MILDURA
FOREST MANAGEMENT AREA

ESTIMATE OF SAWLOG RESOURCE

Department of Natural Resources and Environment
Victoria

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FOREWORD

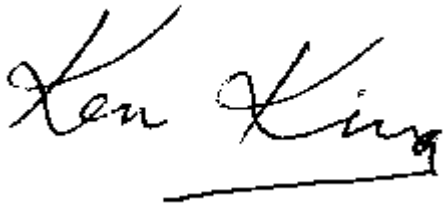
In March 2001 the Minister for Environment and Conservation initiated a process to issue new sawlog licences at appropriate levels. This process culminated in the preparation and release of the *Our Forests Our Future* Statement in February 2002. This Government Statement announced wide ranging reforms 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 Mildura Forest Management Area. This level has been adopted in the *Our Forest Our Future* Statement.

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

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

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



Ken King
Executive Director, Forests Service

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1 Introduction

This Estimate of Sawlog Resource (ESR) summarises current Mildura 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

The Mildura Forest Management Area (FMA) occupies the north-western area of Victoria. It is centred around Ouyen and stretches from the South Australian border in the west to Swan Hill in the east, with the Murray River the northern boundary (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 awlog grades 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.

In 1986 sawlog harvesting in the Mildura Forest Management Area was halted pending completion of the Land Conservation Council's (LCC) review of public land in the North West Study Area. Following completion of the Land Conservation Council study, one long term sawlog licence was issued for a volume equivalent to the estimated sawlog sustainable yield from the Mildura Forest Management Area.

In 1989 the Land Conservation Council recommended that limited timber extraction be permitted in particular areas of River Reserve which were marked on Land Conservation Council maps as E1, excluding the original 60 metre public purposes reserve. This recommendation was adopted by the Victorian Government in 1990. Harvesting has not occurred in any of the designated river reserve areas to date.

The current Sustainable Yield Rate of 700m^3 gross per year is based on the Mildura Forest Management Area Sustainable Yield Review (1996).

A Draft Management Strategy for the Mildura Forest Management Area was released in 2001. The Draft Strategy only relates to the Floodplain State Forest which totals 23,000 hectares, all of which can be used for timber production. The Draft Management Strategy has provided for the protection of all conservation values to agreed targets in the Special Protection Zone (SPZ) and

allowed harvesting in General Management Zone (GMZ) and Special Management Zone (SMZ) under specific conditions (figure 1).

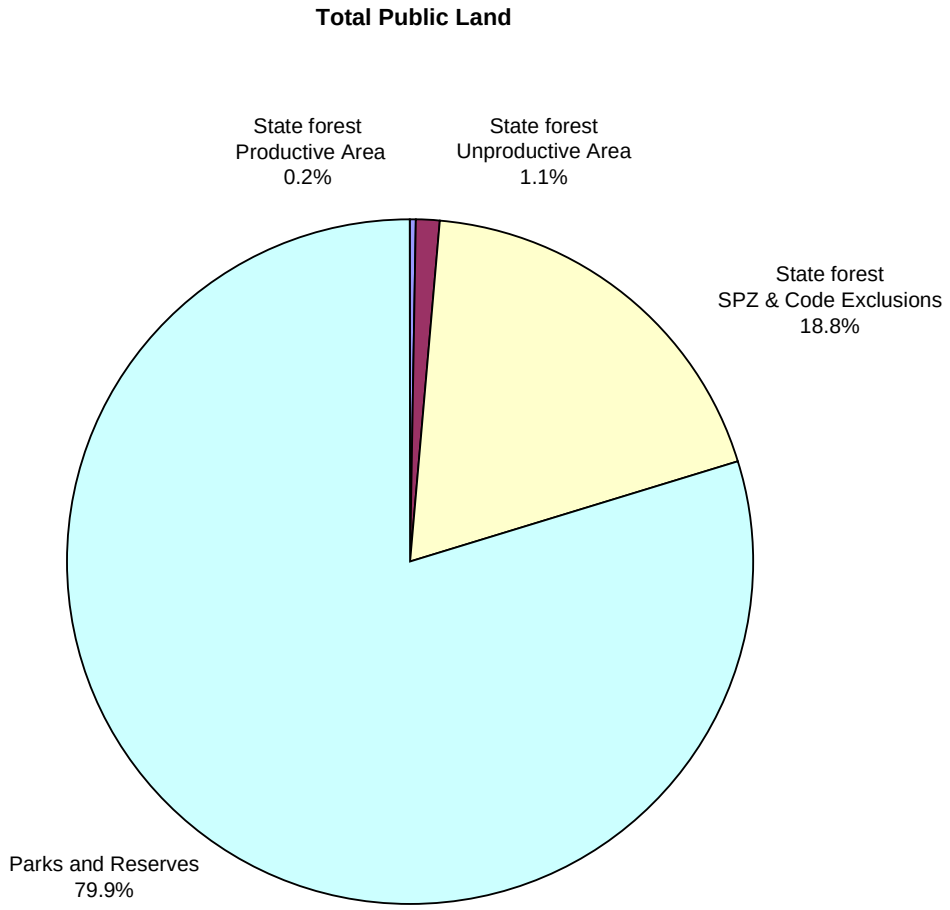


Figure 1. Public Land in the Mildura Forest Management Area

The Mildura Forest Management Area is not covered by a Regional Forest Agreement.

The forest stands of the Mildura Forest Management Area are uneven-aged as a result of a long history of single tree silviculture.

