Towards a New Silviculture
in Tasmania’s Public Oldgrowth Forests

FINAL ADVICE
TO THE
TASMANIAN GOVERNMENT

April 2005

Forestry Tasmania
GROWING OUR FUTURE
Towards a New Silviculture in Tasmania’s Public Oldgrowth Forests:
Final Advice to the Tasmanian Government

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INTRODUCTORY COMMENT

This Advice has been finalised concurrently with discussions between the Tasmanian and Australian Governments on the implementation of the latter’s Tasmanian Forest Policy published during the recent Federal election. The Policy seeks enhanced protection of oldgrowth forests through an additional 170,000 ha of forest reserves (125,700 ha on public land, mainly State forest).

This Advice has been developed without knowing the outcomes of those discussions, which have subsequently been completed. Forest areas, reserve levels and sustained yield projections discussed here reflect the position before implementation of the policy proposals agreed to by the Tasmanian and Australian Governments.

An Addendum has been prepared and included with this Advice to indicate relevant forest status and projections based on the implementation of the Tasmanian–Commonwealth Integrated Forest Strategy, which has now been finalised.
SUMMARY

Context

In September 2003, the Tasmanian Government formally asked Forestry Tasmania to provide advice on the phase-out of clearfelling within oldgrowth forest on public land by 2010.

The advice was requested in the context of the following performance criteria:

1. Maintenance of a minimum supply level of 300 000 cubic metres of high quality eucalypt veneer and sawlog material as provided for in the Forestry Act 1920;
2. Maintenance of contracted commitments to veneer, sawlog and pulpwood customers;
3. Maintenance and enhancement of occupational health and safety in forest operations;
4. Safe processing and removal of forest harvesting residues;
5. Regeneration which meets stocking standards for sustainable forest management; and

Of the total area of 1.24 million hectares of oldgrowth forest in Tasmania, no more than about 60 000 ha is currently identified within clearfell harvest areas. This is the area under consideration in the Government’s request for advice.

Public consultation

One hundred public submissions were received in response to five Issues Papers that were made publicly available for comment early in 2004. There were many issues raised by a broad cross-section of the community. Comments covered silviculture, regeneration and biodiversity; sustaining wood yields; financial, economic and community considerations; and safety considerations.

These issues are discussed and have been taken into account in the development of this Advice.
**Alternative scenarios**

Four alternative scenarios are presented. They are compared with the current practice of clearfell, burn and sow (CBS) silviculture and their ability to meet the performance criteria.

The scenarios are based on the analysis of forest harvest units or ‘coupes’. Coupes containing oldgrowth are defined as those that contain 25% or more by area of oldgrowth forest as mapped under the Regional Forest Agreement. Under each scenario, alternatives to clearfell are applied to these coupes. In Scenario 4, which models the effects of a complete cessation of logging within all oldgrowth forest, a stricter definition is used, which includes all coupes that contain 15% or more of oldgrowth forest, reflecting the stricter intent of this scenario.

The first three scenarios are based on the application of variable retention and single tree/small group selection (SGS) silviculture as outlined in the Issues Papers. Variable retention leaves more than half the total area of a coupe within one tree height of the base of an oldgrowth tree or group of trees for at least one rotation. Variable retention can be practised either as dispersed retention, which leaves individual trees, or aggregated retention which leaves patches of forest. Single tree/small group selection systems usually leave about 80% of the forest cover at each harvest, with harvest operations being carried out approximately every 20 years or longer.

For each scenario, detailed modelling of wood yield and financial and economic outcomes has been completed and presented for the period to 2035.

1. **Scenario 1—Mixed silviculture**

This scenario is based on maintaining a mix of silviculture, including variable retention, in particular aggregated retention, together with limited clearfelling and with SGS harvesting in special timbers management units (STMUs). Prominent environmental and forest scientists have indicated support for such a mix of silviculture, matched to forest conditions.

Subject to conditions, it can meet the performance criteria, including the minimum annual supply of 300 000 m$^3$ of high quality eucalypt sawlogs, albeit with some additional costs and operational difficulties compared to current practice.
A major condition will be the establishment of a commercially viable mechanism for the management of harvest residues, whether by burning or, more desirably, through recovery and utilisation; for example, for biomass energy. Eucalypt regeneration for future sawlog production will generally be achieved. It provides positive benefits for biodiversity and landscape conservation by maintaining oldgrowth structural elements at the coupe level.

The continuation of limited clearfelling will enable some flexibility in dealing with otherwise difficult areas, and is significant in limiting the potential economic impacts.

