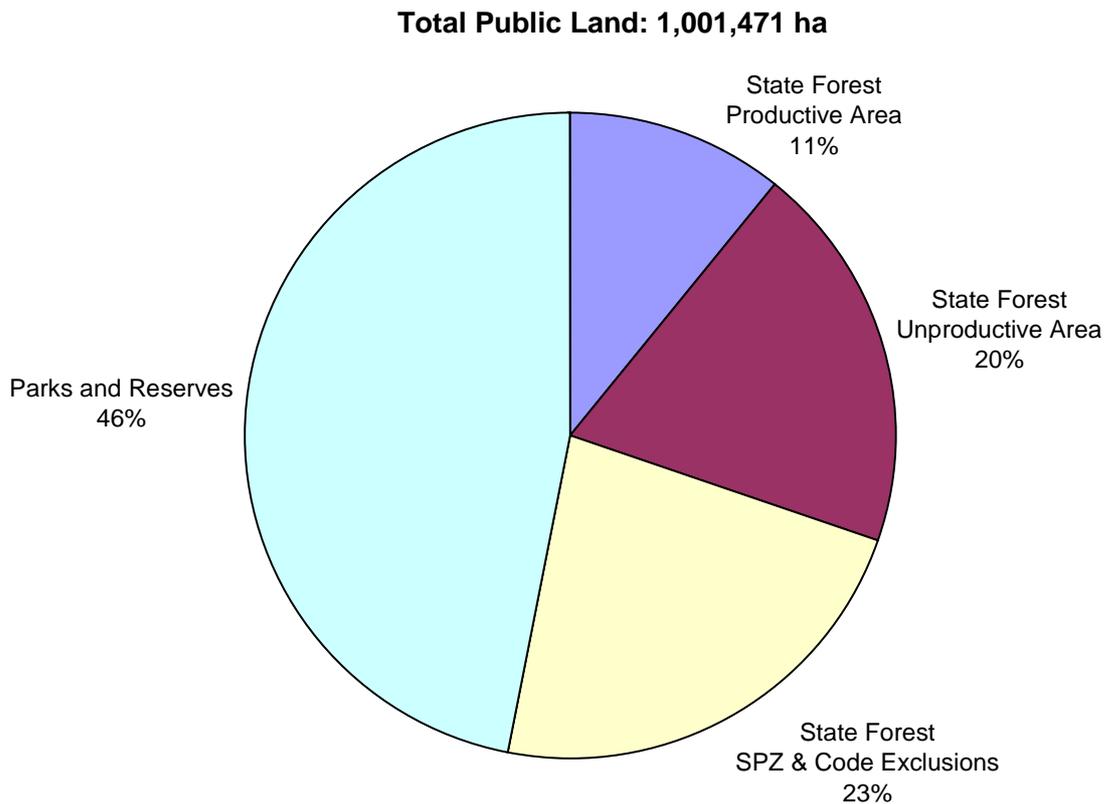


Figure 1. Public Land Area in the North East Forest Management Area

The Statewide Forest Resource Inventory (SFRI) data is benchmarked to the year 2000. The current resource age structure is predominantly mature (ash 31%, mixed species 31%) with advanced regrowth of 1939 or older origin 17%, logging regrowth 18%, and understocked stands 3%.

3 Licence Commitments

The status of current sawlog and residual log licences as at 30th June 2001 for North East FMA is shown in Tables 1 and 2.

Table 1. Current North East FMA Commitments by Licence Type and Expiry

Licence Type	Product	Expiry Date	No. of Licences
Standard	Sawlog	30/06/2002	1
Standard	Sawlog	30/06/2008	4
Short term	Sawlog	30/06/2003	3
Evergreen	Sawlog	30/06/2010	1
Total			9
Standard	Residual Log	30/06/2008	1
Short term	Residual Log	30/06/2003	4
Total			5

Table 2. Current North East FMA Commitments by Species and Grade

Product / Grade	Annual Allocations			
	Species Type			
	Ash Species	Non-specific	Mixed Species	Total
Sawlog (m³ nett)¹				
A	50			50
B	3,700			3,700
C	5,180			5,180
C+	14,772		8,732	23,504
D	582	9,444	512	10,538
D+			1,385	1,385
Sawlog Total	24,284	9,444	10,629	44,357²
Residual Log (m³ gross)				
E Grade Residual Log ³	9,709	1,500	300	11,509
Residual Log	24,273	0	0	24,273
Residual Log Total	33,982	1,500	300	35,782

Note: 1. This assumes current annexures;
 2. The total D+ commitment will be reduced to 37300m³ nett in 2004;
 3. E grade logs are better quality residual logs from which sawn timber can be produced.

4 Harvest History

4.1 Total Sawlog Production

Figure 2 shows the sawlog volume production from the years 1991/92 to 2000/01. Average sawlog production over the last ten years is 40,601m³ nett, which is approximately 3,700m³ nett below the level of the licensed commitment. However, it should be noted that the volume associated with one North East FMA mixed species licence has been supplied from Central and Benalla Mansfield FMAs since 1995/96. Table 2 does not include this licence, but does include the volume associated with a replacement licence that has recently been issued.