3 Licence Commitments

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

Table 1. Current Mildura FMA Commitments by Licence Type and Expiry

Licence Type	Product	Expiry Date	No. of Licences
Standard	Sawlog	30/06/2006	1
Standard	Residual	12/2001	1

Table 2. Current Mildura FMA Licence Commitments

Product	Annual Allocations
Sawlog	700m^3 gross per year
Residual (Log Grade 1)	700m^3 gross per year
Residual (Log Grade 2)	2000 tonnes

4 Harvest History

4.1 Total Sawlog Production

Figure 2 shows sawlog volumes produced from 1991/92 to 2000/01. Average sawlog production over the last ten years is 621m^3 nett.

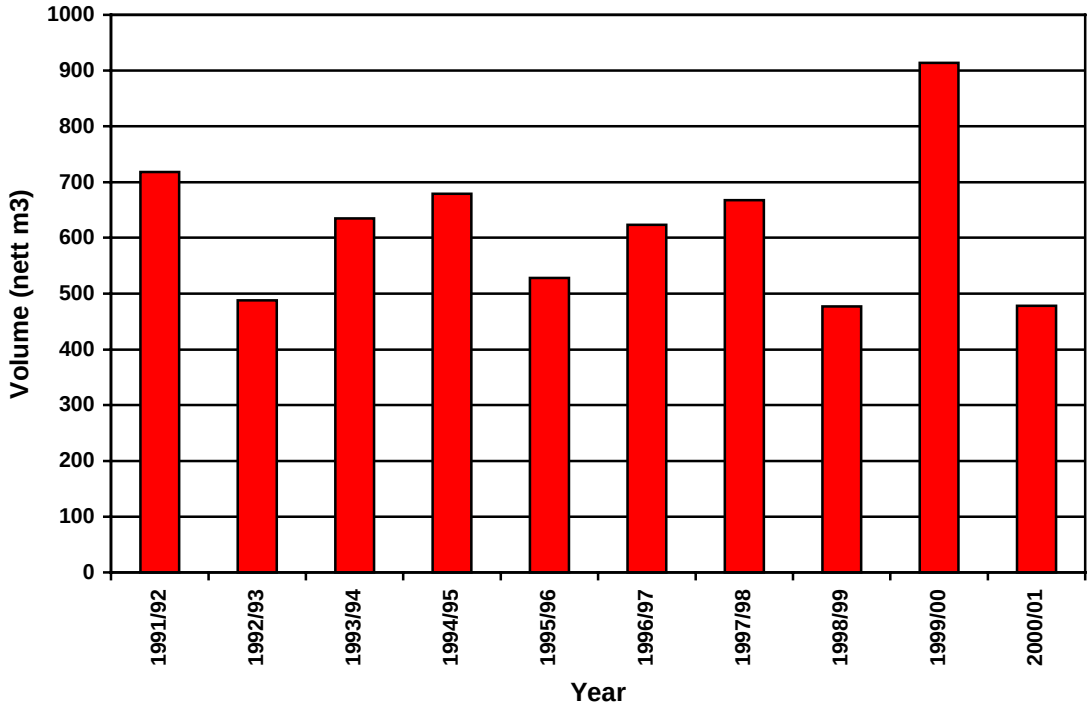


Figure 2. Sawlog Volume Produced by Year

4.2 Sawlog Grades

Figure 3 shows sawlog grade proportions from 1991/92 to 2000/01. The Mildura FMA has two red gum sawlog grades, Red Gum A (RGA) and Red Gum B (RGB) (see Table 3). There has been a significant increase in the proportion of Red Gum A from 1993/94 to 2000/01.