The impact on availability of special species timbers is small, with long-term supply assured through STMUs.

The scenario can be achieved with a small additional area of plantation required (5000 ha) after 2005.

Scenario 1 is estimated to have only a marginal adverse impact on industry compared to current practice, but has a cash impact on Forestry Tasmania and the State Government of $50 million over the next 30 years.

2. Scenario 2—Variable retention silviculture

Scenario 2 phases out clearfelling from all oldgrowth areas in favour of variable retention regimes and applies SGS harvesting in STMUs. It can meet many of the performance criteria, including the minimum annual supply of 300 000 m³ of high quality eucalypt sawlogs. However, there are some additional costs and operational difficulties compared to current practice, and unavoidable economic and job impacts. The impact of this scenario on available special species timbers is slightly more than for Scenario 1, although production from STMUs will remain unaffected in the longer term and maintain supplies.

As for Scenario 1, a major condition will be the establishment of a commercially viable mechanism for the management of harvest residues. Eucalypt regeneration for future sawlog production will generally be achieved. It provides positive benefits for biodiversity and landscape conservation by maintaining oldgrowth structural elements at the coupe level.

Without some clearfelling there is an inability to continue harvesting on steeper slopes, which significantly increases economic impacts.
The scenario can be achieved with a moderate additional area of plantation required (8000 ha) after 2005.

This scenario is estimated to adversely impact on industry value of production compared to current practice to the extent of $39 million per year and loss of 300–370 jobs. It has an adverse cash impact on Forestry Tasmania and the State Government of $50 million over the next 30 years.

3. Scenario 3—Single tree/small group selection (SGS) silviculture

While the SGS scenario can theoretically meet some performance criteria, including the supply of a minimum of 300 000 m³ of high quality eucalypt sawlogs, it is unlikely to prove feasible practically, such that a proportion of production will be foregone. Additional planning and operational costs are highest under this scenario. Safety is compromised and, on this basis alone, the scenario cannot be recommended. Safe burning of harvest residue is virtually impossible and, unless it can be commercially removed from the site, the increase in fire hazard across the forest estate over time will be unacceptably high. The establishment and development of eucalypt regeneration may be achieved to some extent but is problematic, and it is likely that sites will convert to rainforest-dominated stands over time.

There is a significant reduction in the annual availability of special species timbers, reflecting the small areas of oldgrowth that can be harvested each year. The long-term supply of special species from STMUs remains unaffected.

Steeper slopes will no longer be able to be harvested, with a significant increase in the economic impact.

Scenario 3 requires the greatest area of plantation (15 000 ha) to be established after 2005 if high quality sawlog requirements are to be achieved.

This scenario is estimated to adversely impact on industry compared to current practice to the extent of $100 million per year and the loss of 700–900 jobs, together with a cash impact on Forestry Tasmania and the State Government of $250 million over the next 30 years.
4. Scenario 4—No logging in oldgrowth coupes

This scenario does not meet the Government’s requirement under the Forestry Act 1920 to maintain a minimum annual supply of 300,000 m$^3$ of high quality eucalypt sawlogs. There will be contractual difficulties and reduced potential for contract renewal to some existing customers.

There is a significant reduction in the availability of special species timbers, reflecting the unavailability of both coupes containing tall oldgrowth and coupes in STMUs which contain high levels of oldgrowth forest. Future availability of special species timbers such as myrtle, sassafras and celery-top pine will be minimal, with ongoing supplies of special species limited primarily to blackwood and silver wattle.

The cessation of harvesting of oldgrowth forests withdraws at least 308,000 ha of timber resource from industry access and will result in a significant reduction in the size and contribution of the forest industry to the Tasmanian economy. The socio-economic impacts on some regional communities in Tasmania would be severe.

Scenario 4 is estimated to adversely impact on industry compared to current practice to the extent of $326 million per year and the loss of 1800 jobs, together with an adverse cash impact on Forestry Tasmania and the State Government of $305 million over the next 30 years. This does not include provision for industry restructure assistance.

5. Alternative plantation scenario

This alternative adopts the intent of the Forestry Growth Plan for the development of a world-scale resource, which would increase economic efficiency, attract investment and maximise the benefits of downstream processing to the Tasmanian community.

This alternative proposes that up to 30,000 ha of additional plantation be established from 2005/06 to 2009/10. Such additional development would underpin the longer term competitiveness of the plantation resource, support establishment of a pulp mill and provide an effective safety margin into the scenario models.