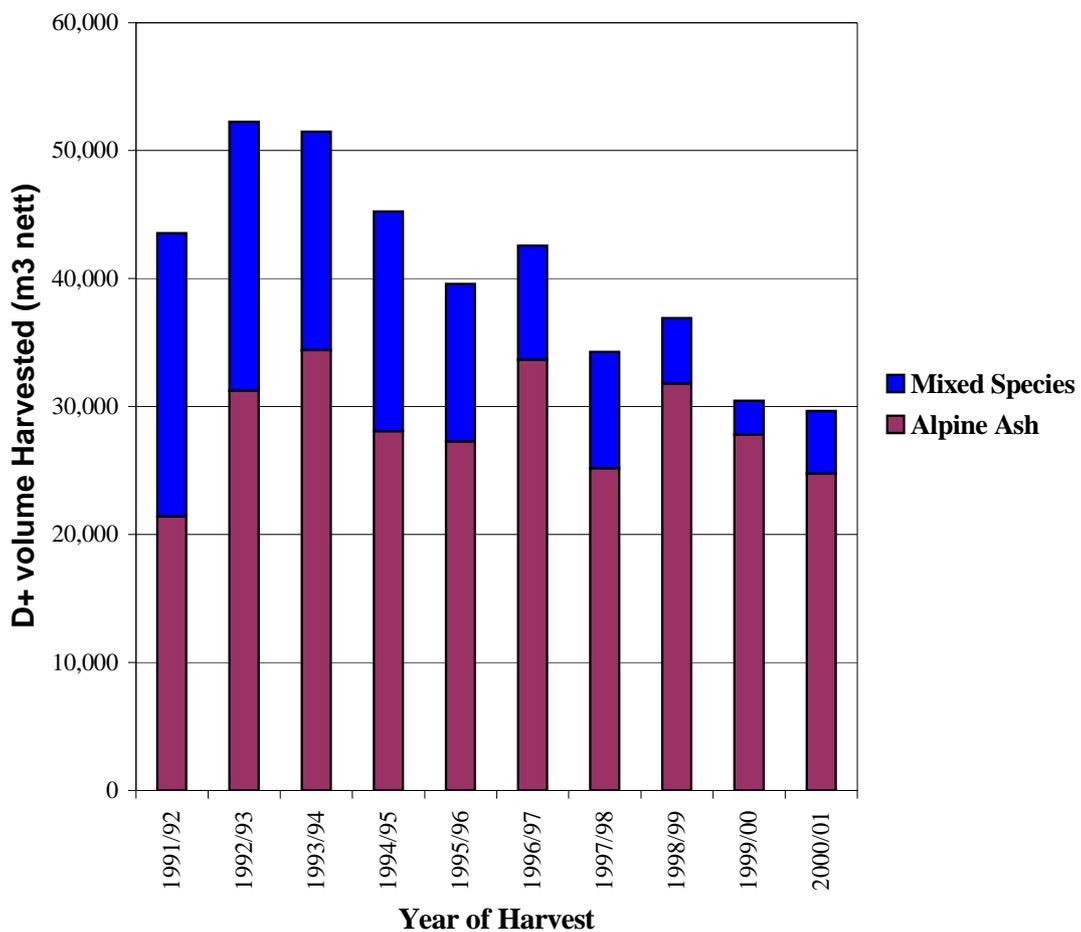


Figure 2. D+ Sawlog Produced by Forest Type by Year

4.2 Sawlog Grades

Figure 3 shows the proportion of sawlog production by grade based on nett volume from the years 1991/92 to 2000/01. The proportion of B grade and better has generally increased over the period, from 11% in 1991/92 to 27% in 2000/01. The increase in B grade and better has been offset by a proportional decline in D grade production. In some years this situation, coupled with undercuts on C+ licences, has resulted in difficulties meeting D grade allocations.