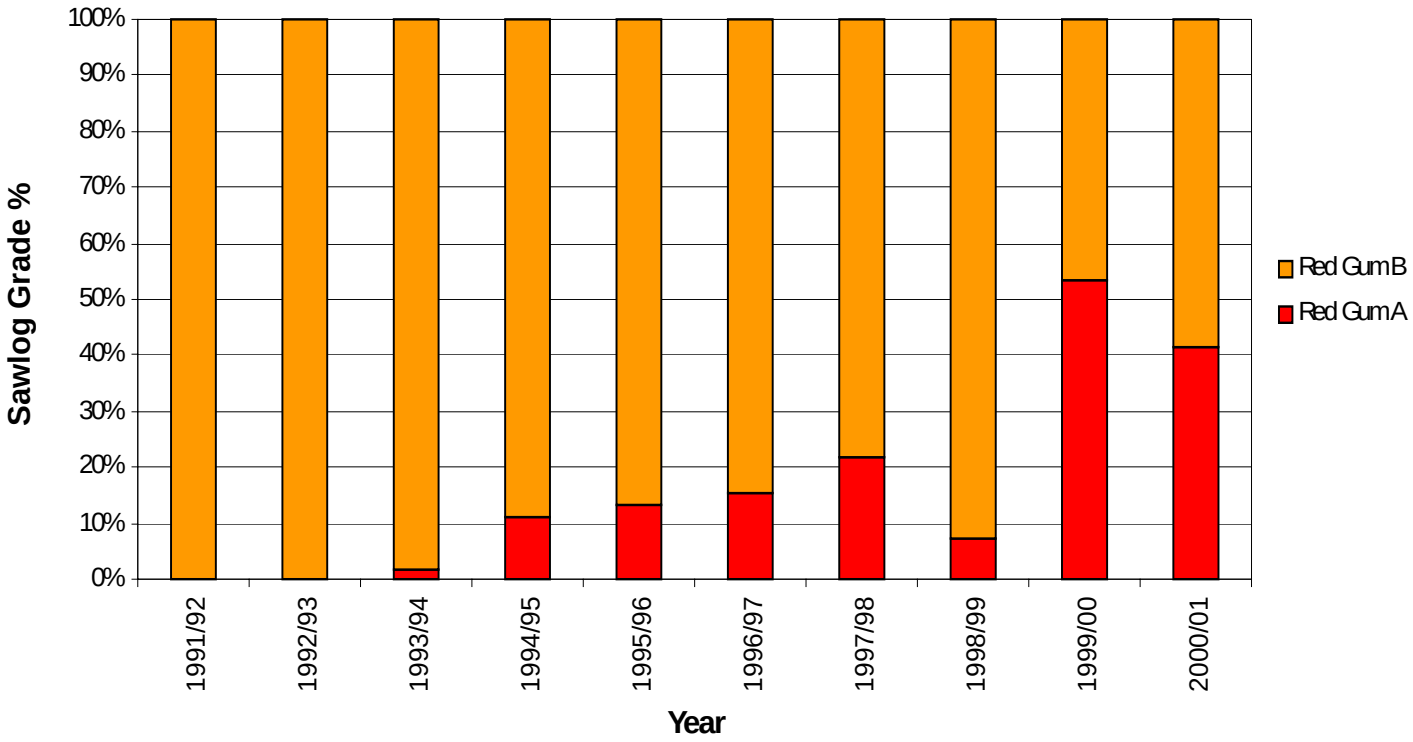


Figure 3 Sawlog Grade Proportions by Year

4.3 Sawlog Size Classes

The Mildura FMA utilisation standards use log size, log length and maximum defect to determine sawlog grades. In the Red Gum A grade the minimum log diameter is centre diameter under bark (CDUB) while for the other grades it is minimum small end diameter under bark (SEDUB). The Mildura FMA utilisation standards specifications are detailed in Table 3.

Under current habitat prescriptions no trees greater than 150cm diameter at breast height over bark can be utilised.

Table 3. Mildura FMA Utilisation Standards

Log Grade	Minimum SEDUB (cm)	Minimum Length (m)	Maximum Defect %
Red Gum A	45cm CDUB	2.7	20%
Red Gum B	25cm SEDUB	2.1	50%
Residual G1	25cm SEDUB	2.1	55-70%
Residual G2	10cm SEDUB	2.1	Not applicable

Figure 4 shows the proportion of size classes for each sawlog grade for the year 2000/01.

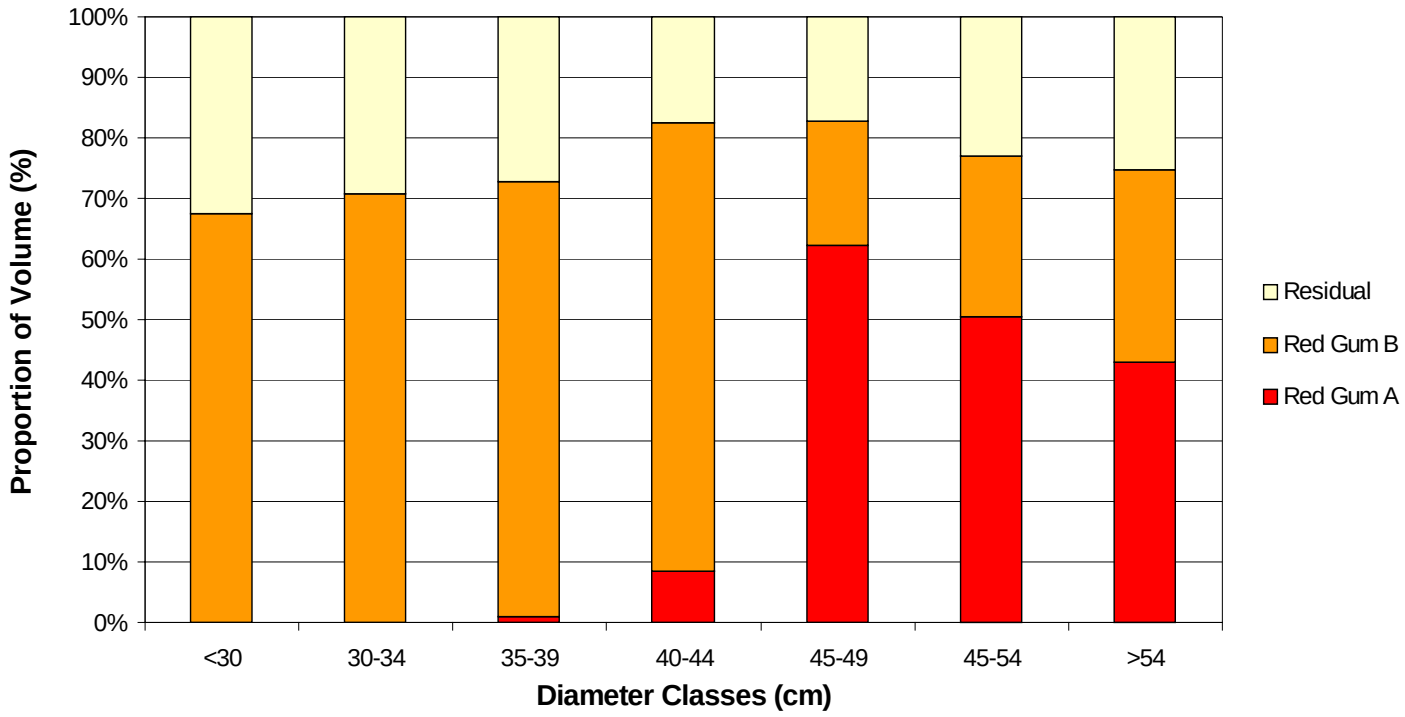


Figure 4. Sawlog Grade by Size Class for 2000/01

4.4 Area Harvested

Productivity varies widely in logging coupes in the Mildura FMA. Coupes are subsequently stratified into Productivity Class 1 (P1), including Stand Classes 1, 2 and 3 (high volumes), and Productivity Class 2 (P2), incorporating Stand Classes 4, 5 and 6 (low volumes). Operations are occasionally conducted across two years which can create an interval of almost two years between sawlog harvesting events.