The capital cost of this proposal is high, particularly if a greater reliance on acquired cleared land is considered desirable. The longer term returns are substantial.
Meeting the performance criteria

The extent to which the scenarios meet the performance criteria is summarised in the following table.

Scenario 1 best meets the Tasmanian Government’s performance

<table>
<thead>
<tr>
<th>Performance criterion</th>
<th>1 Sawlogs</th>
<th>2 Contracts</th>
<th>3 OH&amp;S</th>
<th>4 Residues</th>
<th>5 Regeneration</th>
<th>6 Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed silviculture</td>
<td>yes</td>
<td>yes</td>
<td>yes (?)</td>
<td>?</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Variable retention</td>
<td>yes</td>
<td>yes</td>
<td>yes (?)</td>
<td>?</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>SGS</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>??</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>No OG logging</td>
<td>no</td>
<td>no</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>no</td>
</tr>
</tbody>
</table>

criteria for this Advice. High quality sawlog supply, current contracts with customers, occupational health and safety requirements, and the successful establishment of regeneration can all be achieved, with appropriate conditions. Safe processing and/or removal of forest harvesting residues have yet to be proven at an operational scale, although a few experimental burns have been successful.

Scenario 2 is similar but cannot avoid economic and job impacts resulting from inevitable changes in log quality.

Scenario 3 can theoretically provide the required volume of high quality sawlogs but the costs of roading and harvesting per unit volume mean this scenario is unlikely to be economically feasible. As a result, it can be inferred that contracts will not be met. Safety cannot be assured under this scenario, it has the most difficult residue-disposal problem, and regeneration establishment is highly problematic.

Scenario 4 cannot deliver the required volume of high quality sawlogs and as a result cannot meet contracts. It also has severe economic and job impacts. The other performance criteria are not relevant to this scenario.
Recommendations

Initiatives are detailed in the context of the performance criteria set by the Tasmanian Government. They are directed at minimising the risks that changes to current practice may have on managing State forests for sustainable wood production, while seeking to enhance biodiversity and landscape outcomes. It is recognised that the research into alternative silviculture at Warra is not due for its first substantive review of progress until 2007.

This Advice recommends the adoption of a strategy of mixed silviculture, which seeks to significantly reduce the reliance on clearfelling as a silvicultural system in defined oldgrowth coupes. Such silviculture would include SGS applied to nominated mixed forest/rainforest in STMUs, variable retention, and limited CBS in steeper eucalypt forest. In drier forests, partial/selective systems as currently practised (i.e. essentially Scenario 1) are recommended.

A program of hardwood plantation establishment and pruning to ensure long-term maintenance of sawlog supply will support the adoption of the mixed silviculture strategy. The target should be to establish an additional 10 000 ha by 2010. This recognises the minimum additional requirements for production, with a margin for risks involved in achieving full plantation effectiveness. Native forest conversion to plantation should be phased out by 2010, and no further conversion to plantation of coupes containing oldgrowth should occur after 2005.

The target for full implementation of the strategy is 2010, subject to a publicly reported review in 2007 and confirmation that appropriate progress across the range of initiatives is being made. This review would include:

- Scientific review of the results of the Warra alternative silviculture and associated operational trials. This review is to be associated with an international conference hosted by Tasmania that brings together relevant forest scientists to consider the outcomes from the Warra research and evaluate them against international experience.
- Evaluation of progress, including technology testing and harvesting research, towards the establishment of a commercial market for harvest residue.
- Report by an expert panel on safety and job impacts and mitigation.
- Evaluation of progress in plantation establishment.
It is proposed that a scientific panel of internationally recognised experts in forest and conservation science be established to immediately provide ongoing advice to Forestry Tasmania on the implementation of alternative silviculture benchmarked against international best practice.

These initiatives are dependent on external funding to ensure a smooth transition to forest management based primarily on alternative silviculture but supported by a highly productive sawlog-producing plantation program. Total funding requirement is estimated to be $175 million.
1

INTRODUCTION

In September 2003, the Tasmanian Government formally asked Forestry Tasmania:

To consider how government might address the Tasmania Together benchmark of phasing out clearfelling of oldgrowth forests by 2010 on public land, within a context of maintaining sawlog and veneer supplies to industry, contractual arrangements and employment.

This was outlined in a State of the State address to Parliament by the Premier, in which he confirmed the Government’s commitment to the land-use decision made in the Tasmanian Regional Forest Agreement to the forest industry and to the jobs of Tasmanian timber workers.

The Premier acknowledged Forestry Tasmania’s leadership with its investment in research on alternatives to clearfelling and regeneration burning in tall oldgrowth forests. The research work established at the Warra Long-Term Ecological Research (LTER) Site now provides a basis for operational non-clearfell silviculture on suitable sites in the forest landscape.

