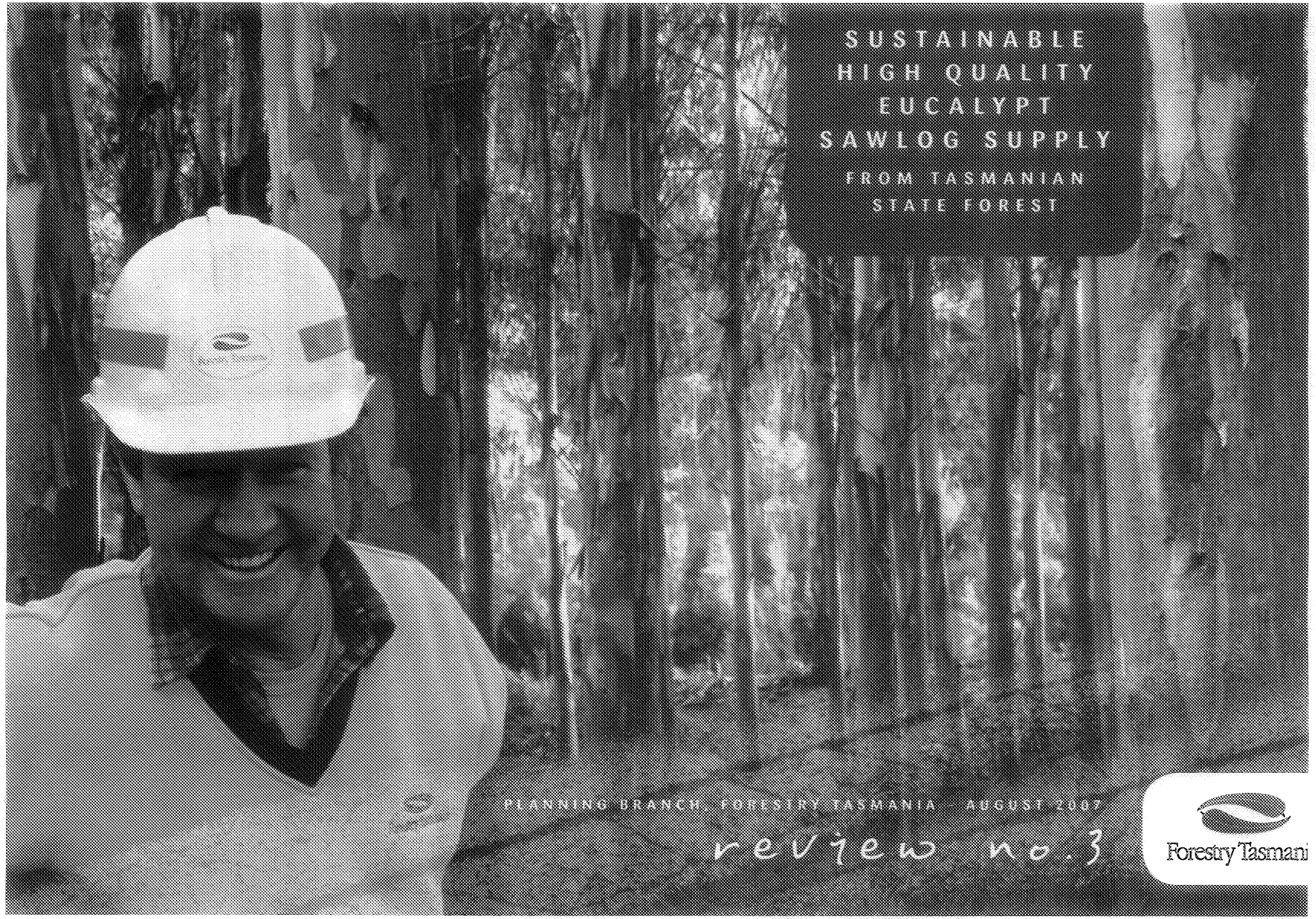

SUSTAINABLE HIGH QUALITY EUCALYPT SAWLOG SUPPLY FROM TASMANIAN STATE FOREST

PLANNING BRANCH, FORESTRY TASMANIA – AUGUST 2007

reviews no.3

Forestry Tasmania

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Forestry Tasmania models and monitors sustainable yield to ensure that harvesting of wood products is consistent with the long-term productive capacity of Tasmania's State forests.

A five-yearly review of sustainable high quality eucalypt sawlog supply from Tasmanian State forest is required under Clause 98 of the Tasmanian Regional Forest Agreement (RFA). The 2007 review updates the review in 2002, which followed the initial post-RFA review in 1998. Also incorporated in this review are outcomes from the Supplementary Tasmanian Regional Forest Agreement, often referred to as the Tasmanian Community Forest Agreement (TCFA), signed in May 2005.

The current review focuses on all native eucalypt forest and eucalypt plantations in wood production areas within State forest, equating to about 40 percent of all State forest or about 9 percent of Tasmania's land area.

The current review describes the evolution of the forest management strategy and direction adopted by Forestry Tasmania to ensure a sustainable supply of high quality eucalypt sawlogs from Tasmanian State forest.

Over the last decade, annual high quality eucalypt sawlog production has averaged 300,000 m^3 per year. Associated pulpwood and related product arisings have averaged 2,500,000 green metric tonnes per year.

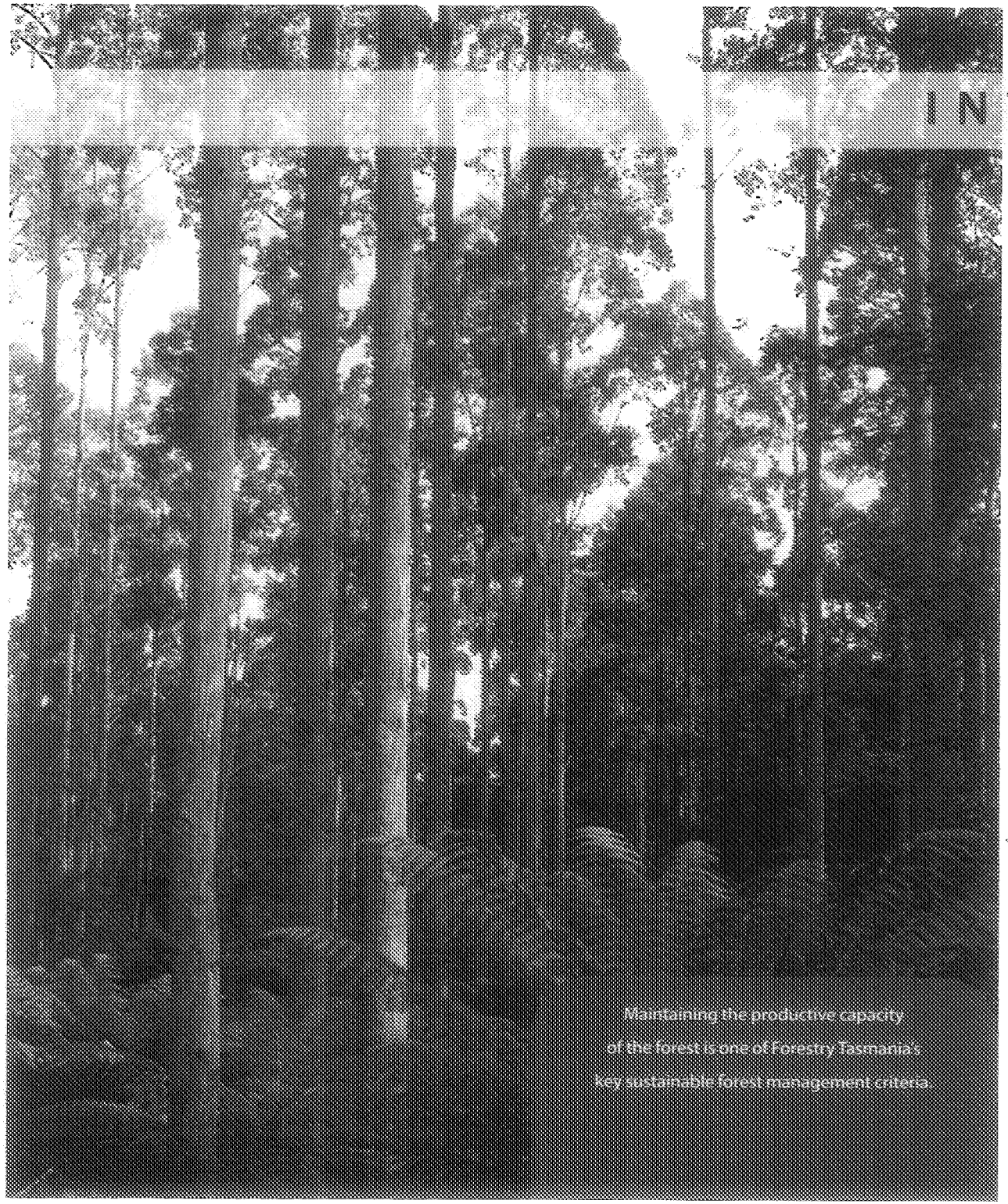
The review confirms the ongoing availability of 300,000 m^3 per year of high quality eucalypt sawlogs on a sustainable basis, together with the capacity to provide a stable supply of pulpwood over the next 20 years. Longer-term changes in pulpwood supply reflect the transition to plantations and regrowth forest.

Thinning of native eucalypt forest and establishment of plantations for production of high quality eucalypt sawlogs have previously been identified as essential elements of the forest management strategy to maintain sustainable yields. The decision in June 2007 to end broadscale conversion of public native forest to plantation has placed further focus on continued thinning of regrowth forests, and increased productivity and tending in existing eucalypt plantations.

Growing stock (a measure of forest capital) is maintained over the 90-year planning horizon. Growth stage (a measure of forest maturity), likewise, is fairly stable, with the proportion of mature eucalypt forest reducing only slightly. Thus the productive capacity of the forest is sustained, maintaining future management options, which include continued wood production at current levels.

The forest management strategy will continue to encourage local processing capacity development and the growth of the Tasmanian economy in the longer term, and makes available at least 300,000 m^3 per year of high quality eucalypt sawlog, as required by Section 22AA of the *Forestry Act 1920*.

Forestry Tasmania



Maintaining the productive capacity of the forest is one of Forestry Tasmania's key sustainable forest management criteria

INTRODUCTION

Sustainable forest management has been defined as the integration of commercial and non-commercial values of forests so that both the material and non-material welfare of society is improved, whilst ensuring that the values of the forest, both as a resource for commercial use and for conservation, are not lost or degraded for current or future generations (Commonwealth of Australia 1992). Sustainable forest management, as measured against the Australian Forestry Standard, is the key driver for Forestry Tasmania's business.

Maintaining the productive capacity of the forest is one of Forestry Tasmania's key sustainable forest management criteria. Forestry Tasmania models and monitors sustainable yield to ensure that harvesting of wood products is consistent with the long-term productive capacity of Tasmania's State forests. This criterion is most relevant when discussing the sustainable high quality eucalypt sawlog supply.