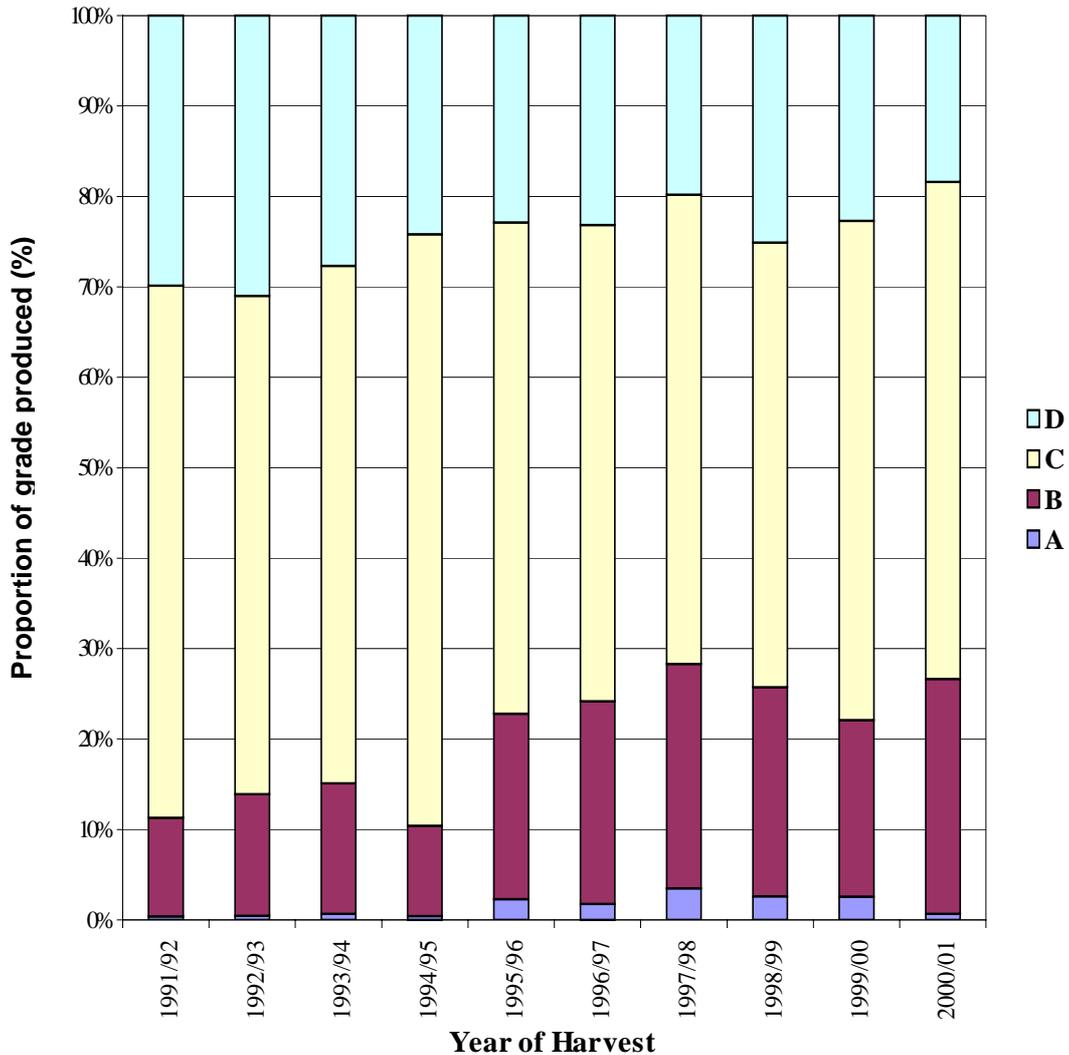


Figure 3. D+ Sawlog Grade Proportions by Year.

4.3 Sawlog Size Classes

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) sawlogs produced over the last ten years.

There has been a significant increase in the proportion of size class 1 from 1998/99 to the present. This can be explained by the cessation of harvesting in the mature East Kiewa resource and subsequent transition to fire regrowth stands.