The advice has been requested in the context of the following performance criteria:

1. Maintenance of a minimum supply level of 300 000 m$^3$ of high quality eucalypt veneer and sawlog material as provided for in the Forestry Act 1920;
2. Maintenance of contracted commitments to veneer, sawlog and pulpwood customers;
3. Maintenance and enhancement of occupational health and safety in forest operations;
4. Safe processing and removal of forest harvesting residues;
5. Regeneration which meets stocking standards for sustainable forest management; and

Figures 1 and 2 provide a picture of the area of oldgrowth forest in Tasmania and the relatively small percentage currently available for harvesting. Of the total area of 1 240 000 ha of oldgrowth, no more
than about 60 000 ha, or 5%, are available for clearfelling and regeneration. It is the cessation of clearfelling and the potential use of alternative silviculture in this 60 000 ha that is under consideration in Forestry Tasmania’s response to the Government’s request for advice.

Forestry Tasmania prepared a series of five Issues Papers (Forestry Tasmania 2004a,b,c,d,e) for public information and comment. The papers are accessible, together with a glossary of technical terms, on Forestry Tasmania’s website (www.forestrytas.com.au). A six-week public comment period ending on 31 May 2004 resulted in the receipt of 100 submissions from a broad cross-section of the Tasmanian community. A list of those people or organisations that made submissions is provided (Appendix 3). Forestry Tasmania has taken into account relevant issues raised in the submissions in developing this Advice.
1. Introduction

Figure 1. Tenure and management of oldgrowth forest in Tasmania.

Figure 2. Area of oldgrowth forest in Tasmania (at 30.6.2001).
2

PUBLIC SUBMISSIONS ON ISSUES PAPERS

There were many issues of value raised in the submissions, although a number were outside the terms of reference of the request for advice.

ISSUES RAISED OUTSIDE THE TERMS OF REFERENCE

Issues raised outside the terms of reference are recognised as important to those making submissions and, in a number of cases, they are equally important to forest managers. However, they cannot be incorporated as part of this particular process. These issues include:

1. Proposals for no logging of oldgrowth, no logging of native forest, no clearfelling of native forest, and logging only in plantations are in conflict with the intent of the Government’s request to advise only on the potential to phase out clearfelling as a silvicultural practice in oldgrowth forest on public land.

   The Government’s request was not directed to logging in native forest or oldgrowth forest as a whole, nor did it extend to clearfelling outside oldgrowth forest. It was specifically directed to the use of a particular silvicultural technique (clearfell, burn and sow, CBS) within forest designated as oldgrowth in the Regional Forest Agreement (RFA). Notwithstanding the above, the implications of a phase-out of logging of oldgrowth are evaluated in this Advice to enable the Government to compare the impact from a full range of scenarios with current practice.

2. The need for increases to and the adequacy of the forest reserve system, including the area of oldgrowth reserved, was addressed during the RFA process. Both the State and Commonwealth Governments agreed that a comprehensive, adequate and representative reserve system that met the JANIS criteria had been established. Recent suggestions that the JANIS criteria should be applied at the bioregional level are not consistent with the RFA, nor are they required by the JANIS guidelines. It is not the intent of this process to re-examine this issue.

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1 Joint Australian and New Zealand Environment and Conservation Council and Ministerial Council on Forestry, Fisheries and Aquaculture National Forestry Policy Statement implementation sub-committee

2 The Australian Government proposals to protect an additional 170 000 ha of forest in Tasmania will be relevant to this issue.
3. Changes to and more independence and transparency for the forest practices system are matters entirely for the State Government and the Forest Practices Board, an independent regulatory authority operating under the Forest Practices Act 1985. These issues have been canvassed recently by the Resource Planning and Development Commission as part of the five-year review of the RFA, and the Parliament has recently passed a legislative package of reforms.

4. The issues of opposition to woodchipping and the establishment of a pulp mill have no specific relevance to the phasing out of clearfelling of oldgrowth. Woodchips, which are the raw material for a pulp mill, can be sourced from the logging residue of any type of harvesting in both native forest and plantations and also from sawmill residue.

5. Export plans for forest products are the result of timber processing and marketing arrangements and are not directly related to the type of silviculture implemented. They are beyond the scope of the present Advice.

6. Forestry Tasmania manages public forest only and, as such, is not in a position to provide advice on private forest. Therefore, an extension of the Advice to include private forest is not appropriate and is outside the State Government’s request.