Forestry Tasmania's aim is to continually adapt forest management strategies to ensure a sustainable yield of high quality eucalypt sawlogs. A five-yearly review of sustainable high quality eucalypt sawlog supply from Tasmanian State forest is required under Clause 98 of the Tasmanian Regional Forest Agreement (RFA). This review is necessarily quite technical in nature. **However, Forestry Tasmania welcomes feedback on how it communicates the nature of this work.** To this end, a feedback form is included in Appendix 2, so that you can tell us what information is, and is not, relevant to you.

scope OF THE REVIEW

This report has been prepared to fulfil the Tasmanian obligation under Clause 98 of the RFA:

The State agrees to undertake a review of sustainable high quality sawlog supply levels from public land to reflect the changes in the forest inventory and new intensive forest management initiatives concluded in this Agreement. The review will be completed and published during the first year of this Agreement, and thereafter will coincide with the 5 yearly reviews of this Agreement.

This review coincides with the 2007 five-yearly review of the RFA, as described in Clause 98 above, and follows from the five-yearly review published in 2002 (Forestry Tasmania 2002). Also incorporated in this review are outcomes from the TCFA, signed in May 2005, which was informed by Forestry Tasmania's Final Advice to the Tasmanian Government, entitled "Towards a New Silviculture in Tasmania's Public Oldgrowth Forests" (Forestry Tasmania 2005).

This review of sustainable high quality eucalypt sawlog supply from Tasmanian State forest is consistent with the production policy specified in Section 22AA of the *Forestry Act 1920*:

(1) *Each year, from multiple use forest land, the corporation must make available for the veneer and sawmilling industries a minimum aggregate quantity of eucalypt veneer logs and eucalypt sawlogs that meet the prescribed specifications.*

(2) *In subsection (1), "minimum aggregate quantity" means -*

- *(a) 300 000 cubic metres; or*
- *(b) if another quantity is prescribed - the prescribed quantity.*

No alternative quantity has been prescribed, and accordingly this review focuses on the availability of at least 300,000 m^3 per year of logs meeting the specification for Category 1 (mature eucalypt) and Category 3 (regrowth eucalypt) sawlogs found in the Forestry Regulations 1999.

The provision of 300,000 m^3 per year of high quality eucalypt sawlog/veneer log is also recognised in Clause 77 of the RFA, and the Intensive Forest Management (IFM) initiatives required to achieve this target. The TCFA includes adjustment of IFM initiatives. Forestry Tasmania's resultant management strategy is described in this report.

The focus of the report, as described above, is sustainable wood supply from native eucalypt forest and eucalypt plantations. Other aspects of Forestry Tasmania's sustainable forest management are beyond the scope of this report, but are reported annually in our Sustainable Forest Management Reports (eg, Forestry Tasmania 2007).

Forestry Tasr

resource BASE

Land and forest area

Forestry Tasmania manages a land base of 1.5 million hectares (Forestry Tasmania 2006). This figure represents about 22 percent of Tasmania's total land area (Figure 1).

Of the State forest area:

- Less than one half is designated for long-term wood production;
- one third is in Formal or Informal Reserves that form part of Tasmania's Comprehensive, Adequate and Representative (CAR) Reserve System; and
- one fifth is not intended for future harvesting.

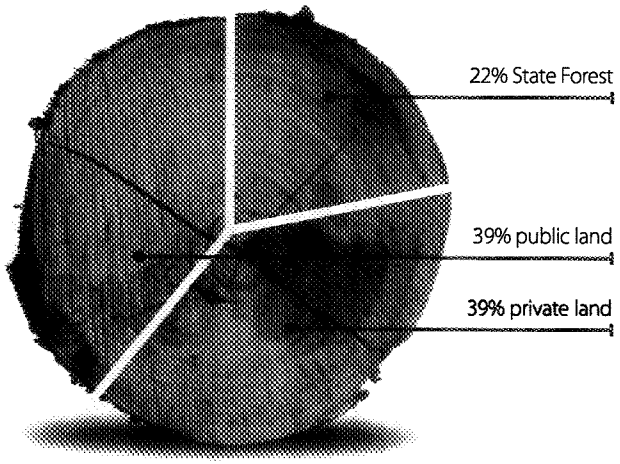


Figure 1: Status of Land in Tasmania
(Total area: 6,812,000 hectares)

State forests are categorised using a map-based zoning system known as the Management Decision Classification (MDC), to delineate forest to be managed for uses other than wood and production forest to be managed for wood production.

State forest reserved land includes:

- Formal Reserves that protect a unique or special feature of the forest; and
- Informal Reserves including wildlife habitat strips and other protection zones where wood production is specifically excluded by management zoning.

In addition to Formal and Informal Reserves, a significant area of State forest occurs outside current wood production areas. Examples include non-commercial forest or steep inaccessible forest not currently practical to harvest.

The protection and maintenance of a range of environmental values ensures that the dynamic nature of ecosystem functions and species and community diversity is managed at a whole-of-forest scale. Forestry Tasmania understands that not all values can be supplied from any one part of the estate at a particular time, and the management of these values must be balanced in time and space. Forestry Tasmania's management of environmental values includes its contribution to the Statewide CAR Reserve System, biodiversity values, threatened species, communities and habitats, geomorphology, soil and water values, oldgrowth, air quality and giant trees.

The basic operational unit for timber harvesting is a coupe. All forest available for wood production has been mapped into provisional coupes. The concepts of provisional coupes and MDC are discussed fully in "Calculating the sustainable yield of Tasmania's State forests" (Whiteley 1999).

A breakdown of the State forest land base is shown in Figure 2. The major change since the last review in 2002 is the increase in Formal and Informal Reserves, as a result of the TCFA, signed in May 2005. Consequently the area available for wood production has decreased to less than half of the State forest land base.

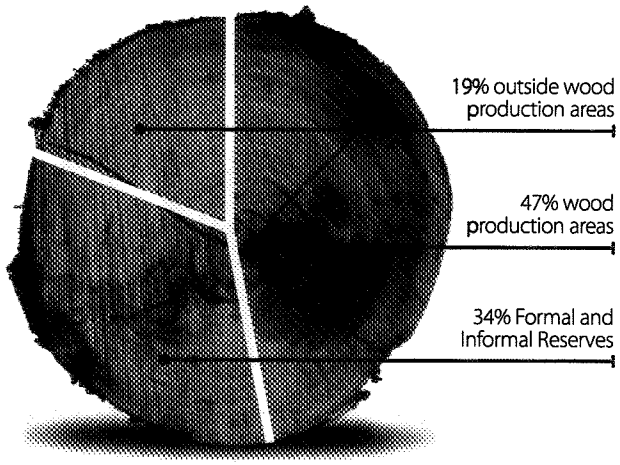


Figure 2: Land Use Classification of State Forest
(Total area: 1,500,000 hectares)

Forest management types

Wood production areas can be further subdivided into broad forest management types. These management types are shown in Figure 3. This distribution of management types is planned to remain relatively stable over the future planning horizon, with the possible exception of some limited replanting of softwood plantation to hardwood plantation, and very limited reversion of plantation to native forest following harvest. Broadscale conversion of native forest to plantations ceased in 2007.

Native eucalypt forest and hardwood plantations together form the basis of the area assessed in this review (ie, the eucalypt wood production area). This review area accounts for 87 percent of the wood production area (Figure 3) or just 40 percent of all State forest, and about 9 percent of Tasmania's total land area.

Native eucalypt forests are managed on rotations of sufficient length so that the dominant trees are of sawlog size. The nominal rotation length is 90 years but the actual rotations required will vary with site quality and market conditions.

The silviculture of the native eucalypt forest can be broadly split into partial harvesting and clearfelling systems. The majority of the area cut each year is by partial harvesting systems, which are applied to highland eucalypt forests and dry eucalypt forests, which generally have short open understoreys, and where a high level of disturbance is not required to promote regeneration. Partial harvesting systems are based on the retention of a proportion of the existing trees and include seed tree, shelterwood, potential sawlog and advance growth retention (Forestry Commission Tasmania 1994). The initial partial harvest and a number of the subsequent stages of partial harvesting will occur in the 90-year time horizon of the model.

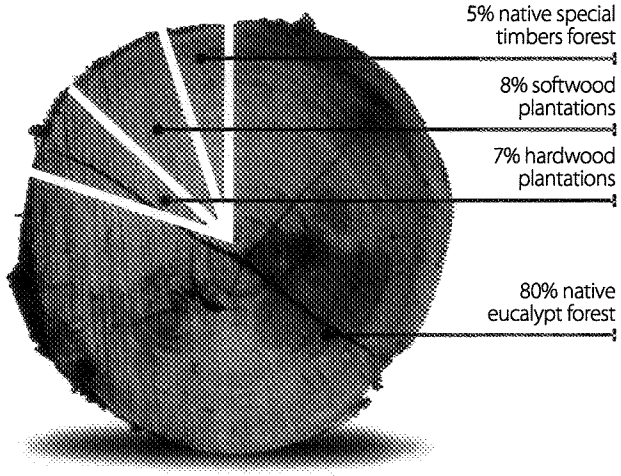
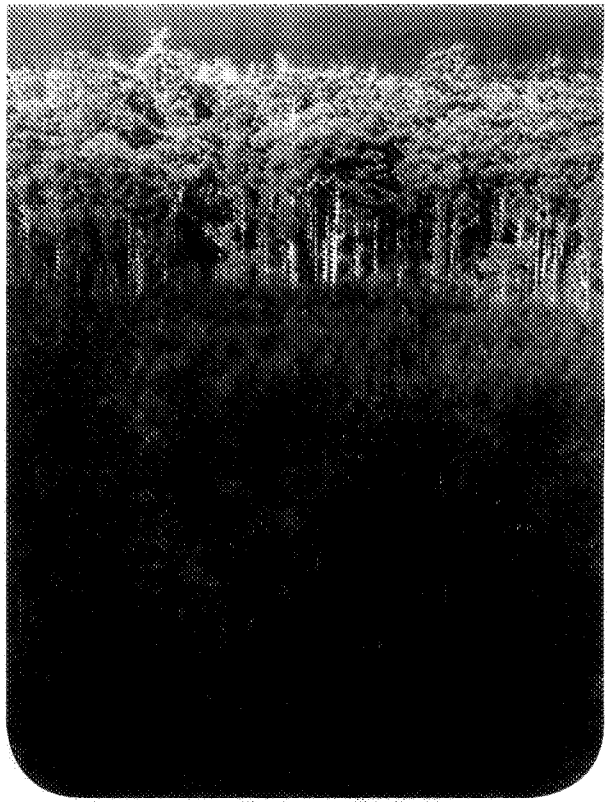


Figure 3: Management of Wood Production Areas within State Forest (Total area: 700,000 hectares)



Clearfelling, followed by burning and aerial sowing of eucalypt seed, is used for wet eucalypt forests, with tall dense understoreys, where a high level of disturbance is needed to promote the establishment of a new forest. A single harvest is usually undertaken although densely stocked stands of even-aged silvicultural regeneration can be thinned, typically at ages from 25 to 40 years, to concentrate stand growth on fewer stems so that the nominal rotation length can be reduced to about 65 years. Thinning also allows an interim commercial harvest of pulpwood and peeler logs that would otherwise be lost to natural mortality.

resource BASE

Since the TCFA, harvesting in tall oldgrowth forest is increasingly being undertaken using variable retention systems that retain oldgrowth forest elements in each coupe, so that the majority of the harvested area is within a tree's length of standing trees that are retained for at least the next rotation. **Variable retention (VR) silviculture seeks to better emulate the natural regeneration process of infrequent massive wildfires,** which nevertheless usually leave sufficient oldgrowth elements to allow late successional species to persist and regenerate.