Figure 5 shows the areas of Productivity Class 1 and Productivity Class 2 harvested from 1991/92 to 2000/01.

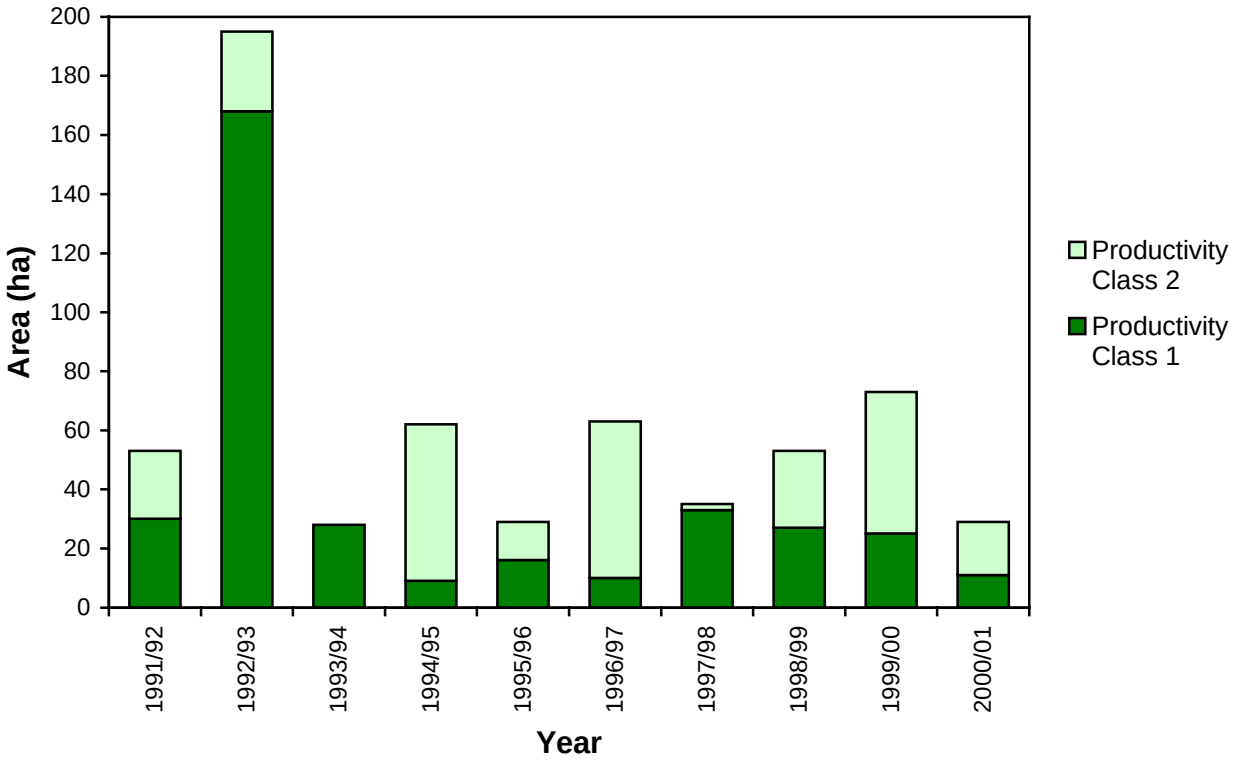


Figure 5. Area Harvested by Productivity Class by Year

4.5 Sawlog Yields

Figure 6 shows sawlog yields from 1991/92 to 2000/01. The yields are from coupes which are stratified into two productivity classes, Productivity Class 1 (P1) and Productivity Class 2 (P2) (see section 4.4). Residual log yields were not measured prior to 1997/98.