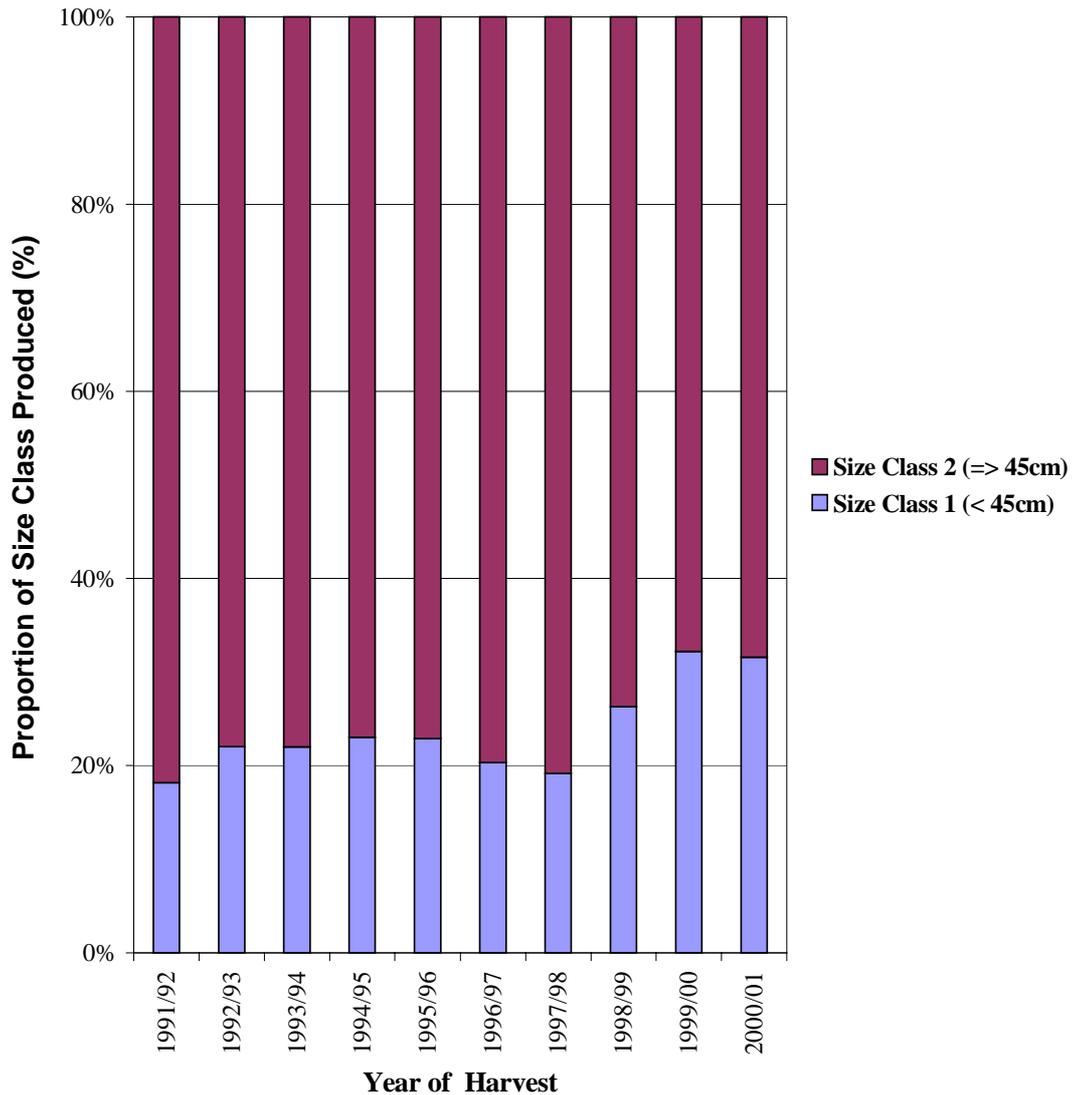


Figure 4. D+ Sawlog Size Class Distribution by Year

4.4 Area Harvested

Figure 5 shows the area harvested by forest type for the years 1991/92 to 2000/01. There has been a significant and steady decline in the total area harvested over the period. The area harvested in recent years is 30% of the ten-year average and 19% of area harvested in 1991/92. The reduced area is due to the reduced volume of mixed species harvested where the sawlog yields are lower than ash coupes.