An Intensive Forest Management (IFM) strategy seeks to produce more high quality eucalypt sawlogs from a land base that has been progressively reduced by transfers of land from production to reservation. IFM includes thinning of wet eucalypt regrowth forests, potential sawlog retention in highland eucalypt forests, and hardwood plantations based on solid wood production.

Plantations are being established under one of two regimes, using *Eucalyptus nitens* or *E. globulus*, either low pruned or high pruned. It is assumed that most of the area planted will be high pruned to produce Category 3 sawlogs. On the remaining area trees will be low pruned only. From all plantations a variety of logs, both pruned and unpruned, suitable for solid wood products, and pulpwood, will be produced.

More background on the native forest and plantation wood production strategies can be found in "Towards a new silviculture in Tasmania's public oldgrowth forests: final advice to the Tasmanain Government" (Forestry Tasmania 2005).

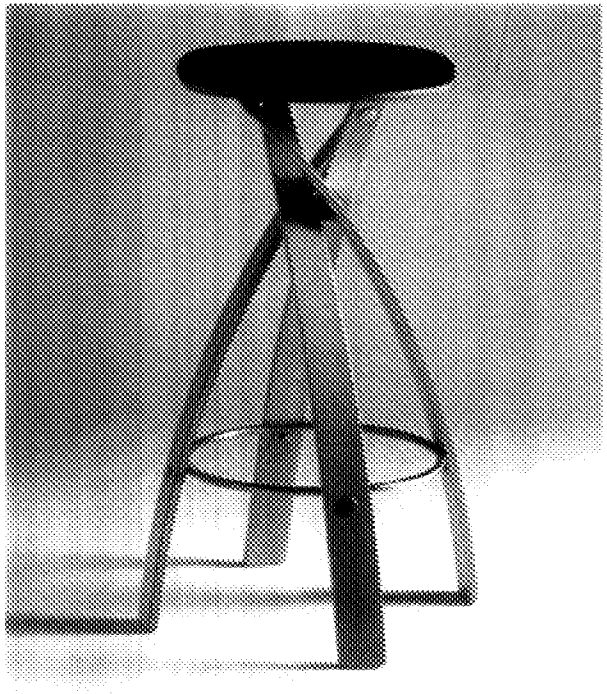
Forestry Tasmania has a half share in a joint venture which manages the majority of softwood plantations on State forests and also manages some softwood plantations in its own right. Obviously these plantations make no contribution to the supply of eucalypt sawlogs, and are not further considered in this report.

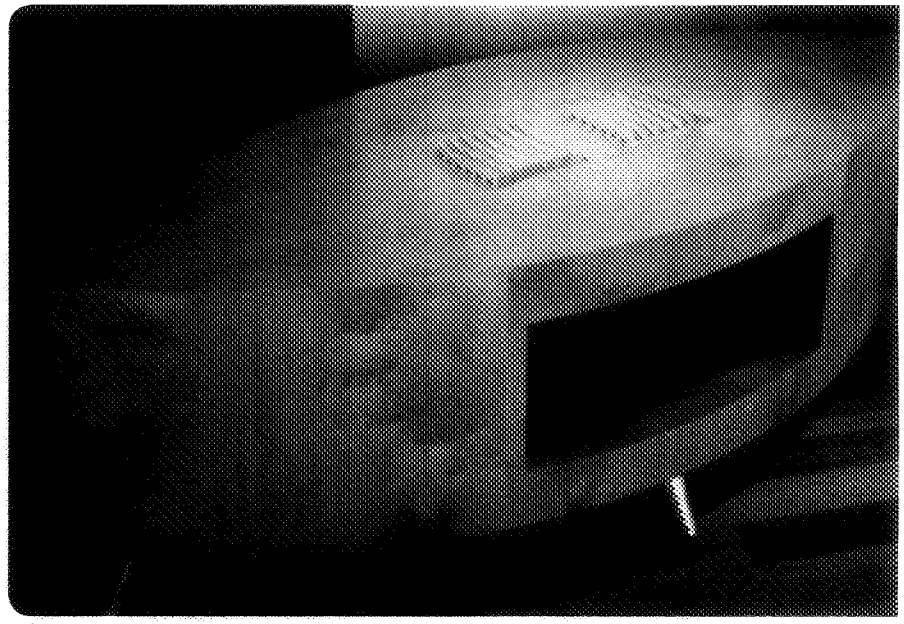
The 5 percent of State forests that are managed specifically for special timbers is primarily rainforest but includes some areas of wet eucalypt forest. However, the eucalypts in these areas are not included in the calculation of sustainable yield of eucalypt sawlogs. These areas, and special timbers production, are not further considered in this report.

Eucalypt forest growing stock and growth stage

The native eucalypt forest in wood production areas (Figure 3) has a current standing merchantable volume of wood (often referred to as the growing stock, a measure of forest capital) of 83.4 million m^3. Similarly, the eucalypt plantations in this review have a current growing stock of 2.3 million m^3.

The current growth stage of one million hectares of eucalypt forest (both in and outside wood production areas) is characterised in Figure 4. **Fifty-two percent of the eucalypt forest area within State forest is mature** (ie, the majority of trees are more than 110 years old). For further definitions of plantation, regrowth and mature forest used in this chart, see the Glossary on page 22.





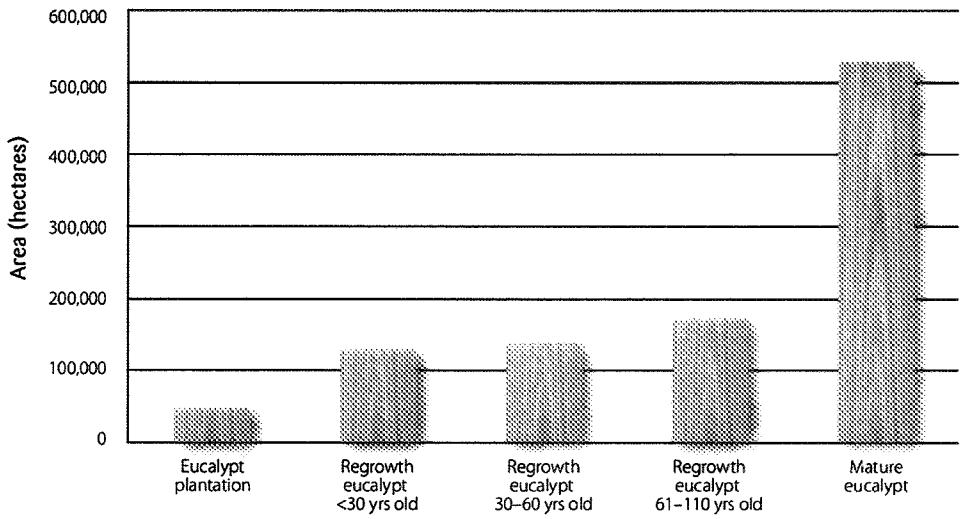
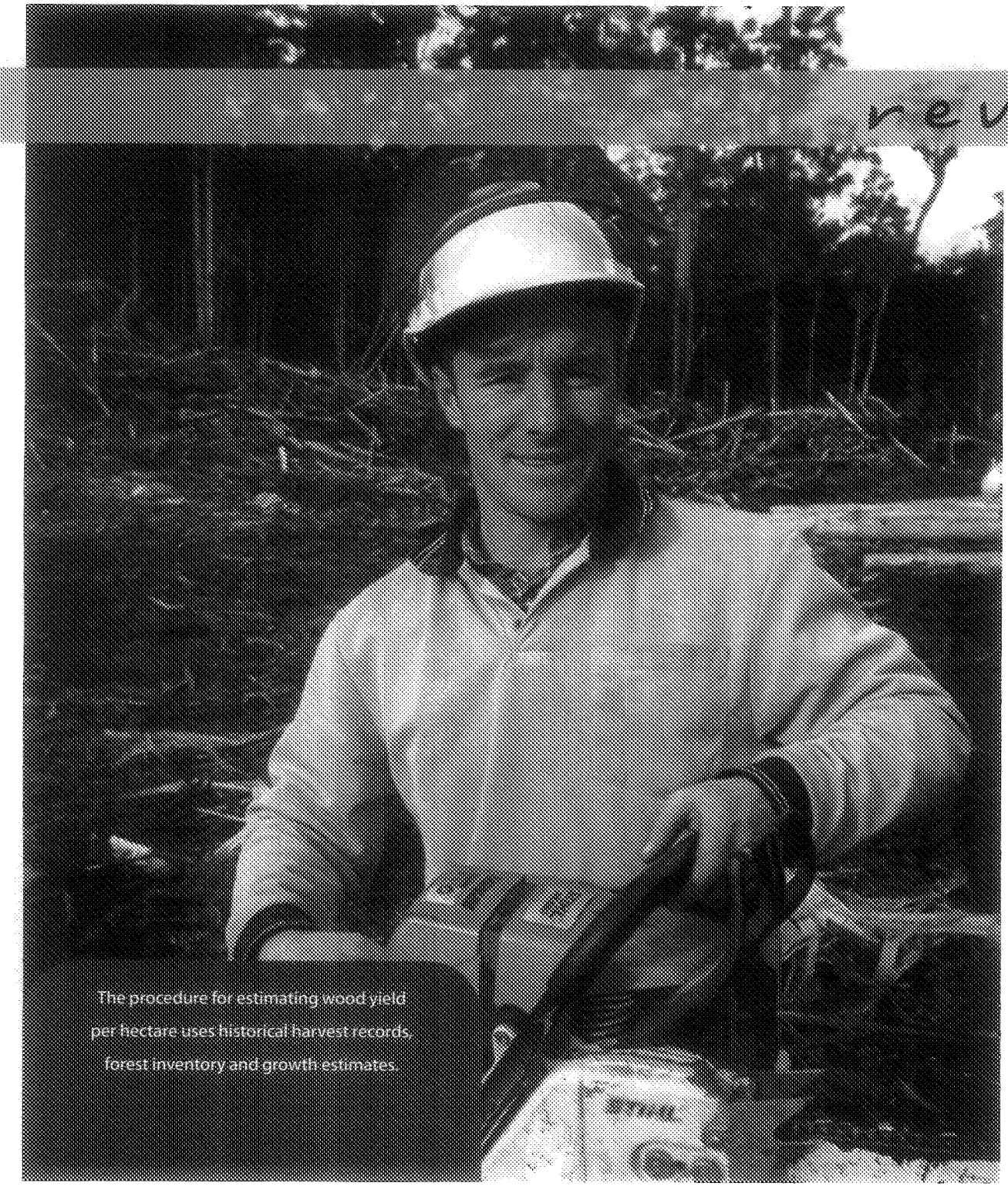


Figure 4: Eucalypt Forest Growth Stage within State Forest in 2006

Forestry Tas

review METHOD



The procedure for estimating wood yield per hectare uses historical harvest records, forest inventory and growth estimates.