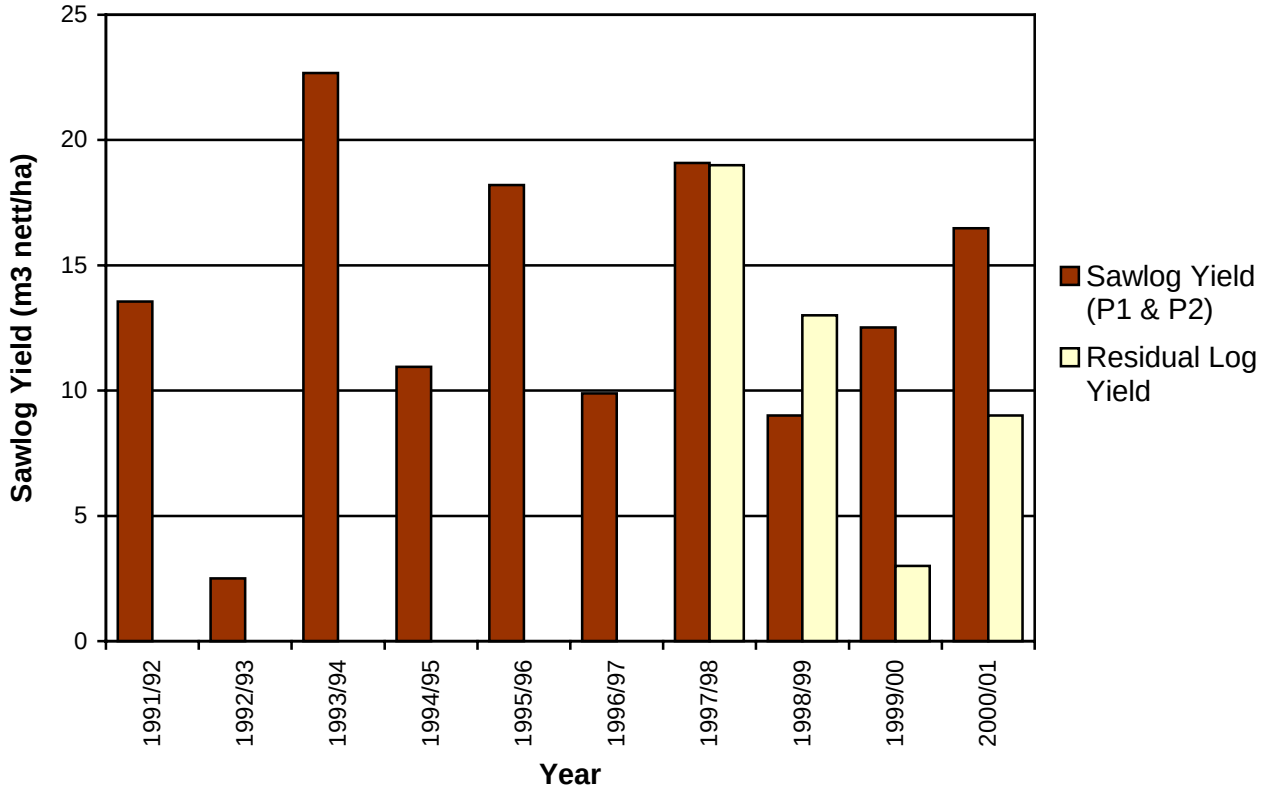


Figure 6. Sawlog Yields by Year

4.6 Residual Log Sales

Recent tenders have shown strong demand for residual logs across the Mildura FMA. There is one annual licence for various grades of residual product. The main products from residual logs are firewood, fence posts, poles and garden landscape timbers. This provides an opportunity for ongoing silvicultural treatment of stands.

5 Volume and Growth Information

5.1 Growth Data

Growth data is not available for Mildura FMA productive stand classes. Area and yield analysis combined with harvest history has been used to determine the timber resource information.

A spreadsheet based model has been developed to calculate an estimate of the harvestable yields in uneven-aged forests. To date, this model has only been applied in the Box Ironbark forests in Bendigo FMA. Early prototypes have been tested in Red Gum forests, but they are considered to be unreliable and require further development.

Stocking surveys have been undertaken in coupes following harvesting events since 1998, although no comprehensive inventory of the various stand components below 25cm diameter breast height over bark (DBHOB) have been undertaken. The following information is unknown:

- the area, distribution, growth and structure of the regrowth,
- the effect of shading and competition on regrowth survival and growth, and
- the response of regrowth to an overstorey thinning.

Yields over nominated harvest cycles have been tested against volume Periodic Annual Increments (PAI) derived from other Red Gum forests, Continuous Forest Inventory (CFI) plots and cutting intensity. These have been compared with data from some long term thinning plots in the Barmah State Forest.

While these Periodic Annual Increments may be representative of the forest type, they do not have a sound statistical basis and they are confounded by the different flood regimes between the productive areas in the Mildura FMA and the Barmah State Forest.

5.2 Cutting Cycle Approach

The cutting cycle is the planned interval between major harvesting operations in the forest and roughly equates to the period required to grow the forest back to the pre-harvest basal area. The Mildura FMA has used a cutting cycle of 40 years for this resource estimate.

Sawlog harvesting removes approximately 50% of stand basal area and is conducted in coupes with a basal area of up to $30m^2$/ha. This leaves approximately $15m^2$/ha of habitat trees and growing stock along with some unstocked areas for new regrowth (see Appendix 1).

The sawlog yield is divided by productivity classes into yields of $8m^3$ nett/ha for Productivity Class 1, $0.8m^3$ nett per ha for Productivity Class 2. This stratification is based on the relative proportions of the two classes harvested, and gives a weighted average yield of $5m^3$/ha due to the bias towards stands with higher productivity. An increased yield to $3m^3$/ha in Productivity Class 2 stands occur in later growing periods due to the high sapling and pole component of these classes.

Table 4. Summary of yields used in modelling

Productivity Class	Yield m^3 nett per ha per harvest cycle	Comment
1	8 first cut	Reduces in following cuts due to habitat tree growth effects.
2	0.8 first cut, 3 thereafter	Increases in following cuts due to regrowth growth effects.

6 Resources

6.1 Woodflows

In the Mildura FMA the predominant silvicultural system is single tree selection. This results in stands of mixed age. Trees are retained in single tree selection operations for growing stock, habitat, seed fall and in buffers along streams. The estimate of the availability of sawlogs into the future is based on the assumption that single tree selection will continue as the predominant silvicultural systems.