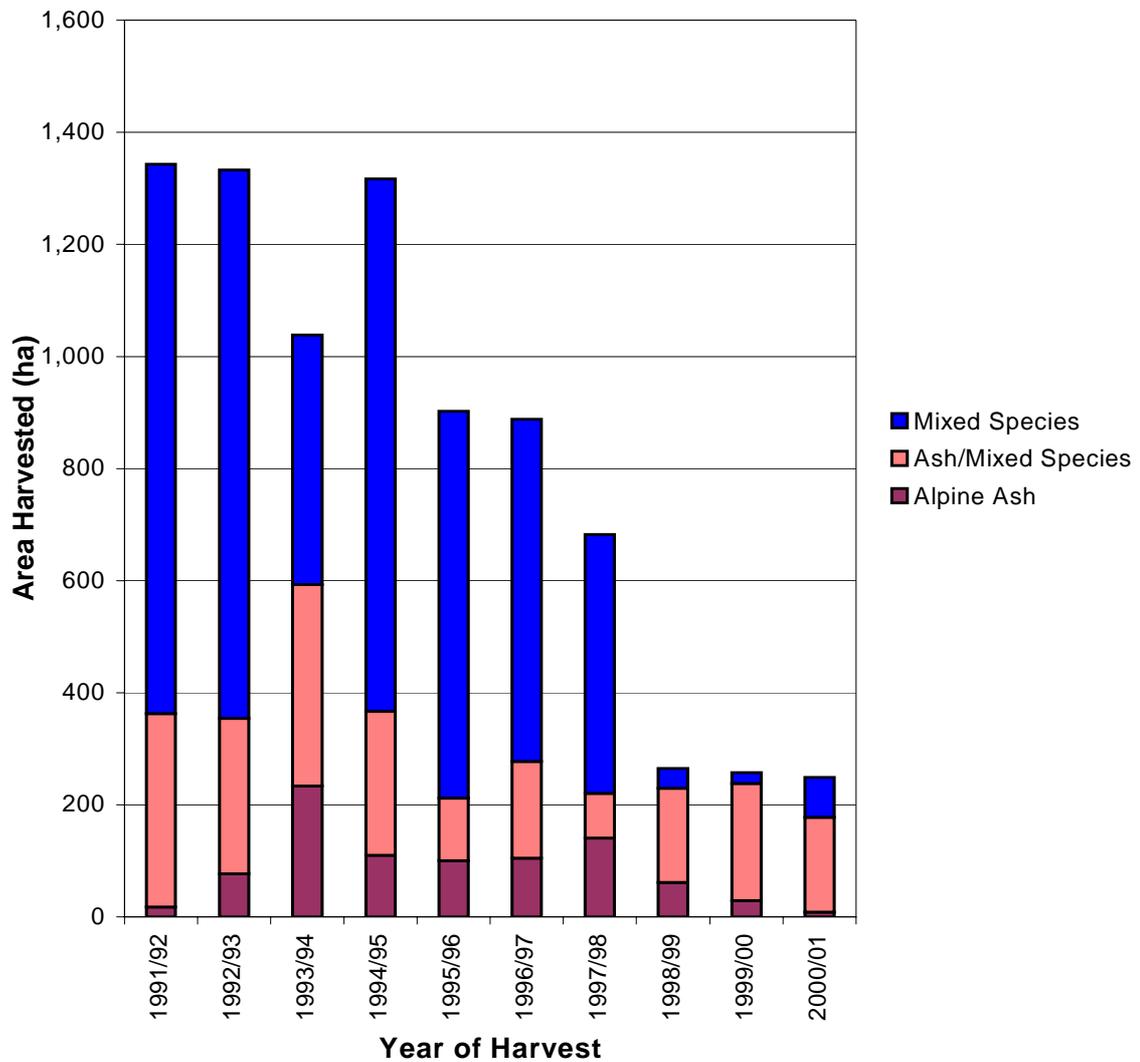


Figure 5. Area Harvested by Forest Type by Year

4.5 Sawlog Yields

Figure 6 shows the yields produced by sawlogs for the years 1991/92 to 2000/01. The significant trend in the figures is an increasing yield in both ash and mixed species however, figures are distorted by the Ash/Mixed species categories. It is assumed that the yield for pure ash stands represents the better quality stands and conversely the yield for pure mixed species stands represents the lesser quality stands. The increase in mixed species yield from 1995/96 onwards is also partly explained by a shift from single tree selection to a seed tree silvicultural system in the latter part of the decade.

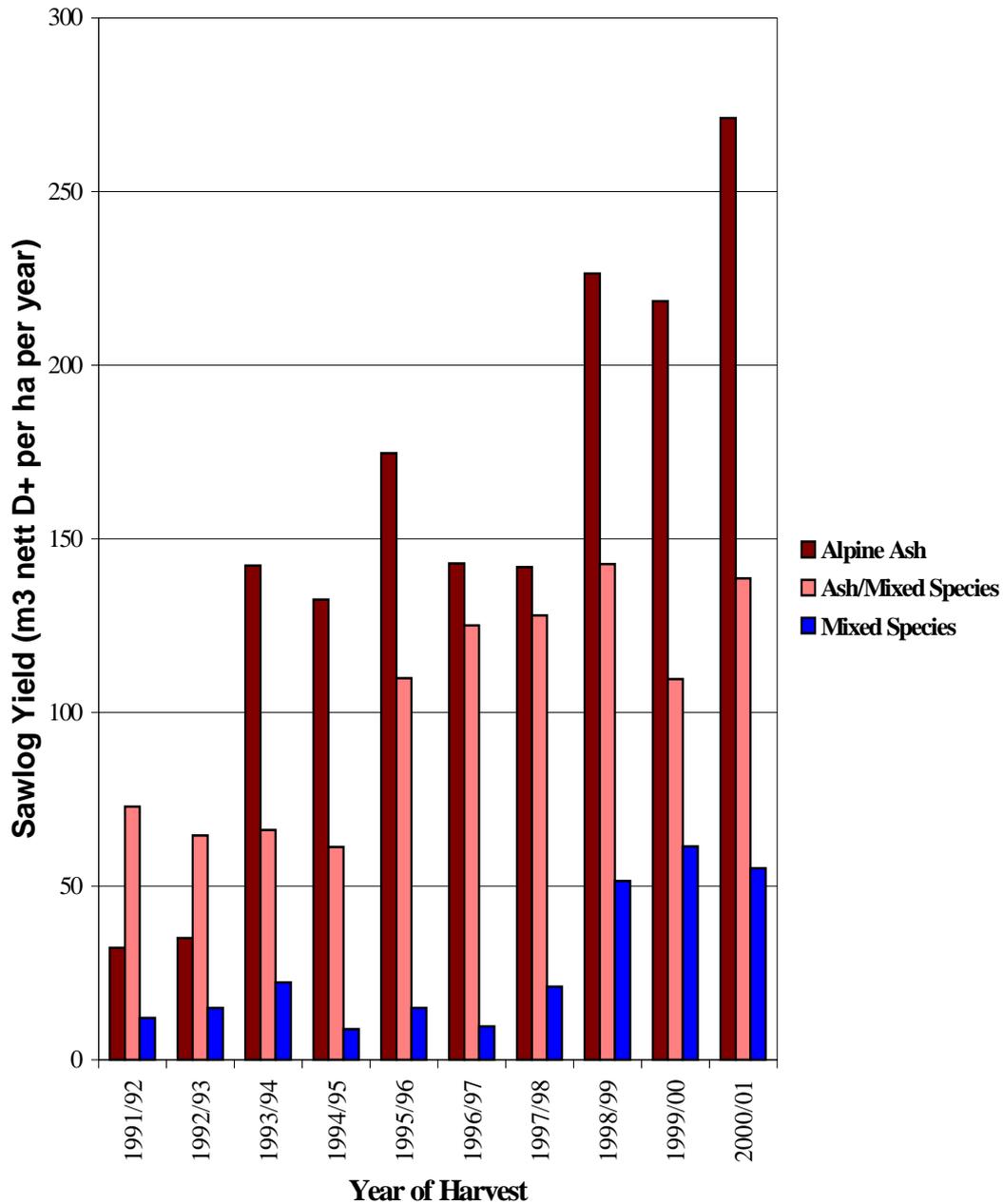


Figure 6. D+ Sawlog Yields by Forest Type by Year.

4.6 Residual Log Sales

Figure 7 shows the quantity of residual logs produced and sold over the last ten years. Residual log sales have historically been relatively insignificant in the North East FMA due to cartage distance from processing and shipping facilities. Significant quantities of residual log have been produced but not sold before 2000 in this FMA. Changes in market conditions and transport costs in 2000/01 resulted in good quantities of residual ash logs being sold.