The process of completing a resource review of sustainable yield is described in detail by Whiteley (1999). In addition, a presentation is available from Forestry Tasmania's monthly lunchtime talks series on calculating the sustainable wood supply from Tasmania's public forests, which also describes the process (McLarin 2006).

In short, the major components involved in resource estimation are the area of forest, yields of wood, operational factors, cutting strategies and growth information. The procedure for estimating wood yield per hectare uses historical harvest records, forest inventory and growth estimates. Growth and yield are applied to individual coupes and the results modelled, using specialised software (Remsoft Inc. 2006), over a 90-year period, to produce the annual flow of product yield predictions reported. In terms of the large and complex estate that Forestry Tasmania manages, this process typically takes over 12 months to complete.

The basic process described in Whiteley (1999) is used essentially unchanged in the current review. However, the evolution of the wood model since the last review, which is now based on updated and improved area estimates and forest measurements, has continued to allow trends and issues to be understood at a greater level of detail than in previous reviews.

The review process has been independently audited.
The auditor's statement is contained in Appendix 1 on page 23.

management STRATEGY

Regional Forest Agreement

Forestry Tasmania's current management strategy has evolved from the Tasmanian Forest and Forest Industry Strategy (TFFIS) of 1990 (Forests and Forest Industry Council of Tasmania 1990), the RFA of 1997 and the TCFA of 2005. This evolution has been in an environment where recognition of the needs for conservation and sound forest practices have resulted in significant areas of forest being withdrawn from wood production and included in conservation reserves. At the same time wood production operations on the remaining land base have become increasingly regulated, further constraining wood production flexibility.

In 1982 about 13 percent of the State was reserved. By 1990, after the TFFIS and other land use policy decisions, this area increased to 21 percent. At this time 1 percent of State forest was formally protected in Forest Reserves. Post RFA, some 40 percent of the State was in Formal and Informal Reserves. **The TCFA of 2005 increased reservation further to 42 percent of the State. This level of reservation has had a substantial impact on the available wood production capacity from State forests, as much of the increased reserve area has been from the State forest estate. Now, 34 percent of State forest is in Formal or Informal Reserves.**

Consequently, the inventory, or standing volume, of wood available has been progressively reduced. The Federal Government response to the recommendations of the Lemonthyme and Southern Forests Commission of Inquiry resulted in a 10 percent reduction per year of sustainable sawlog production (Forestry Commission Tasmania 1989). The TFFIS then made an additional 9 percent unavailable, and the RFA resulted in the further notional loss of approximately 7 percent of the sustainable sawlog production capacity of the remaining State forests in the absence of new management strategies (Forestry Tasmania 1998).

The reduction in standing volume limits the options for meeting wood yield requirements, and maintenance at pre-existing levels

requires the growth of wood resources at a rate higher than relatively unmanaged forest will produce. Maintenance of supply levels thus requires more intensive management to improve forest growth and productivity. This can be achieved through thinning native eucalypt forest and establishing and tending plantations, on parts of the remaining productive State forest land base.

In the TFFIS and RFA wood reviews, assumptions on more intensive management have been incorporated to improve productivity and maintain long-term wood production to support the Tasmanian forest industries. The TFFIS included thinning options, and the RFA provided for a plantation program, as well as additional regrowth thinning, to augment future production.

Forestry Tas

management STRATEGY

Forestry Growth Plan

The Forestry Growth Plan of 1998 defined a forward wood production vision from the RFA. The objectives of this Plan were to:

- **ensure the supply of 300,000 m³ per year of high quality eucalypt sawlogs in perpetuity;**
- **develop a world-scale, internationally competitive plantation resource; and**
- **develop new value-adding markets for Tasmanian wood products.**

The 1998 post-RFA review (Forestry Tasmania 1998) recognised that the creation of a eucalypt plantation estate was necessary to maintain high quality sawlog supply. It also discussed the long-term difficulties that would arise if the estate was sub-optimal in area, as it would be if it was planted solely to satisfy the high quality sawlog requirement, without consideration of the practical requirements for managing new plantation products. The principal difficulties arising from a sub-optimal estate would be the significant challenge to developing the appropriate processing technologies and marketing strategies to ensure competitive local processing of the new products that will be available.

Forestry Tasmania has energetically pursued a strategy of more intensive forest management since the RFA to build a world-scale wood production estate. Since 1998 about 30,000 hectares of hardwood plantation have been established, and about 6,000 hectares of native eucalypt forest have been thinned, on State forests. In parallel, there has been a surge in investment in eucalypt plantations by private companies. These achievements are detailed in the Sustainability Indicators for Tasmanian Forests 2001–2006 report (Tasmanian and Australian Governments 2007).

Private plantation owners are not obligated to produce high quality sawlog, and much early planting has been specifically focused on the production of short-rotation pulpwood. However, other products from private plantations can contribute to emerging industries including rotary peeled veneer mills and specialised sawmills focused on small diameter plantation logs, and it is anticipated that significant volumes will in time become available for local processing from these private plantations.

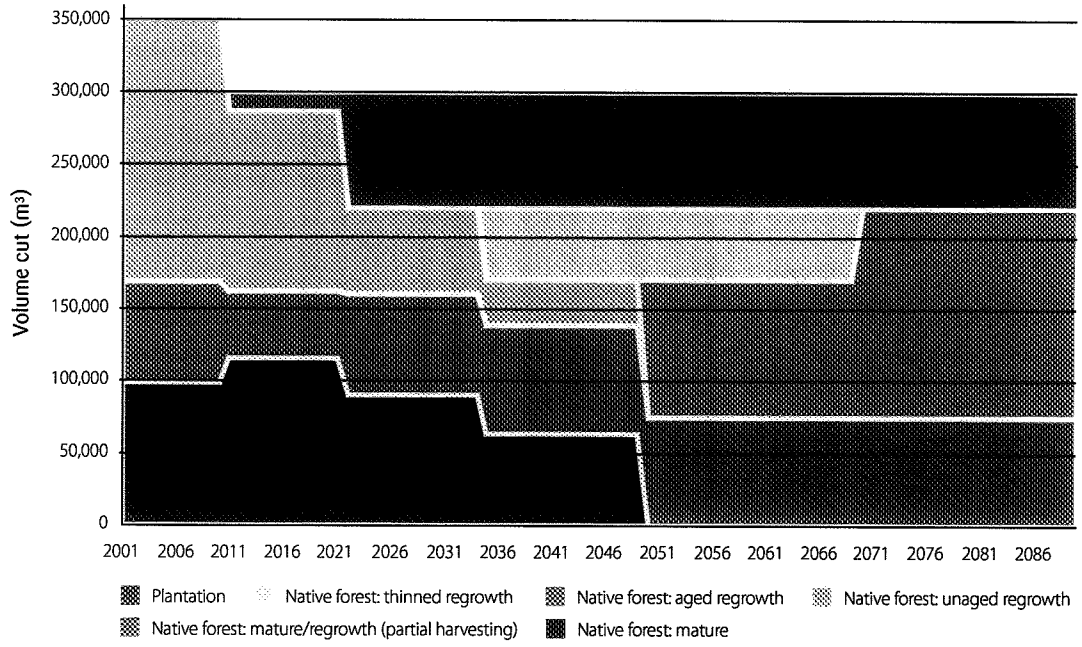


Figure 5: 2002 Review of High Quality Eucalypt Sawlog Sustainable Yield from State Forest (Forestry Tasmania 2002)

Thus the requirement for Forestry Tasmania to build an estate solely through its own resources was reduced and, within this framework, Forestry Tasmania reviewed its short- to medium-term IFM targets.

The actual areas of IFM achieved from 2001–02 to 2005–06 were:

- an average of 4,000 hectares per year of new eucalypt plantations, primarily by conversion of native forests; and
- an average of 500 hectares per year of native eucalypt forest thinning (including commercial thinning, potential sawlog retention and pre-commercial thinning).

The 2002 five-yearly RFA review (Forestry Tasmania 2002) provides a starting point for this review. The view in 2002 of high quality eucalypt sawlog sustainable yield is provided in Figure 5. Regrowth native forest is described as unaged when it has regenerated after wildfire or other disturbances, and when there is no deliberate site preparation or seed sowing. Alternatively, aged regrowth native forest has been logged and regenerated, generally since 1960, using deliberate site preparation and seeding techniques. Mixed-age native forest (both mature and regrowth) results from partial harvesting, whereby some trees are retained. For further definitions of terms used in the legend for Figure 5 see the Glossary on page 22. The actual harvest of high quality eucalypt sawlogs for the five years to 2006 has averaged 334,000 m^3 per year.