To estimate the availability of sawlogs into the future a method of scheduling wood flows is required. This estimate uses a spreadsheet developed by NRE for this task. It uses the area of each forest type of known cutting cycle 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 5 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 5. Profile of Resource Elements for Mildura FMA

No.	RESOURCE ELEMENT	Area (ha)	Annual Volume (m^3 nett/yr)
	STATE FOREST (INCLUDING SOME HISTORIC AREAS)	348,000	
	Code and Forest Management Plan (FMP) elements:		
1	SPZ & proportion SMZ	325,000	
2	*Code* slope & stream buffer exclusions	0	
3	FMP prescriptions	0	
4	Unmapped streams and soaks not considered in *Code* buffer exclusions	0	
5	Standard SFRI unproductive stands	18,850	
	BIOLOGICALLY SUSTAINABLE YIELD	4,150	1,000
	Operational elements:		
6	Further unproductive stands	0	150
7	Slopes additional to *Code* exclusions	0	
8	Areas not harvested near stream buffers	0	
9	Small and isolated areas	0	140
10	Rocky areas	0	
11	Harvesting losses	0	
	Management elements:		
12	Landscape buffers	0	
13	Fire losses	0	100
14	Disease losses	0	10
15	New flora, fauna and cultural site reservations	0	
16	Temporal and spatial constraints		
	Remaining element:		
17	Economically Accessible Resource	4,150	600
	Potential issue elements:		
18	Changed residual log markets		
19	Changed minimum log diameter specification		
20	Changed silviculture system		
21	Additions to the forest estate		
22	Reforestation of unstocked stands		

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

6.3 Resource Elements

6.3.1 Special Protection Zones and proportion of Special Management Zone

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

6.3.2 Code Slope and Stream Buffer Exclusions

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

6.3.3 Forest Management Plan Prescriptions

The effect of guidelines for retaining current or potential hollow-bearing trees has not been quantified by area The potential may have an effect on future sawlog yields is addressed under element 16.

6.3.4 Unmapped Streams and Soaks Not Considered in Code Buffer Exclusions

As coupe areas on which yields are based include code buffers, this element is not applicable.

6.3.5 Standard Statewide Forest Resource Inventory Unproductive Stands

Statewide Forest Resource Inventory has not been completed for the Mildura FMA. The area of productive State forest is determined by excluding forests of inherently low productivity, stratified in timber assessments as Box species or unproductive, which is usually open water, reedbeds, swamps or grass plains. These are excluded from the available area in the Mildura FMA.

6.3.6 Further Unproductive Stands

A reduction of 150m^3 nett has been made for further unproductive stands.

6.3.7 Slopes Additional to Code Exclusions

Slopes additional to *Code* exclusions are not considered to contribute to area reductions. No reduction has been made due to the very flat terrain and generally good access across the economically accessible resource area.

6.3.8 Areas Not Harvested Near Stream Buffers

As coupe areas on which yields are based include code buffers, this element is not applicable.

6.3.9 Small and Isolated Areas

A reduction of 140m^3 nett has been made for small isolated stands across the economically accessible resource area.

6.3.10 Rocky Areas

No reduction has been made for rocky outcrops due to the very flat terrain and generally good access across the economically accessible resource area.

6.3.11 Harvesting Losses

Harvesting losses are accounted for by the use of yields based on actual coupe harvesting yields.

6.3.12 Landscape Buffers

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

6.3.13 Fire Losses

A reduction of 100m^3 nett has been made for losses through wildfires.

6.3.14 Disease Losses

There has been an allowance of 10 m^3 nett for disease losses.

6.3.15 New Flora, Fauna and Cultural Site Reservations

No allowance is made for the possibility of new reservations although there are a large number of aboriginal cultural sites in these forests.

6.3.16 Temporal and Spatial Constraints

The current prescription for River Red Gum forests in the General Management Zone is to retain the following numbers of trees in each size class averaged across the coupe:

- 50 to 100cm diameter breast height class retain 20 trees per 10 hectares
- 100 to 150cm diameter breast height class retain 20 trees per 10 hectares
- more than 150cm diameter breast height class retain all trees.

The effect of this prescriptions is explored further in Section 7, Resource Outlook.

6.3.17 Economically Accessible Resource

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

6.3.18 Changed Residual Log Market

The ability to supply certain grades of residual logs far exceeds the current demand and need not necessarily be limited to sawlog harvesting operations. Red gum regrowth does not readily self thin, so that regrowth management activities provide an opportunity to produce considerable quantities of small diameter material, and aid sawlog growth. It is not possible from current resource information to quantify the amount of residual material that may be available.

6.3.19 Changed Minimum Log Diameter Specification

The adoption of a consistent minimum small end diameter under bark across the Mildura FMA may provide an opportunity to increase the annual sawlog volume with some consequent impact on the sleeper industry.

6.3.20 Changed Silviculture Systems

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

6.3.21 Additions to the Forest Estate

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

6.3.22 Reforestation of Unstocked Stands

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

7 Resource Outlook

The current forest management prescription aims to increase the proportion of larger trees in an area. This could inhibit regrowth, which may result in a long term reduction in available volume. In addition to the immediate impact on available sawlog volume there are compounding effects that result from the continual recruitment of habitat stems above the nominated upper diameter limit and the influence they may exert on growing stock. The process will be more noticeable than in the surrounding reserves as harvesting selects against the smaller diameter stems.

- Yield reductions of 32% and 42% have been applied to second and third cuts, respectively. This is based on the data used to model Barmah State Forest and State Park.
- It is assumed that the Nyah State forest will continue to be available for timber production.

If the area harvested in each cutting cycle is maintained at a uniform level, the total volume able to be harvested in the first cutting cycle is 600m^3 nett per year, 87% of which is Productivity Class 1 forest. The total volume available in the second and third cutting cycles remains relatively constant, however, the proportion of Productivity Class 1 declines to 55% and 51% respectively.

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 Mildura Forest Management Area, area was given one star, yield, one star, and woodflows, two stars. This 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 forests of the Mildura FMA are uneven-aged red gum forests that have had a long history of single tree silviculture. The area available for harvesting has been maintained from previous estimates. The growth and yield data are considered inadequate by the Expert Data Reference Group. Revised estimates are expected in 2005. Current licence levels can be maintained at $600m^3$ nett per year using a fixed area habitat prescription instead of the current size class prescription.