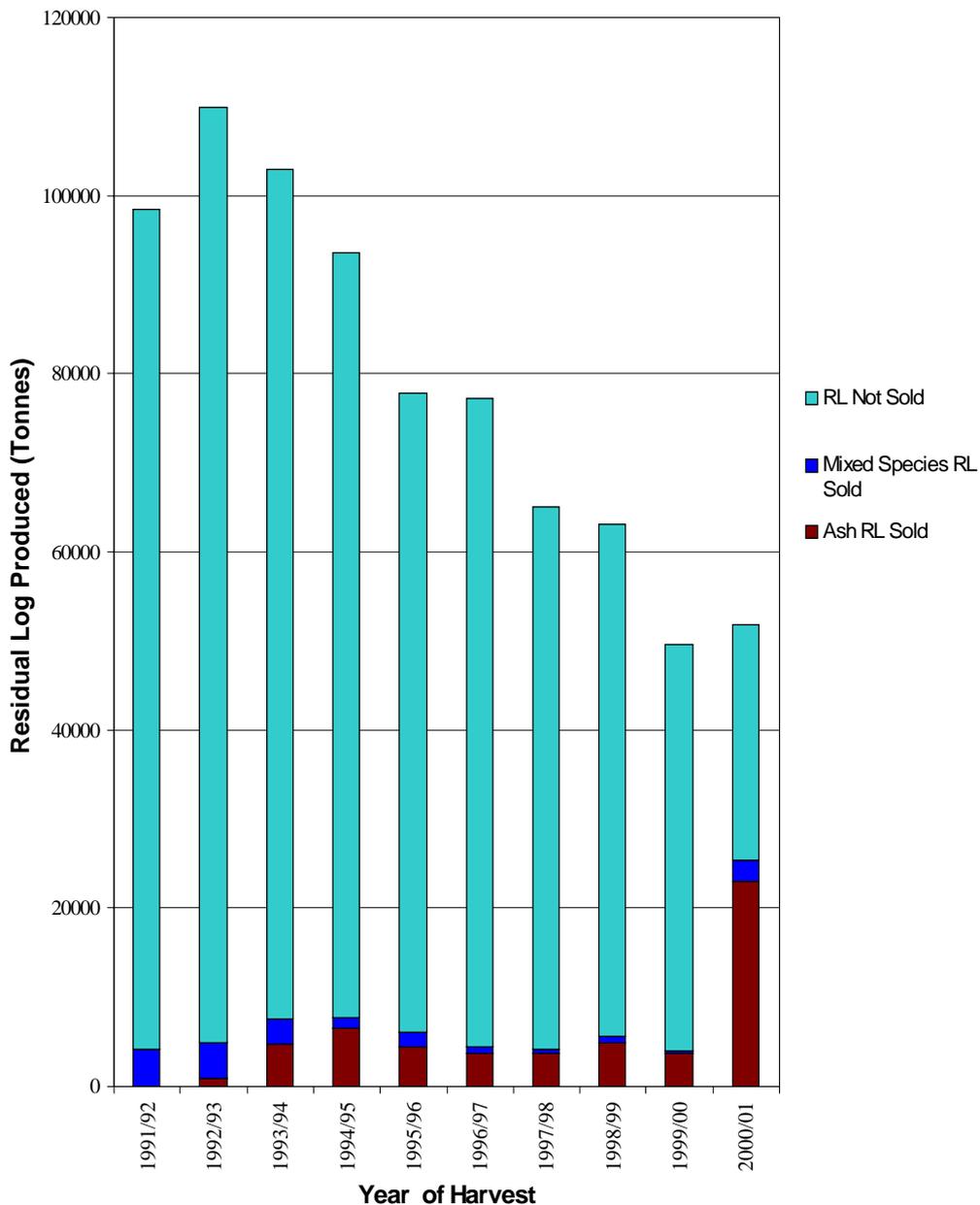


Figure 7. Residual Log produced by Year

5 Volume and Growth Information

5.1 Standing Volume

The SFRI program sampled stands across the North East FMA, assessing trees for dimensions and external defects at each sampling point. This information was used, in combination with internal defect data, to develop estimates of nett D+ sawlog and residual volumes per hectare. The current specifications for D+ sawlog were applied.

Data was collected on a set of additional validation felling plots in mixed species forest to compare the estimated individual tree volumes with the actual graded volumes. This information was used to develop a calibration model which was applied to the SFRI standing volume estimates for the North East FMA.

At the time of preparing this ESR there is no data available for the North East FMA to compare and calibrate standing and felled volumes for the ash sample points. Analysis of similar data from Tambo and Central Gippsland FMAs indicated, however, that the felled volume was 24% less than the SFRI estimate of standing volume on felled ash plots. Comparison of the modelled ash yields for North East FMA with calibrated ash yields from the Tambo FMA showed that the average uncalibrated yield for 1939 ash of 206m³ nett D+/ha was considerably higher than the calibrated yield of 185m³ nett/ha for 1939 ash in the Tambo FMA. As the quality of the ash in the two areas is perceived to be similar, a reduction of 24% has been applied to all the North East FMA ash volumes, based on the modelled reduction in the Tambo FMA. Models were developed to relate the calibrated, sample volumes to stand characteristics. The models have been used to estimate current standing volumes for all productive mature stands (including 1939 regrowth).