7. Detailed consideration of values such as wilderness, global warming and noise pollution are outside the focus of the issues to be considered in this Advice to Government and have been, or are being, dealt with through separate processes of Government.

8. The safety of log trucks on public roads is an issue for the Department of Infrastructure, Energy and Resources and for local government.

9. Forestry Tasmania’s treatment under the Freedom of Information Act 1991 has been addressed in reforms recently passed by the Parliament.

10. The requirements and legitimacy of the Australian Forestry Standard were raised in a few submissions. The Australian Forestry Standard, developed under the auspices of Standards Australia, sets the benchmarks for auditing against the delivery of sustainable forest management outcomes. Independently accredited certification bodies audit the implementation of the Standard. Successful implementation of appropriate silviculture is only one of a wide range of parameters that are monitored. It is in Forestry Tasmania’s interest to ensure that it meets the requirements of the Standard. It is not the Standard that is being reviewed in this Advice.
These issues are noted here and will be conveyed to State Government for information. They are not considered further as part of this Advice to Government.

Most issues raised were relevant to the State Government’s request for advice and the key issues are discussed below.

ISSUES RAISED WITHIN THE TERMS OF REFERENCE

2.1 Silviculture, regeneration and biodiversity

Views expressed in the submissions

Submissions indicated that there was support for a range of approaches to the management of tall oldgrowth forest. While there was support for the cessation of clearfelling of oldgrowth forest, there was also support for the retention of the status quo; that is, clearfell, burn and sow silviculture. Others indicated a preference for single tree/small group selection, variable retention regimes including aggregated retention and dispersed retention, or a range of silvicultural systems (including some limited areas of smaller clearfell coupes on steeper slopes).

The reasons given for the retention of clearfell, burn and sow silviculture were that it is a proven system, supported by science that results in good eucalypt regeneration. It was considered essential to retain clearfelling on steep slopes where cable logging is currently the only feasible operational harvesting system. There was concern that the community poorly understands this silvicultural system and that this lack of understanding needs to be addressed. Those opposed to this system were concerned about the regeneration and development of non-eucalypt species, impacts on biodiversity and aesthetics, and the impacts of intense regeneration burns on the site and on air pollution. It was suggested that modifying coupe size and spatial and temporal dispersal could ameliorate the impacts of clearfelling.

Submissions supporting moves to the various types of alternative silviculture saw the alternatives as being better for the maintenance of biodiversity and forest structural elements, and resulting in improved visual outcomes. Aggregated retention was seen to be more practical and safer to implement than dispersed retention. The retained aggregates provide potentially better and more easily
managed conservation outcomes for maintenance of structural elements and biodiversity at the coupe level. None of these non-clearfell silvicultural regimes can currently be carried out on steep slopes using cable-logging systems.

In single tree/small group selection and the variable retention systems, concerns were raised about the disposal of logging residue, creation of a suitable seedbed and whether adequate stocking of eucalypt regeneration could be obtained. Without removal of logging debris, the potential for increased intense wildfires was raised. There was also opposition to the use of the poison 1080 to control browsing of young regeneration, with alternative control measures favoured. Some submissions put the view that aggregated retention would have a similar impact as clearfelling over a rotation while others were concerned that the silviculture was still in the experimental phase and yet to be proven.

Single tree/small group selection was supported primarily by those with an interest in the long-term supply of special species timbers, while those with an interest in routine eucalypt harvesting were concerned with operational economics. Forestry Tasmania already applies this type of silviculture in rainforest and eucalypt forest in Special Timbers Management Units (STMUs) established to ensure long-term supply of special species timbers.

Several submissions to the background papers called for a range of silvicultural systems to be used for tall oldgrowth forests that reflect specific site attributes and objectives. This approach is consistent with the views of several leading forest ecologists (e.g. Professor David Lindenmayer, Dr Ross Florence and Dr Fred Bunnell) who have cautioned against the wholesale replacement of one harvesting method with another. They advocate a varying harvesting strategy, just as the effects of natural disturbance vary, so that structural diversity is maintained across a forest landscape. They proposed that a range of silvicultural systems and coupe sizes be applied that are matched to sites on the basis of topography, aspect and natural disturbance regimes. Limited clearfelling should be included and applied in smaller coupes than at present, particularly on the steeper slopes, and managed on much longer rotations. It was further suggested that in coupe planning, the coupe should be modelled to obtain the best shapes for retained aggregates, areas to be harvested, and for ease of post-logging burning.
Forestry Tasmania’s response to submissions relevant to silviculture, regeneration and biodiversity

In consideration of the submissions, four scenarios related to the alternative management of tall oldgrowth forest have been developed for further consideration in the Advice to Government. The scenarios detailed later in this Advice are:

1. Mixed silviculture—the implementation of a broad range of silviculture, mainly based around variable retention systems but including limited clearfelling in smaller coupes and single tree/small group selection in STMUs;
2. The implementation of variable retention systems, together with single tree/small group selection in STMUs;
3. Broader application of the single tree/small group selection system;
4. No logging in oldgrowth forest.