10 References

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

NRE (2000). *Proposed Management Strategy for the Floodplains State Forests of the Mildura Forest Management Area.* Department of Natural Resources and Environment, East Melbourne.

11 Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Log Grading Assessment of the quality of a sawlog.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Overmature A growth stage of a forest stand or individual tree that is characterised by declining crown leaf area and irregular crown shape due to loss of branches and epicormic growth.

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

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

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

Public Land Unalienated land of the Crown managed and controlled by the Minister for Conservation and Land Management, the Minister for Agriculture and Natural Resources, or the Secretary of Natural Resources and Environment, whether or not occupied under a licence or other right (but not including land occupied under a lease, or land vested or leased by the Victorian Plantations Corporation or its successor in law).

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

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

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

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

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

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

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

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

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

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

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

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

Senescent See Overmature.

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

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

Shelterwood System A silvicultural system used for harvesting and regenerating particular forest types. It consists of the removal of a proportion of the mature trees to allow the establishment of essentially even-aged regeneration under sheltered conditions, followed by later felling of the remainder of the mature (seed) trees.

Silviculture The theory and practice of managing forest establishment, composition, and growth, to achieve specified objectives.

Single Tree Selection The felling of scattered mature individual trees, at intervals (generally 10-15 years) over the rotation. Regeneration is largely from lignotubers and coppice.

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

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

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

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

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

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

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

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

Stand A group of trees in a forest that can be distinguished from other groups on the basis of age, species composition, condition etc.

Stand Condition The health, age and size class distribution, and stocking of a forest stand.

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

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

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

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

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

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

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

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

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

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

Uneven-aged Stand Forest stand which contains a continuum of age classes as a result of more or less continuous regeneration within the stand over a number of years.

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

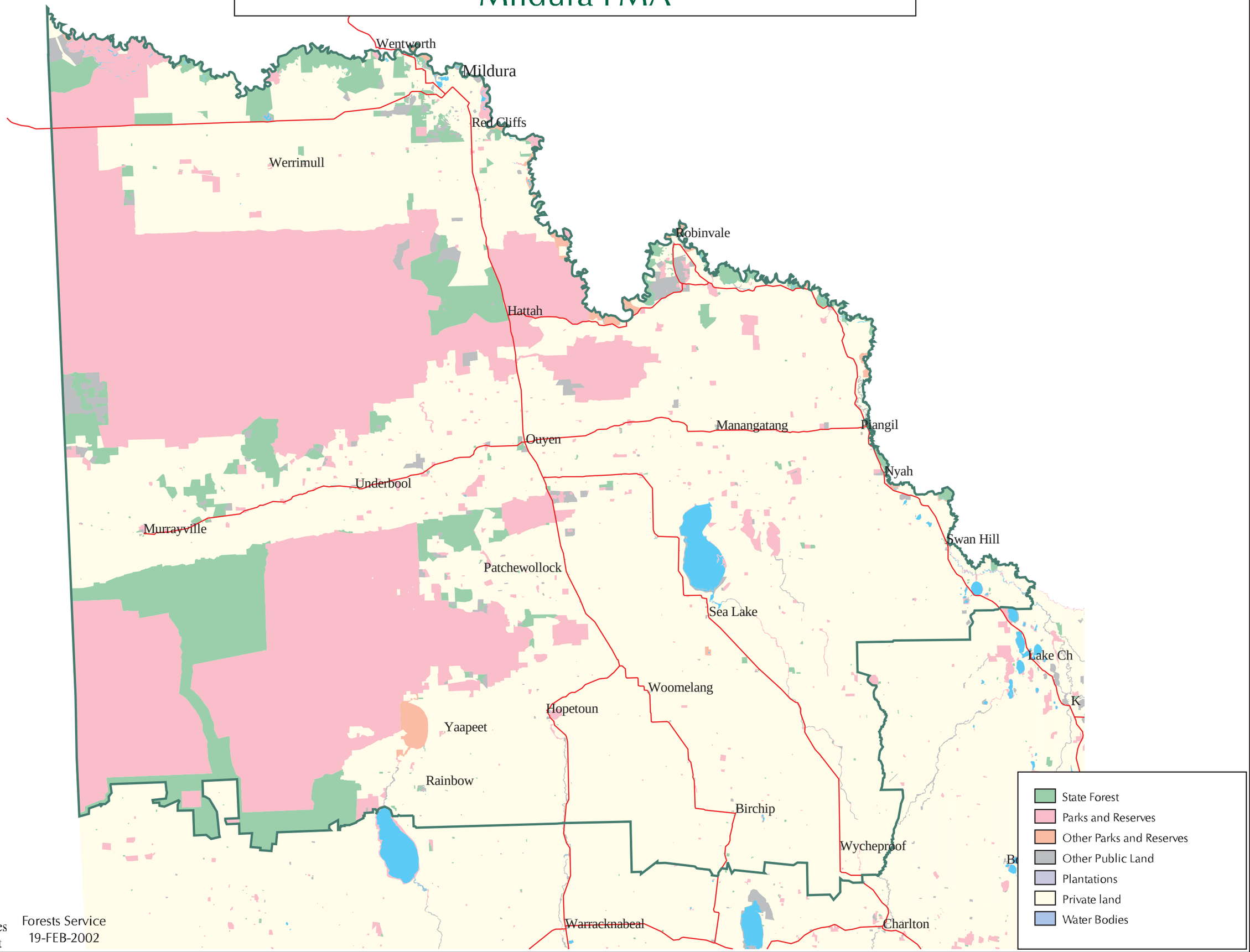
Value Adding An economic term which describes how a raw product is processed into a product which is of more value than the material in its raw state. In the forest and wood industry context, examples of this include the kiln-drying of sawn timber and the manufacturing of wood veneers.