The calibrated SFRI ash volume figures were checked against operational yields on over 34 coupes totalling an area of about 760ha. They were found to predict, on average, about 72% of the harvested volume. The under-prediction may be largely attributed to coupes being planned in better than average stands.

There are significant areas of ash stands that are not dominated by regrowth but have harvesting records. These stands have a mixed history but since they are recorded as having at least partial harvesting, and carry a mix of regrowth and mature stems, they have been tabulated in a separate 'cut over' category for this estimate. They have been given a modified volume, calculated as 42% of the full volume estimate for a similar stand with no harvest record.

There is also a significant area of mixed species stands that is not dominated by regrowth but has harvesting records. These have also been included in a 'cut over' category for this analysis. It is assumed that the merchantable volume has been removed from these stands, and that any regrowth is suppressed. They have been given a nominal volume of 1m³ nett/ha and have been excluded from future growth scenarios.

Much of the mixed species forest, and some of the mature ash stands, have had a history of low intensity selection harvesting, which has resulted in a reduction of the

sawlog volume, with the remaining trees tending to have high defect levels. 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 area of mature ash and mixed species stands affected by selection harvesting was made using SFRI information. A commensurate reduction in standing sawlog volume was applied.

Average sawlog volumes have been calculated for each mature age category in each forest type. No allowance has been made for the proportion of the volume that may not be harvested due to smash or because it occurs in single short log-lengths in otherwise non-sawlog trees because the standing volumes have been calibrated to felled volumes.

5.2 Growth

Yield curves were developed for each major regrowth age/development class in each of the forest types. Mature and older stands were assumed to show no future increase in yields.

The ash yield curves have been derived from the standard simulation (STANDSIM) based yield curves developed for the North East SFRI Project (NRE 1999). SFRI estimates of stand age, basal area, site quality, diameter distribution and stem quality from the North East were used to make these STANDSIM predictions. The resulting yield curve was scaled to match the average modelled stand volumes for the 1925, 1939 and mature Ash and Ash/mix forest types. For the younger regrowth age classes the yield curve was scaled to match the combined average yields of the 1925, 1939 and mature classes.

There is not an equivalent growth model to STANDSIM that 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. The generalised yield curve developed from the North East SFRI Report was used as a basis for the regrowth mixed species yield curves. The age of initial sawlog production was adjusted to 40 years and the curve was scaled on the yield axis to match the average modelled volume of the mature stands, assuming a stand age of 80 years.

6 Resources

6.1 Wood flows

In the North-East 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 North East FMA

No.	RESOURCE ELEMENT	Area (ha)	Annual Volume (m ³ nett/yr)
	STATE FOREST (INCLUDING SOME HISTORIC AREAS)	530,971	
	<i>Code and Forest Management Plan (FMP) elements:</i>		
1	SPZ & proportion SMZ	139,038	
2	<i>Code</i> slope & stream buffer exclusions	88,624	
3	FMP prescriptions	6,489	
4	Unmapped streams and soaks not considered in <i>Code</i> buffer exclusions		
5	Standard SFRI unproductive stands	187,407	
	BIOLOGICAL SUSTAINABLE YIELD	109,413	87,000
	<i>Operational elements:</i>		
6	Further unproductive stands	22,999	0
7	Slopes additional to <i>Code</i> exclusions	7,172	7,000
8	Areas not harvested near stream buffers	29,538	29,000
9	Small and isolated areas	11,560	11,000
10	Rocky areas		700
11	Harvesting losses		1,900
	<i>Management elements:</i>		
12	Landscape buffers		
13	Fire losses		500
14	Disease losses		
15	New flora, fauna and cultural site reservations		
16	Temporal and special constraints		
	<i>Remaining element:</i>		
17	Economically Accessible Resource	38,144	37,300
	<i>Potential issue elements:</i>		
18	Changed residual log markets		
19	Changed minimum log diameter specification		
20	Changed silviculture system		
21	Additions to the forest estate		
22	Reforestation of unstocked stands		

Note: Element 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 the Special Management Zone is available for harvesting.

6.3.2 Code Slope & Stream Buffer Exclusions

Areas steeper than 30 degrees and 20m buffers on mapped permanent streams are excluded under provisions of *The Code of Forest Practices for Timber Production* (NRE, 1996).

6.3.3 Forest Management Plan Prescriptions

SMZ for the Long-footed Potoroo is not available for timber production and was excluded. Harvesting operations will continue to be excluded from these areas until research regarding Long-footed Potoroo response to disturbance is completed.

6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions

An allowance of 5% in volume, which is included in resource element 6.3.2, 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 SFRI and is determined by excluding forest of inherently low productivity. The forest stands which are excluded in the North East FMA on the basis of being non-productive are *E. goniocalyx* (Long-leaved Box), *E. pauciflora* (Snow Gum), and *E. mannifera* (Brittle Gum). Other non-productive stands that are not capable of attaining heights greater than 28 metres have also been excluded.

6.3.6 Further Unproductive Stands

Some mixed species stand combinations, in addition to those defined as unproductive by SFRI, were evaluated to determine their suitability for sawlog production, in particular, *E. radiata* (Narrow-leaved Peppermint) stand combinations. The following species/stands are considered productive:

- Alpine Ash
- Mountain Gum
- Blue Gum
- Messmate
- Manna Gum
- Narrow-leaved Peppermint, either as pure stands or if dominant, in mixture with one of the above species. In all cases the stand height must be greater than thirty-four metres.