Tasmanian Community Forest Agreement

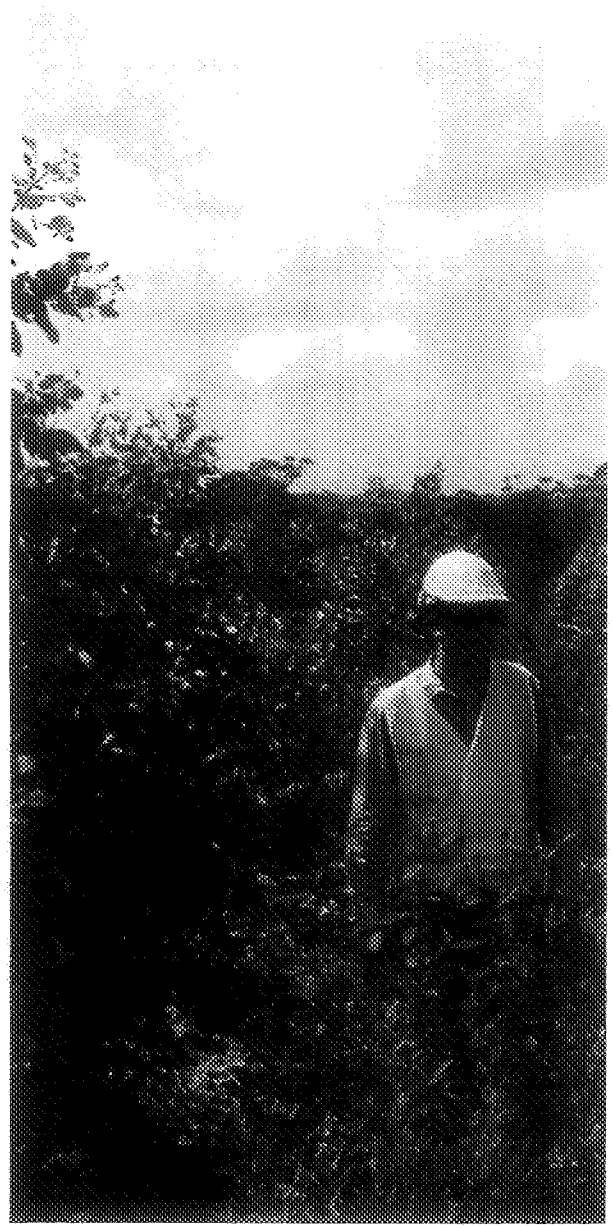
Since the 2002 review there have been further changes to the environment in which Forestry Tasmania operates. In September 2003 the Tasmanian State Government formally asked Forestry Tasmania to provide advice on the phase-out of clearfelling within oldgrowth forest on public land by 2010 (Forestry Tasmania 2005).

Concurrently with the finalisation of this advice, discussions between the Tasmanian and Australian Governments were concluded in respect of the latter's Tasmanian Forest Policy. The agreed outcome (the Integrated Forest Strategy) represented **a strategy of enhanced protection of oldgrowth forest, a reduced reliance on clearfell silviculture within oldgrowth forest retained for timber production, and an investment strategy designed to mitigate social and economic impacts and maintain long-term sustainable yields from public forests and regional forest-sector jobs.**

The Integrated Forest Strategy was formalised as part of TCFA, signed in May 2005 by the Tasmanian and Australian Governments.

Practically, the Integrated Forest Strategy involved further reservation of oldgrowth forest, the use of variable retention harvest silviculture, and the establishment of a further 16,000 hectares of plantation before 2010 to ensure a long-term sustainable yield of high quality eucalypt sawlogs.

Forestry Tasr



The TCFA also resulted in an upgraded Permanent Native Forest Estate Policy which **capped conversion of native forest on public and private land so that at least 95 percent of the 1996 area of native forest would be retained.** Under this new policy broadscale clearing and conversion of native forest on public land would be phased out by 2010. Forestry Tasmania anticipated it would be able to meet all its obligations in maintenance of the permanent forest estate, yet have sufficient land available for IFM to meet its wood production goals.

In conjunction with the 2002 five-yearly RFA review (Forestry Tasmania 2002) mentioned previously, the Final Advice to the Tasmanian Government, entitled "Towards a New Silviculture in Tasmania's Public Oldgrowth Forests" (Forestry Tasmania 2005), provides another point of comparison for this review.

This 2005 document changed the focus of presentation of eucalypt wood supply information to respond to community interest in oldgrowth forests and the Government's request for advice on alternative harvest silviculture in these forests.

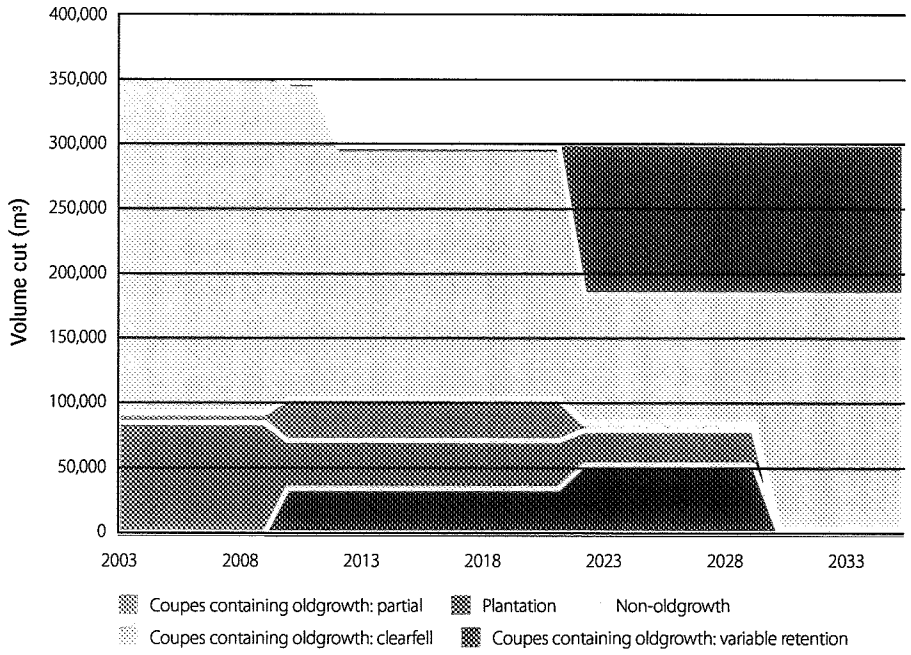


Figure 6: Eucalypt Timber Supply: High Quality Sawlog under the Integrated Forest Strategy (Forestry Tasmania 2005)

Oldgrowth does not occur in one large block on State forest but rather in a mosaic of communities of varying area resulting from past disturbance patterns. Oldgrowth within coupes for wood production can range from a few hectares to the entire coupe. As planning and operations are necessarily managed at the coupe level, further definition of oldgrowth in this context was required.

Because it is not feasible to isolate oldgrowth forest in most oldgrowth coupes for wood production, 'coupes containing oldgrowth' were defined based on a minimum (25 percent) proportion of oldgrowth (Forestry Tasmania 2005). These coupes may include a range of age classes, including regrowth, mature forest and oldgrowth forest. Sensitivity analysis has shown that there is little difference in the area of oldgrowth captured across the range, from a minimum of 15 percent up to 25 percent oldgrowth forest by area constituting a 'coupe containing oldgrowth', but the area of non-oldgrowth captured varies significantly (Forestry Tasmania 2004).

The 2005 view of high quality eucalypt sawlog sustainable yield, provided in Figure 6, uses this new 'coupes containing oldgrowth' approach. While the models have been run over a 90-year planning horizon, results were presented for the period to 2035, when the most significant effects are apparent.

Changes from the 2002 review to the Integrated Forest Strategy include:

- the use of variable retention harvest and other partial harvest methods so that 80% of the annual oldgrowth harvest area would be by non-clearfell methods by 2010; and
- an increased reliance on sawlogs from plantations from about 2020 onwards.

Most recently, **in June 2007, Forestry Tasmania announced that no more broadscale conversion of native forest to plantation would occur on State forests, some three years before the 2010 deadline in the TCFA.**

Forestry Tasmania's resulting ongoing strategy to ensure a sustainable supply of high quality eucalypt sawlogs now involves:

- continued harvest and regeneration of native eucalypt forest;
- thinning an increased proportion of native eucalypt forest to promote growth of remaining trees to produce sawlogs in the future; and
- the increased productivity of existing plantations on State forest following harvest of first rotations, most of which will be pruned to produce sawlogs in the future.

yield PRODUCTION

A look at past annual eucalypt wood production provides some context for the next section's future yield predictions.

Over the last ten years annual high quality eucalypt sawlog production has averaged about 300,000 m³ per year. This volume has all come from native eucalypt forest. The associated pulpwood and related products (eg, low quality sawlogs and peeler logs) are 'arisings' from the high quality sawlog harvest, and have averaged about 2,500,000 green metric tonnes per year.

In addition, pulpwood from eucalypt plantations has been produced since 2000, averaging more than 100,000 green metric tonnes per year over the last four years.

Total eucalypt wood production over the last ten years is shown in Figures 7 (high quality sawlogs from native forest) and 8 (pulpwood and related products from native forest and plantations).

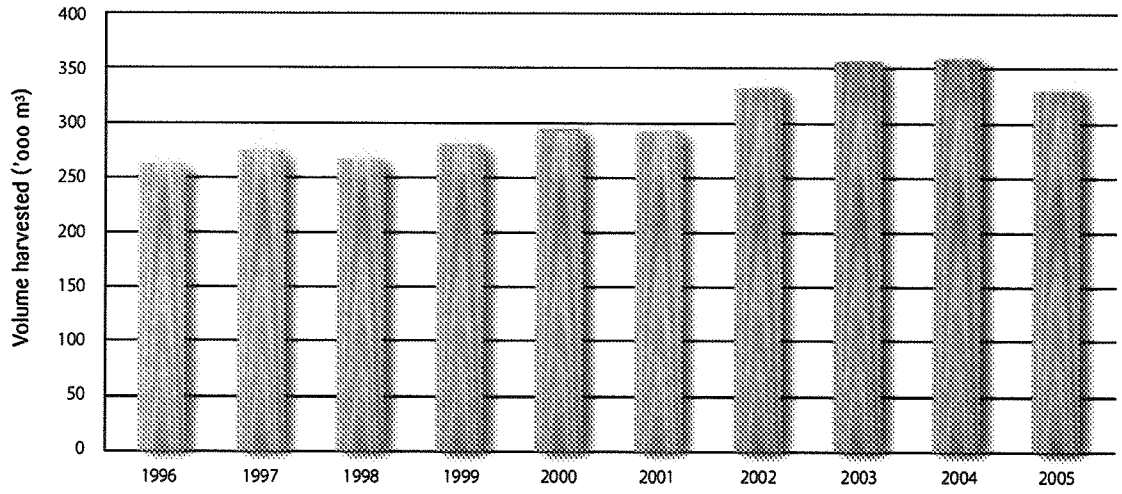


Figure 7: High Quality Eucalypt Sawlog Production from State Forest 1996–2005 (year starting 1 July)