Waste See Smash.

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

12 Map 1 – Mildura FMA

Mildura FMA



State Government Victoria
Department of Natural Resources and Environment

Forests Service
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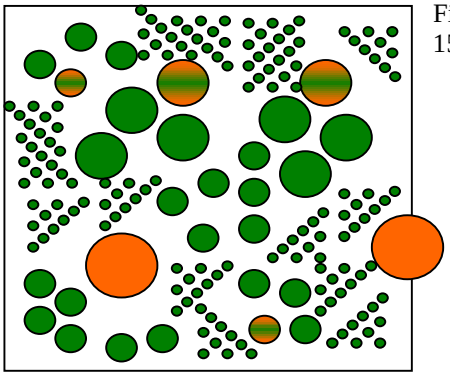
Appendix 1. Habitat Tree Impact Principles for Modelling

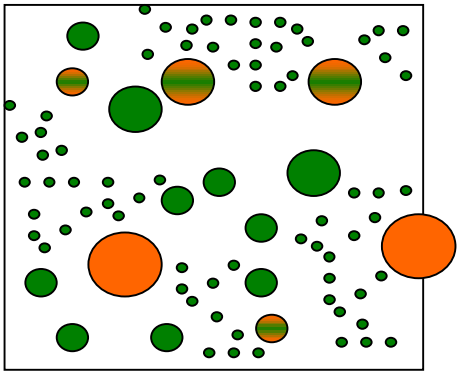
Habitat trees

Trees available for harvest

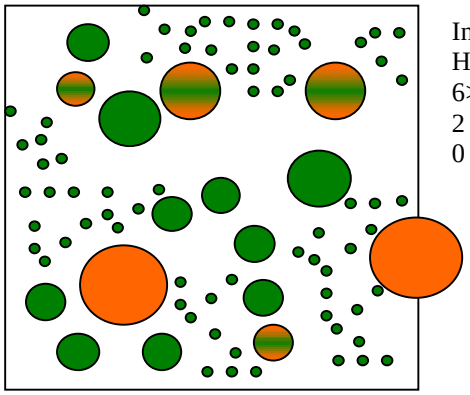
One ha
30 m^2/ha
Habitat trees:
2>150cm
2 of 50-100cm
2 of 100-150cm



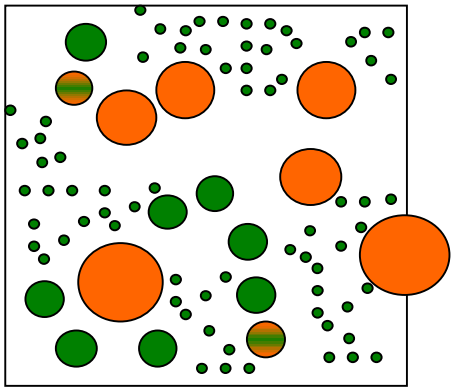
First Cut: Year 2000
15 m^2/ha



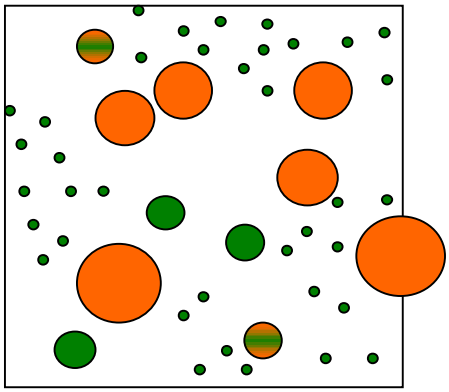
Grow to 2040
30 m^2/ha



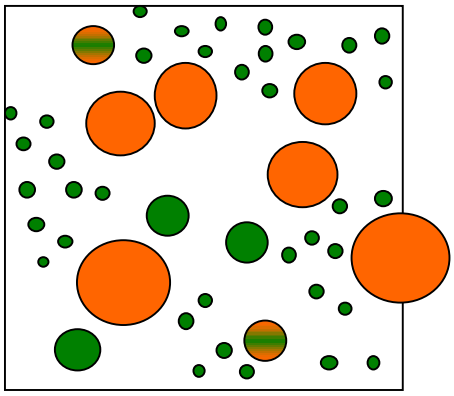
In 2040
Habitat trees:
6>150cm
2 of 50-100cm
0 of 100-150cm



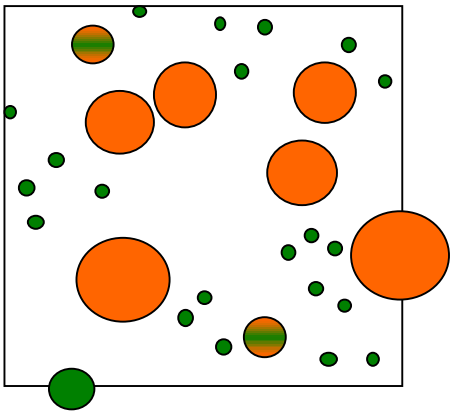
Second Cut:
Year 2040
15 m^2/ha



Grow to 2080
30m^2/ha



Third Cut: Year 2080
15 m^2/ha
Habitat trees:
6>150cm
2 of 50-100cm
0 of 100-150cm



Grow to 2120:
30 m2/ha
Habitat trees:
8>150cm
4 of 50-100cm
0 of 50-100cm