In each of Scenarios 1–3, partial harvest systems (including variable retention) would continue to be used in dry eucalypt forests, reflecting current practice, while clearfell, burn and sow would continue to be used where appropriate in non-oldgrowth forests.

2.2 Sustaining wood supply

Views expressed in the submissions

There was support for the RFA, which is intended to give the timber industry certainty until 2017. Some submissions endorsed the maintenance of current woodflow obligations while others considered that the current timber yields are not sustainable and need to be reviewed. A few submissions called for the abandonment of the legislated minimum annual supply of 300 000 m³ of high quality sawlogs. There was also concern as to whether current yields could be maintained under alternative silviculture where there would be loss of yield at the coupe level.

It was suggested that the approach adopted for modelling sawlog yields unnecessarily exacerbates the impact on yield because the definition of ‘coupes containing oldgrowth’ picks up large areas of non-oldgrowth within logging coupes. It was also suggested that the surplus sawlog yield (> 300 000 m³) in the first 10 years could be used to offset some yield impacts in later years.
Views were expressed that no timber should be chipped if it is capable of being sawn and that sustainable yields need to be determined for pulpwood.

The view was expressed that forest management currently favours eucalypt timber production over special species timbers. It was proposed that recovery of special species timbers needs to be maximised and that an inventory of special species timbers needs to be completed, particularly in STMUs, to ensure long-term availability and resource security for users of special species timbers.

To ensure best practice in Tasmania’s forests, including improved utilisation standards, it was suggested that only registered ‘forestry preferred’ contractors should be used.

There was concern that mitigation measures to counter loss of high quality oldgrowth timber resource would result in an increased plantation establishment program. There was opposition to the conversion of any more native forest to plantation. Any future plantation establishment should be on previously cleared land.

The risks inherent in increased reliance on plantations for high quality sawlogs were raised as the timber quality from this source is unproven. Unpruned and late-pruned plantation trees will result in low yields of select-grade sawn product. Early pruning in multiple lifts is required to gain improvements in log quality and sawn output.

There were varying views as to how much additional plantation area might be required to meet sawlog commitments. There were also concerns raised about chemical use, exotic species, monocultures and genetic pollution.

Forestry Tasmania’s response to submissions relevant to sustaining wood supply

In response to concerns about high quality sawlog supply, Forestry Tasmania has modelled the available volume from native forest under the four alternative scenarios that have been developed since the Issues Papers were published and public comment received. The definition of ‘coupes containing oldgrowth’ has been reviewed, with a view to minimising the incidental inclusion of non-oldgrowth forest. The area of plantation required and the volume of high quality sawlog that it will produce is part of that modelling process. The assumptions involved in this modelling are explicitly addressed. Specific consideration of effects on the quality of future log supply has also been included. The concern about conversion of native forest to
...plantation has been taken into account with consideration of options that maximise the use of existing plantation areas and seek to minimise requirements for future native forest conversion. Long-term special species timber supply has been given specific consideration in additional studies, and results are specifically addressed in the scenarios.

2.3 Financial, economic and community considerations

Views expressed in the submissions

Employment was the most important issue raised under this heading. While it was suggested that some additional employment might be required to deal with the increased complexity of forest management, the overwhelming concern was the potential loss of jobs. Estimates of up to 1345 job losses were put forward on the basis of detailed economic modelling (Symetrics 2004). If cable logging ceased in oldgrowth forest, as indicated, there was concern about ensuing job losses and the need for compensation for the owners of cable equipment. The need for industry transition packages was raised for workers affected by alternative forest management. Different views on the employment impacts of the cessation of oldgrowth harvesting in Western Australia were submitted. A few people suggested alternative employment in tourism.

Several submissions considered that full assessment of the costs and benefits of alternative silviculture is required, both on and off site, including full social and economic considerations. It was considered that there was a lack of understanding of the full social and economic flow-on benefits of the timber industry to Tasmanian regional economies and communities.