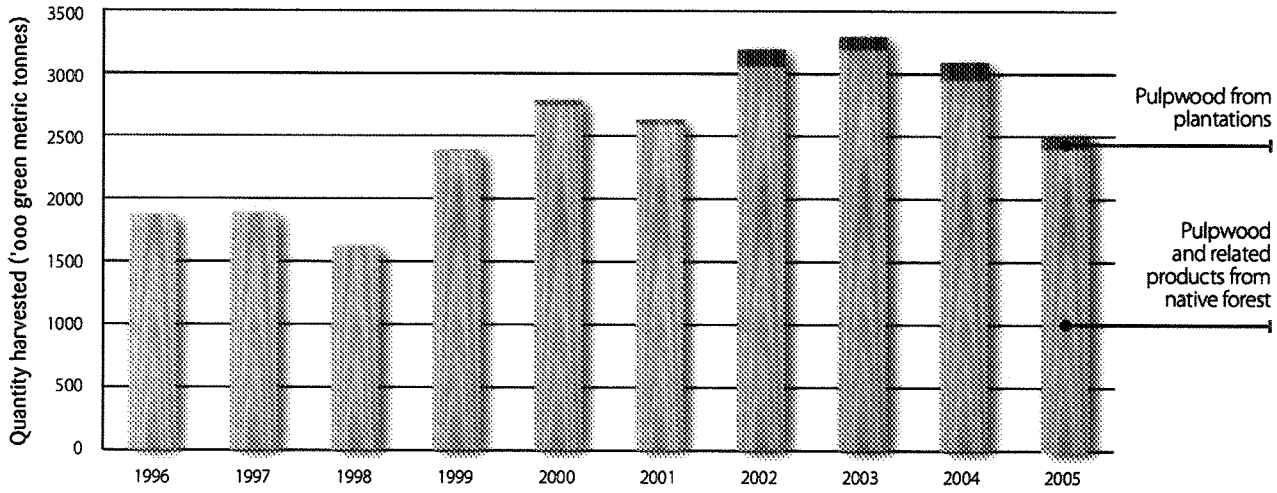


Figure 8: Eucalypt Pulpwood Production from State Forest 1996–2005 (year starting 1 July)

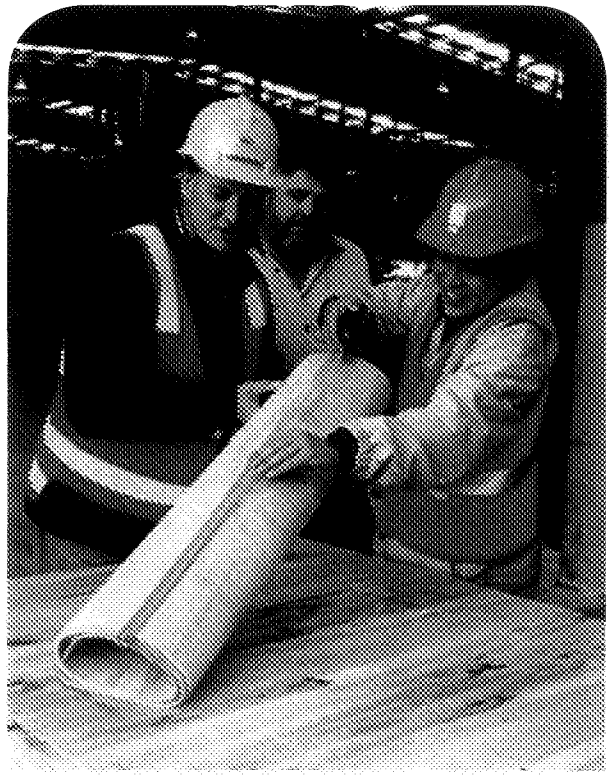
yield PREDICTIONS

The revised yield predictions presented below are for up to 90 years from 1 July 2006. The 90-year yield predictions represent at least one rotation of native eucalypt forest harvest, regeneration and growth, and about three rotations of plantations.

As was the case for the first time in the 2002 review, all areas of Forestry Tasmania's native and plantation eucalypt forest managed for wood production have been combined in a single model for this review. The model includes some 9,600 coupes. The result is a large and complex model that enables a thorough investigation of sustainable yield to be accomplished.

High quality eucalypt sawlog sustainable yield

The ongoing strategy confirms a sustainable yield of high quality eucalypt sawlogs is available, at or above 300,000 m^3 per year (Figures 9 and 10).



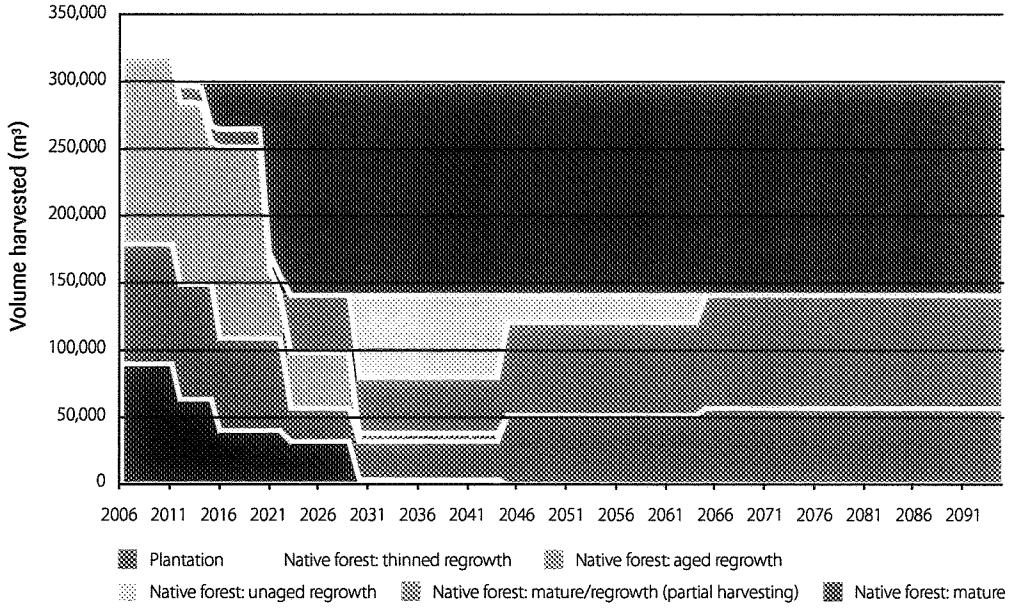


Figure 9: 2007 90-year View of High Quality Eucalypt Sawlog Sustainable Yield from State Forest (by forest type) (year starting 1 July)

yield PREDICTIONS

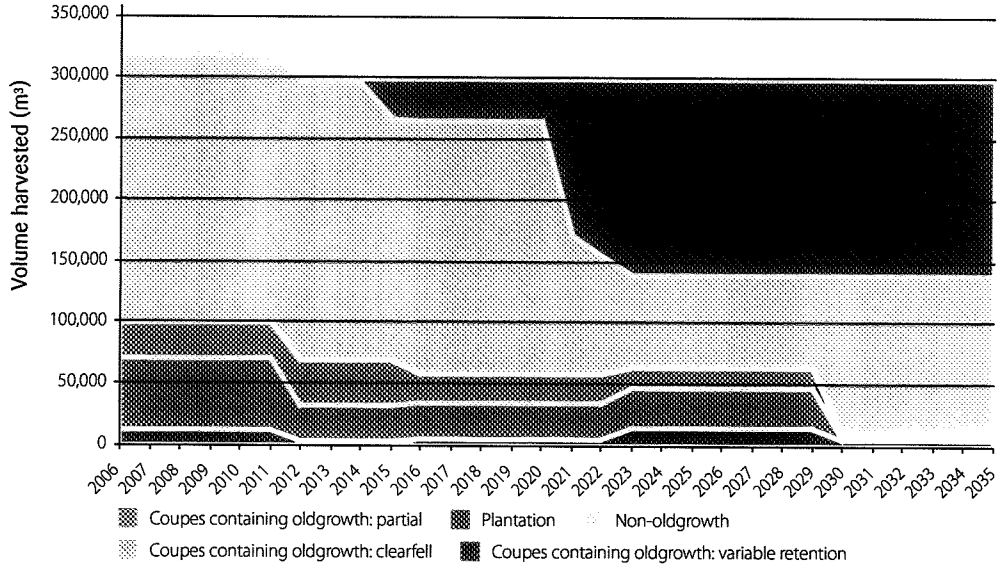


Figure 10: 2007 30-year View of High Quality Eucalypt Sawlog Sustainable Yield from State Forest (by oldgrowth/non-oldgrowth/plantation) (year starting 1 July)

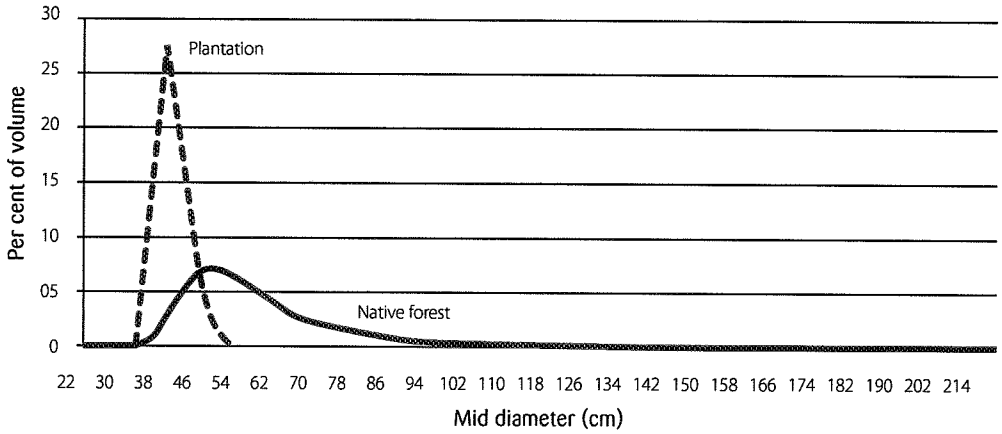


Figure 11: Sawlog Diameter Distribution

The main features of this strategy are:

- An initial level of sawlog cut (320,000 m^3 per year) for the first six years, which slightly exceeds the longer-term requirement of 300,000 m^3 per year. This initial level of cut meets current contractual wood supply agreements.
- **Plantations contribute significantly to sawlog production from about 2020 onwards.**
- Thinned native eucalypt forest contributes significantly to sawlog production in the medium term.
- In the first half of the 90-year timeframe wood harvested from partial harvesting operations will largely be characterised as mature. In the second half of the timeframe, subsequent stages of partial harvesting will result in regrowth wood.
- Sawlogs from mature forest are a critical component in maintaining the yield level in the short to medium term.

Comparisons with the previous review show:

- the different nature of the timing and yield from plantations and aged regrowth: some of the aged regrowth harvest has been brought forward, and plantations account for about half of the supply from about 2020 onwards;
- less yield from mature forest in total, due to increased reservation, particularly of oldgrowth forest. However, this portion is vital for sustaining the supply of high quality eucalypt sawlogs in the short to medium term.

The transition from mature and unaged regrowth native eucalypt forest to aged regrowth native eucalypt forest and eucalypt plantations will change the nature of the sawlog supply. In the move from native forest to plantation, the average sawlog size diameter will decrease. A comparison of the distribution of sawlog diameter between native forest and plantations is shown in Figure 11. In the short to medium term sawlog supply will continue from mature and unaged regrowth native eucalypt forest.

Plantation solid wood yield (additional to high quality sawlogs)

In addition to meeting the high quality sawlog production requirements, additional solid wood products will be produced from eucalypt plantations and be available for new wood processing industries (Figure 12).