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 degrees 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 – 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 are greater than 30 degrees
- Greater than 30 degrees excluded in the timber resource

6.3.8 Areas Not Harvested Near Stream Buffers

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

To evaluate the extent of productive forest that could be operationally unavailable, a variable-width buffer system (using GIS digital terrain model) has been developed. The main inputs are Digital Elevation Model and the stream coverage. Using the mean slopes and the average mature stand height within eighty metres on both sides of the streams (based on SFRI data), the following buffer rules were applied:

- slope into stream 0-15 degrees, 25 metre buffer applied;
- slope into stream 15-20 degrees, 40 metre buffer applied;
- slope into stream 20-25 degrees, 60 metre buffer applied;
- slope into stream 25-30 degrees, 60 metre buffer applied.

An extensive survey of actual buffer widths and slopes was conducted to verify the model. The results of this survey show a strong correlation between the modelled and actual buffer width.

6.3.9 Small and Isolated Areas

Small areas are isolated patches of available productive forest, below a minimum size that are considered uneconomic to harvest. These were defined as stands of less than five hectares for ash forests and ten hectares for mixed species forests, which were surrounded by unproductive, economically unviable or unavailable forests. These small areas have been identified and have been excluded from the analysis.

6.3.10 Rocky Areas

An allowance of 700m³ nett has been made for areas that may be unavailable for harvesting due to rocky outcrops.

6.3.11 Harvesting Losses

A 1,900m³ nett volume reduction has been applied to allow for the losses in converting standing volume to harvested 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 temporarily, 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 15 m³ nett/ha for ash species and 20 m³ 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%. A 500m³ nett volume reduction has therefore been applied to modelled scenarios.

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 SMZ and SPZ may be created around future identified sites of cultural, historic, flora or fauna significance occurring in GMZ areas of North East FMA. 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 Special 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 is 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 no residual log production. Following delineation of further unproductive stands in light of past practices, the minimum yield for productive stands is considered acceptable given a history of low

mixed species sawlog yields. Substantial new residual log markets could improve harvest yields from productive stands and make harvesting in some currently unproductive stands economically feasible.

6.3.19 Changed Minimum Log Diameter Specification

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

6.3.20 Changed Silviculture System

The potential impact of thinning has not been investigated. There is no history of regrowth thinning in this FMA. On the majority of past coupes it would be difficult to meet the terrain criteria, which specifies that logging debris should not be excessive. Historically, coupes have contained large volumes of post-harvest debris due to a lack of residual log markets. In addition, coupes have generally been in mature stands, so the piece size of the remaining debris is significantly larger than for regrowth stands.

6.3.21 Additions to the Forest Estate

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

6.3.22 Reforestation of Unstocked Stands

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

7 Resource Outlook

A sawlog level of 37,300m³ nett per year is possible. 67% of this volume is pure Ash, 19% Ash/Mixed Species and 14% High Quality Mixed Species. Volume increases gradually from 2055. This woodflow is 16% below current licence commitments from the FMA.

The Timber Industry Strategy sets a nominal rotation age of 80 years for ash species and 120 years for mixed species stands and 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 above modelling, a minimum harvest age of 70 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.

The volume available and proportion for individual forest type for this scenario is shown in Table 4.

Table 4. Volume available by forest type for North East FMA

Forest Type	Volume (m ³ nett per year)	Proportion of Total (%)
Alpine Ash	25,050	67
Alpine Ash / Mixed Species	7,000	19
Mixed Species (High Quality)	5,200	14
Mixed Species (Low Quality)	0	0
Total	37,300	100

8 Data Standard

The Expert Data Reference Group has provided an independent assessment of data and methods used in the development of Estimates of Sawlog Resource. They have 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 North East Forest Management Area, area was given four stars, yield, three stars, woodflows, three stars. This has 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 North East FMA are dominated by mature and late-mature forests. The area available for harvesting has been reduced from that used to determine 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. If the current licence commitments are reduced by 12% to 37,300 m³ nett per year, there will be sufficient sawlog resources to maintain the licence levels on an ongoing basis.

10 References

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

NRE (1999) Forests Service Technical Reports 99-2, *Victoria's Statewide Forest Resource Inventory: Benalla/Mansfield, Wangaratta and Wodonga Forest Management Areas*, May 1999, Department of Natural Resources and Environment.

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

11 Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“D” Grade Sawlog A “D” grade sawlog is considered to be any sawlog with a minimum small end diameter under bark of 25cm which has maximum allowable defects on exposed ends of: two diameters length of loose gum veins/pockets or shakes, 10 diameters length of tight gum vein more than 3mm width, unlimited length of tight gum vein less than 3mm width, dark stain, maximum

sloping grain angle of 1:8 along the length of the sawlog, maximum of three defective quarters, and maximum of 120cm square of pipe defect on exposed ends.

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

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

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

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

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

Expert Data Reference Group (EDRG) A group appointed by the Minister to review the data used to estimate the available volumes. Consist of Professor J. VanClay (Southern Cross University) 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 (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 – North East FMA

North East FMA