It was submitted that oldgrowth produces the highest value product and a reduction in the oldgrowth component in mill input could affect the viability of some businesses and also lead to the loss of markets. A detailed external analysis of the economic impacts of the cessation of clearfelling of oldgrowth forests (Symetrics 2004) showed that, if implemented, the impacts on the timber industry would include:

- An increase in log mill-door costs (more complex planning and harvesting);
- A reduction in log recovery rate;
- An increase in log processing and conversion costs (less high quality large sawlogs);
A reduction in product value out-turn and price;
A reduction in timber sales revenue;
A reduction in the profitability margin of about 50%.

This analysis also highlighted the significant additional effects that would flow from excluding cable coupes from harvest, as these areas have contributed proportionally higher levels of higher quality sawlogs.

Another submission suggested that higher prices should be charged for logs that will produce high value products.

Industry submissions considered that increased reliance on regrowth and plantation timber would service the commodity product market rather than the high quality and high value board market. Any adverse impact on the profitability of industry would create a negative investment climate. It was considered that further timber processing investment to enable value-adding and associated employment in Tasmania was very important.

A number of submissions suggested that silvicultural approaches and the timber supply mitigation measures through new plantations need to take into account catchment values, including water quality and yield and their potential impact on local communities.

Other submissions suggested that the impact of the type and extent of harvesting and associated activities on other industries such as beekeeping, organic farming and tourism should be given more consideration. The maintenance of aesthetics and visual amenity was considered important. Air pollution from regeneration burns and associated potential impacts on human health were also considered important. Forest management should be more open, transparent and responsive to local communities and this could mean the development of community partnerships.

Concerns were raised about the increased costs that will be incurred in more complex forest management, earlier roading investment, more difficult harvesting, and changes in timber processing.

Forestry Tasmania’s response to submissions relevant to financial, economic and community considerations

Consideration of economic effects outlined in the Issues Papers included only gross volume reductions and cost increases to mill-door. The Symetrics (2004) report has demonstrated that the effects of
log size and quality, and subsequent implications on log processing and recovery, have additional effects. The net result is that it is now accepted that the impacts as presented in the Issues Papers were significantly understated.

Forestry Tasmania has sought further external expert economic input and, together with the Symetrics analysis, outcomes are incorporated into the evaluation of various scenarios later in this Advice. The range of scenarios has been designed to include options for minimising socio-economic impact. This has specifically included consideration of the particular issues surrounding steeper cable coupes and the issue of non-oldgrowth inclusion within ‘coupes containing oldgrowth’.

The current forest management strategy will lead to a pattern of change in the nature of future log supply. Strategies for managing this change and the additional changes which may emerge from the adoption of alternative strategies are specifically addressed.

Further consideration of the Western Australian experience has highlighted the potential impacts on furniture and craftwood timbers, and further investigation and reporting of these issues are now included.

2.4 Safety considerations

Views expressed in the submissions

Submissions from timber industry people considered clearfelling as the safest form of harvesting and they were concerned about worker safety with any change to alternative silviculture in tall oldgrowth forest. The potential for increased injuries and mortality was raised and it was considered that any change would also lead to an increase in insurance costs. It was considered that aggregated retention was potentially a safer harvesting system than dispersed retention or single tree/small group selection systems.

Some of those opposed to clearfelling considered that if safety were an issue in this type of forest it was a good reason to cease harvesting.

It was recognised that safe harvesting methods need to be developed for alternative silvicultural systems to minimise potential risk to worker safety. Such methods could be expected to be more time consuming and potentially result in a drop in harvesting
productivity. Two submissions considered it would have been useful to report the views of contractors who have been involved in alternative silviculture trials.

There was a strong view that not enough information was available to properly evaluate the nature of the additional risks that might attach to methods other than CBS, and that this needed to be addressed before any firm commitments to such alternatives were made.

Forestry Tasmania’s response to submissions relevant to safety considerations

It is clear that insufficient information is readily available to completely evaluate the additional risks inherent in full-scale replacement of clearfelling by alternative harvesting methods. It will be critical to address this issue to ensure the safety of those who will be expected to undertake these new practices on a routine basis. There is a need to proceed very cautiously with any new practices, and their introduction must be accompanied by full operational safety audits. Further review and expert advice will be required. This should be drawn from both national and international experience in this field. Safety has been a primary focus in the implementation of variable retention regimes in Canada and the Pacific Northwest of the United States of America, and opportunities to draw on this experience will be essential.
3

EXPLANATION OF KEY TERMS AND CONCEPTS

3.1 Defining oldgrowth areas

The nationally agreed definition of oldgrowth forest, identified through the national RFA process, is based on the definition in the National Forest Policy Statement (Commonwealth of Australia 1992) that is documented in Australia’s State of the Forests Report (National Forest Inventory 2003):

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

This definition was used in the Tasmanian RFA and also adopted in the Tasmania Together process.