While not meeting the size specification for Category 3 sawlogs, this solid wood plantation material is suitable for rotary peeling into various quality veneers, for gluing and reconstitution as solid wood products (including laminated veneer lumber – LVL). It can also be used in specialised sawmills developed to process small-diameter plantation logs. The bulk of this material will be unpruned, but it is intended to produce a short pruned portion which falls below the current length and diameter specifications for Category 3 sawlogs. This low pruned log will provide high quality material suitable for face veneer.

In comparison with the previous review the overall projected volume of solid wood (other than high quality sawlogs) is less. Increased activity by private growers, and revised IFM targets within Forestry Tasmania, have resulted in a lower projected level of plantation establishment by Forestry Tasmania.

The increased activity by private forest growers means that any apparent reduction in the supply of this material from public forests is capable of being balanced from the private plantation resource.

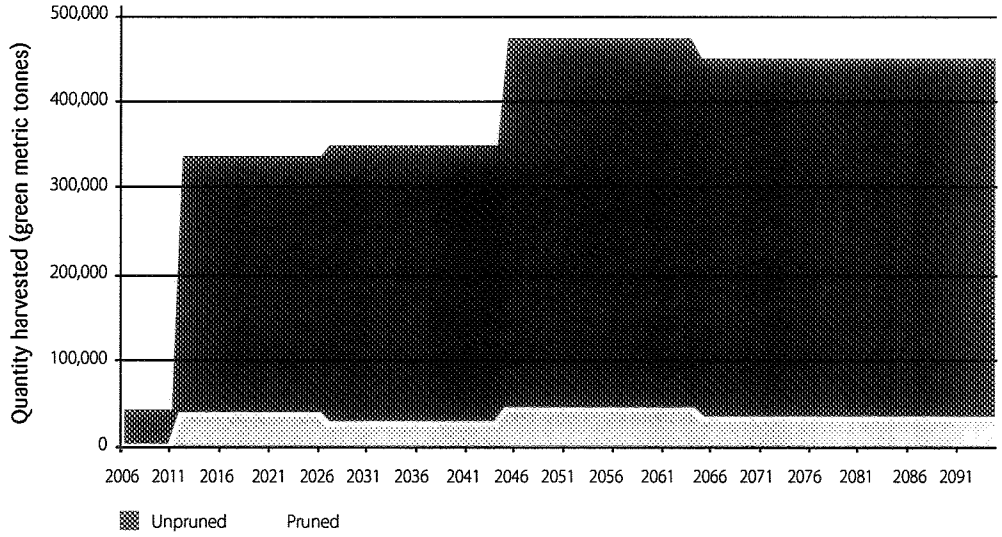


Figure 12: 2007 90-year View of Eucalypt Plantation Solid Wood Yield from State Forest (year starting 1 July)

yield PREDICTIONS

Pulpwood yield

Arising from the strategy is also a flow of pulpwood (Figures 13 and 14). Included in the native forest pulpwood are related products like low quality sawlogs and regrowth peeler logs. Pulpwood arises as a secondary or residual product from the sawlog and solid wood strategies; however, these flows are managed to provide stable supply to industry. These graphs include the plantation solid wood yield from Figure 12.

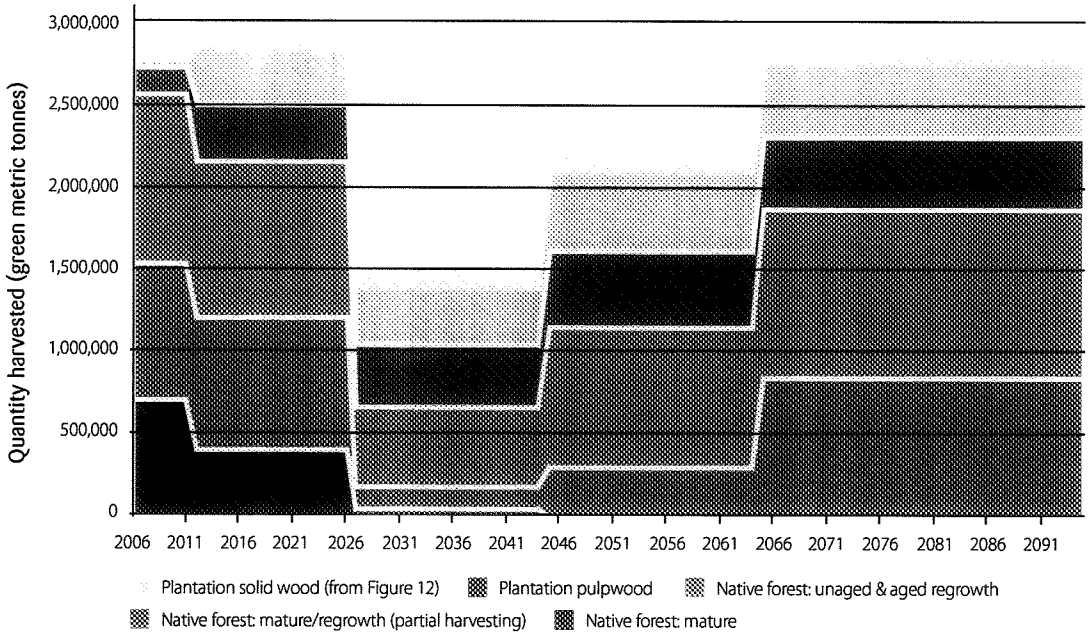


Figure 13: 2007 90-year View of Pulpwood Arising Yield from State Forest (by forest type) (year starting 1 July)

The main features of this yield are:

- As the type of forest being harvested changes, so too does the type and quantity of pulpwood arising.
- **In the short term, stable pulpwood supply is maintained for the first 20 years.**
- In the medium term, pulpwood levels reduce during the transition from mature and unaged regrowth native eucalypt forest, to aged regrowth and subsequent partial harvesting of native eucalypt forest, which yield much lower ratios of pulpwood. This is also the time when previously thinned native eucalypt forest is harvested, yielding a much lower ratio of pulpwood to the high quality sawlog produced.
- **From 2027 a significant proportion of wood production comes from plantation,** which includes solid wood products as well as pulpwood. In addition a significant volume of residue will be available from the processing of sawlogs and other solid wood products from plantations.
- There is opportunity to further balance pulpwood supply statewide, should this be desirable, by accessing yields from private plantations.

Maintaining future eucalypt forest growing stock and growth stage

The condition of the State forest estate at the end of the 90-year time horizon is an important indicator of the overall sustainability of the modelled strategy. This strategy for the review has required management activity across parts of the forest estate, harvesting and regenerating various types of forest.

The model indicates that at the end of 2095 the growing stock of wood in native eucalypt forest available for wood production is 86.3 million m^3, and in eucalypt plantations it is 6.3 million m^3. These compare with growing stock figures in 2006 of 83.4 million m^3 and 2.3 million m^3 respectively. **This indicates that the strategy over the 90-year period harvests less than the growth of the forest, hence increasing the forest capital (ie, the growing stock is greater in 2095 than at the start in 2006). Thus the productive capacity of the forest is sustained, maintaining future management options, which include continued wood production at current levels.**

The growth stage of one million hectares of eucalypt forest in 2095 is characterised in Figure 15. Compared with 2006 (page 7), the percentage of the eucalypt forest area within State forest that is mature has decreased by just 3 percent to 49 percent. The proportion of the youngest regrowth has increased, and the older regrowth has reduced. These changes are to be expected in a dynamic, complex system, including both growth and harvest.

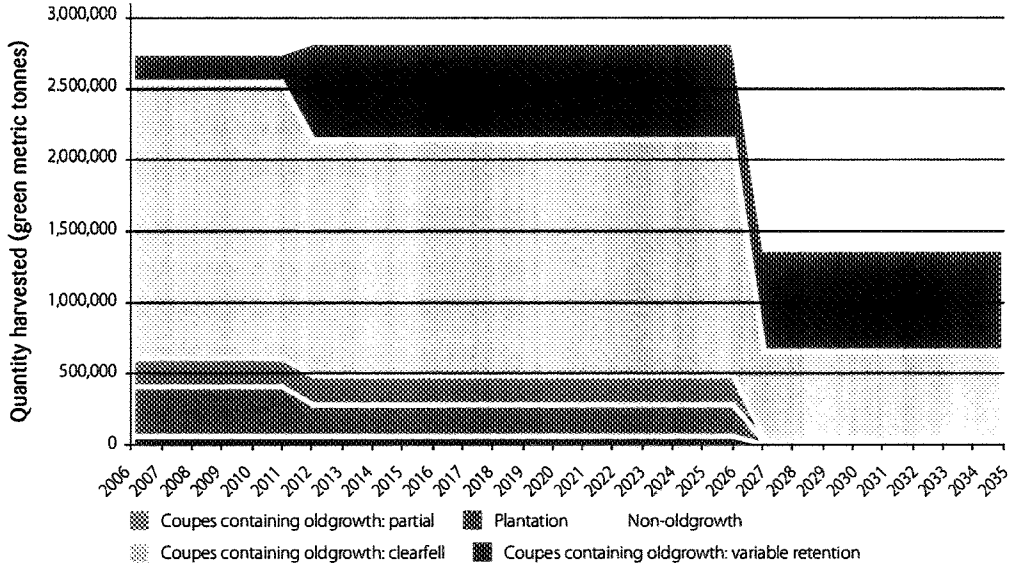


Figure 14: 2007 30-year View of Pulpwood Arising Yield from State Forest (by oldgrowth/non-oldgrowth/plantation) (year starting 1 July)

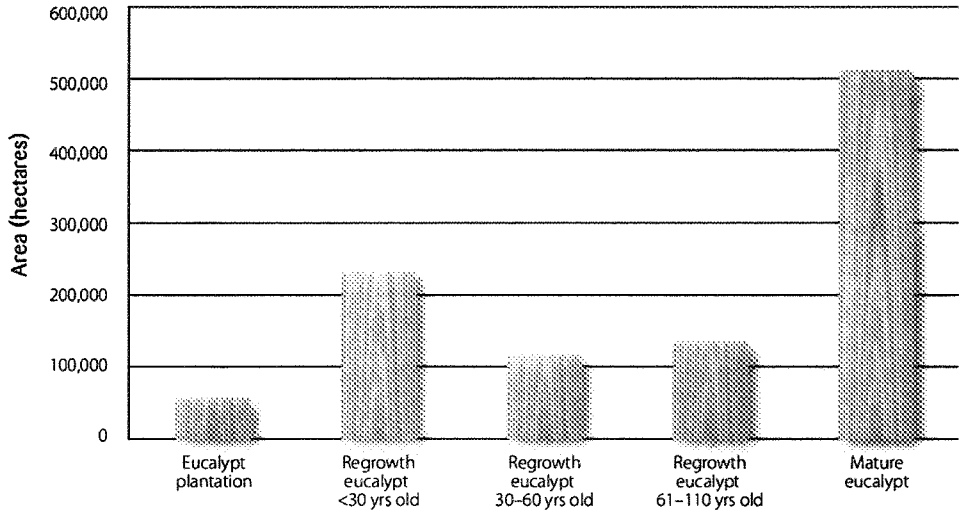


Figure 15: Eucalypt Forest Growth Stage within State Forest in 2095

Conclusion

This five-yearly wood review builds on previous work, and **reconfirms Forestry Tasmania's ability to deliver at least 300,000 m³ per year of high quality eucalypt sawlogs for the next 90 years.**

Forestry Tasmania's strategy is to continue intensive forest management, by thinning native eucalypt forest and pruning eucalypt plantations on about 5 percent of the State forest estate, to enable sawlog requirements to be met and to enable new value-adding solid wood industries to develop. Pulpwood production will continue to be available to support existing and new industries, in conjunction with complementary supplies from private lands.

The intensively managed forests will supply a significant proportion of the required yield in the longer term. In the short to medium term the major emphasis for wood production will be on existing mature and regrowth native eucalypt forests, as these IFM investments in thinning and eucalypt plantations are maturing.

REFERENCES

Commonwealth of Australia (1992). The National Forest Policy Statement. AGPS, Canberra.

Forestry Commission Tasmania (1989). Annual Report 1988/89. Forestry Commission, Hobart.

Forestry Commission Tasmania (1994). Silvicultural Systems. Native Forest Silviculture Technical Bulletin No. 5. Forestry Commission, Hobart.

Forestry Tasmania (1998). Post-RFA review of sustainable high quality Eucalypt sawlog supply from Tasmanian State forest. Planning Branch, Forestry Tasmania, Hobart.

Forestry Tasmania (2002). Sustainable high quality eucalypt sawlog supply from Tasmanian State forest – Review No 2. Planning Branch, Forestry Tasmania, Hobart. <http://www.forestrytas.com.au/forestrytas/pdf_files/hq_euc_sawlog_supply_review2.pdf>

Forestry Tasmania (2004). Sustaining the volume and quality of wood yields from State forests. Paper 2 in the series *Towards a New Silviculture in Tasmania's Public Oldgrowth Forests*. Forestry Tasmania, Hobart. <http://www.forestrytas.com.au/forestrytas/pdf_files/clearfell_oldgrowth_reports/report_2_web.pdf >

Forestry Tasmania (2005). Towards a new silviculture in Tasmania's public oldgrowth forests: Final Advice to the Tasmanian Government. Forestry Tasmania, Hobart. <http://www.forestrytas.com.au/forestrytas/pdf_files/2010_final_advice_april_05.pdf >

Forestry Tasmania (2006). Annual Report 2006. Forestry Tasmania, Hobart. <http://www.forestrytas.com.au/forestrytas/pdf_files/ft_annual_report_2006_web_part_1.pdf>

Forestry Tasmania (2007). Sustainable forest management report 2005-2006. Forestry Tasmania, Hobart. <http://www.forestrytas.com.au/forestrytas/pages/sustainable_fm_contents.htm>

Forests and Forest Industry Council of Tasmania (1990). Secure Futures for Forests and People. Recommendations for Tasmania's Forests and Forest Industry Strategy.

McLarin, M. L. (2006). Calculating the sustainable wood supply from Tasmania's public forests. Forestry Tasmania Monthly Lunchtime Talk No. 20. 25 January 2006. <http://www.forestrytas.com.au/forestrytas/pdf_files/forestry_talk_mlm.pdf>

Remsoft Inc. (2006). WOODSTOCK User Guide. Remsoft Inc., Fredericton, New Brunswick, Canada.

Tasmanian and Australian Governments (2007). Sustainability Indicators Report 2001-2006. Prepared by the Tasmanian and Commonwealth Governments for the 2007 Review of the Tasmanian Regional Forest Agreement. Forest Practices Authority. <http://www.dpac.tas.gov.au/divisions/policy/rfa/documents/2007%20INDICATORS%20REPORT_FINAL%2024%20May%202007.pdf>

Whiteley, S. B. (1999). Calculating the sustainable yield of Tasmania's State forests. Tasforests V11: 23 – 31. <http://www.forestrytas.com.au/forestrytas/tasfor/tasforests_11/tasforests11_part_2.pdf>

GLOSSARY

Arisings - Wood products produced additional to targeted products when harvesting an area (eg, target sawlogs, pulpwood as arisings).

Coupe - For harvesting, the forest is subdivided into discrete areas called coupes.

High quality sawlogs - First-grade eucalypt sawlogs as specified in the Forestry Regulations 1999, Schedule 1, Part 2. These logs are referred to as Category 1 sawlogs when derived from mature forests and Category 3 logs when derived from regrowth forests or plantations.

Intensive forest management (IFM) - Silvicultural management beyond the minimum required to ensure regeneration. Usually refers to thinning native forest, or establishing and managing plantations.

Laminated veneer lumber (LVL) - Reconstituted solid wood product created by gluing peeled or sliced wood veneer together.

Mature forest - Forest containing a majority of trees more than 110 years old.

Native eucalypt forest - Forests consisting of eucalypt tree species that are native to Tasmania, other than plantations. Native eucalypt forests include mature and regrowth forest.

Oldgrowth forest - Ecologically mature forest where the effects of disturbances are now negligible.

Partial harvesting - Harvesting systems that retain some trees; eg, advance growth, seed tree, shelterwood and group and single tree selection.

Peeler logs - Logs suitable for peeling on a lathe to produce veneer for a range of solid wood products.

Plantations - Forests established by planting seedlings rather than sowing seed. Plantation areas usually have intensive site preparation prior to planting. They are managed intensively for future timber harvesting.

Potential sawlog retention - A silvicultural treatment applied to multi-aged forest (typically highland or dry eucalypt forest) which releases potential sawlogs from competition and initiates a new crop of seedlings.

Pulpwood - Logs below sawlog quality but suitable for manufacturing pulp, paper and panel products.

(Aged) Regrowth forest - Forest that has been logged and regenerated, generally since 1960, using deliberate site preparation and seeding techniques. The year of sowing is documented and the age of the trees may be determined. Also referred to as silvicultural regeneration.

(Unaged) Regrowth forest - Forest regenerated after wildfire or other disturbances, and containing a majority of trees less than 110 years old, where there is no deliberate site preparation or seed sowing. Unaged regrowth forest may contain scattered individuals or stands of ecologically mature trees.

Sawlogs - Logs for processing into sawn timber.

Solid wood - Wood (excluding high quality sawlog), principally from regrowth forest and plantations, that is suitable for lower grade sawn boards or for producing a range of products in sheet or beam form based on peeling and gluing technology.

Sustainable yield - The level of commercial timber (or product mix) that can be maintained under a given management regime, without reducing the long-term productive capacity of the forest.

Thinning - A silvicultural treatment to overstocked regrowth or plantation stands to release potential sawlogs from competition. There is no intention to induce regeneration.

Variable retention - A harvest system where structural elements or biological legacies (eg, old trees, stags, logs, treeferns) from the harvested stand are retained for the new stand to achieve various ecological objectives. The system typically requires the majority of the felled area to be within one tree height of forest that is retained for at least a full rotation.

APPENDIX 1: auditor's STATEMENT

Audit of Forestry Tasmania's Five-Yearly Estimate of Wood Resources for the 2007 RFA Review Final Report: June 2007. Dr Cris Brack, The Fenner School of Environment and Society, Australian National University

1 Executive Summary

As part of the process of conducting a Five Year Review of the State's Wood Resources, I have been engaged to conduct an audit to inform the Board of Forestry Tasmania of the reliability of data sets, models and systems that support the production of sustainable yield estimates. I, in conjunction with colleagues on earlier occasions, have been involved in similar audits in 1996 and 2002. This current audit is based on these earlier works and focuses on changes to the various models and systems.

Since 2002, developments have resulted in significant improvements to the reliability of, and confidence in the Area systems. These developments include formal reviews of the accuracy of Aerial Photo-Interpretation, tighter linkage of provisional coupe design and the Forest Operations Database, and regular publication of Wood Planning Resource Indicators.

Significant improvements have also been made in the Forest Information systems including: substantial revision of the number and placement of inventory plots, audit and monitoring of inventory measurement standards, and tighter linkages between operations and sales systems. Some potential issues with human resources have been avoided due to training (e.g. aerial photograph interpreters), while some are still being rectified (e.g. technically trained inventory crew foremen). Overall, these developments have significantly improved the confidence and reliability in the forest information systems, setting best practice standards in inventory plot measurement. The growth modelling systems have improved in terms of transparency with the conversion of all models into a common library. However there have been no developments in the model forms or parameter re-fitting. This is particularly unfortunate given the importance of the plantation growth estimates and the increased amount of data available since last review. This lack of development may be partially due to the lack of on-staff biometricians or statisticians. More importantly, ad hoc analysis of the growth estimates has found significant statistical bias, probably due to the original native forest growth models being developed from subjectively located stands, rather than from a broader set of randomly sampled stands that encompass the range of stockings. For the 2007 Review, this bias has been corrected by an expert estimation and ratio correction approach. Preliminary analysis suggests that the correction may not be reliable for all stands due to localised biases.

The Simulation/Optimisation system continues to be very reliable. Developments in this system have enhanced confidence in the overall system by allowing multiple case studies for sensitivity analyses.

Provided that the statistical biases of the native forest growth models and that other growth models are appropriately considered in the simulation/optimisation sensitivity systems, I conclude that the datasets, models, approximations, systems and methodologies used in the calculation of sustainable yield for 2007 are reasonable and adequate for purpose.

APPENDIX 2: feedback FORM

In line with our commitment to continuous improvement, Forestry Tasmania invites you to comment on how this report met your expectation and requirements. In addition to the completion and return of this section, any other comments or suggestions on how we might be able to enhance our report to more clearly communicate sustainable yield issues can be directed to the contact details given below.

How much of our report did you read? ☐ All ☐ The majority ☐ Some

Overall, how do you rate the report?

Not at all informative ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 **Extremely informative /useful**

Please rate the following criteria by checking the appropriate category:	**Poor**	**Unsatisfactory**	**Good**	**Very good**
Substance/Content	☐	☐	☐	☐
Credibility	☐	☐	☐	☐
Readability/Understanding	☐	☐	☐	☐
Completeness	☐	☐	☐	☐
Appearance/Format	☐	☐	☐	☐

As a result of reading the report, do you have a clear and sufficient understanding of Forestry Tasmania's approach to sustainable yield? .....

What additional information would you like to see in the future? .....

All other comments and suggestions are welcome .....

.....

Are you? ☐ a Forestry Tasmania employee ☐ a customer ☐ a supplier

Are you a member of: ☐ the community ☐ the government ☐ an NGO ☐ academia

☐ other (please specify) .....

Additional written comments can be directed to:

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Division of Forest Management, Planning Branch
Forestry Tasmania
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for generations, FT has managed the
State's forest asset maximising & maintaining
environmental, social & economic benefits —
for the Tasmanian community today &
for future generations

Forestry Tasmania