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 harvest coupes 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 is required.

Because it is not feasible to isolate oldgrowth forest in most oldgrowth harvest coupes, ‘coupes containing oldgrowth’ have been defined based on a minimum proportion of oldgrowth. These coupes may include a range of age classes, including regrowth, mature forest and oldgrowth forest. Issues Paper 2 (Forestry Tasmania 2004b) considered a range of options, from a minimum of 15% up to 25% oldgrowth forest by area as constituting a ‘coupe containing oldgrowth’. Sensitivity analysis shows that there is little difference in the area of oldgrowth captured across the range of options above but the area of non-oldgrowth captured varies significantly. This has important implications for yield impacts.

For this reason, ‘coupes containing oldgrowth’ have been defined as those coupes containing more than 25% oldgrowth. The difference in terms of oldgrowth in clearfell coupes is only 4000 ha (55 000 ha compared to 51 000 ha), while the incidental capture of non-oldgrowth forest is reduced by 21 000 ha (53 000 ha compared to 32 000 ha), thereby significantly mitigating potential yield effects (Table 1).
Public concerns over clearfelling of tall oldgrowth forests have prompted a search for practical alternatives to clearfelling that continue to allow wood production yet retain oldgrowth species and structures at the coupe level at all times. The two major alternatives identified in Issues Paper 1 (Forestry Tasmania 2004a) are variable retention systems or a modified form of light selective logging where a proportion of trees is retained to overmaturity.

Variable retention systems, as defined in parts of Canada and the Pacific Northwest of the USA, leave more than half the total area of a coupe within one tree height of the base of an oldgrowth tree or group of trees for at least one rotation. These systems have the potential to maintain some oldgrowth biodiversity and enhance aesthetic and social objectives at the coupe level while still allowing a level of economic timber production. Variable retention can be practiced either as dispersed retention, which leaves individual trees for habitat purposes, or aggregated retention (Photo 1), which leaves patches of forest to potentially provide for all oldgrowth biota. Preliminary outcomes from the Warra trial indicate that variable retention, practised predominantly as aggregated retention, could be a practical silvicultural alternative to clearfelling in tall oldgrowth forests, provided that harvest residues (slash) can be managed. The likely level of retention in most oldgrowth coupes would be about 20% and the rotation length would be about 90 years.
Single tree/small group selection (SGS) systems (Photo 2) usually leave about 80% forest cover at each harvest. Harvesting operations may be carried out approximately every 20 years or longer. It is assumed that it would take about 100–200 years to grow eucalypts to sawlog size under an SGS system, noting that growth rates are expected to be significantly lower than for other systems. For modelling purposes, the SGS prescription applied for production of high quality eucalypt sawlogs from tall oldgrowth forests would be to harvest about 16% of the canopy at each of five cutting cycles. This would result in 20% of the canopy retained for at least one rotation of 100–200 years. If the primary objective of the SGS treatment is to grow special timbers sawlogs (as it is in Special Timber Management Units), then the rotation length would need to be at least 200 years.
Single tree/small group selection systems are impractical for most tall oldgrowth forests due to safety, regeneration and economic considerations, but can be modified for harvesting mixed oldgrowth forests in STMUs where the primary objective is the ongoing supply of special timbers. There is a need to further develop selective harvesting practices that ensure worker safety, a return to the forest owner, acceptable fire risk and adequate regeneration. This work is currently being undertaken in an STMU within the Warra LTER Site.

Clearfelling is still the most practical system for wood production from wet eucalypt forests and could continue to be used in some tall oldgrowth forests. It may be particularly appropriate for steeper areas currently harvested by cable, if biodiversity and aesthetic values can be better met by measures such as longer rotations or a reduction in coupe size. Smaller coupes, perhaps down to about 20 ha, have less visual impact and would increase the frequency of forest edges and retained wildlife habitat clumps so that a higher level of structural and biological diversity is retained. Edges and clumps also provide animal refuges and seed sources for coupe recolonisation, but can lead to an increased browsing risk for young seedlings.

For oldgrowth sites on gentler slopes, variable retention potentially offers a different balance of economic, environmental and social values. However, safety and slash management issues will probably limit the application of variable retention on steeper land currently harvested using cable logging or in forests with very high slash residues.

Research on alternatives to clearfelling has only delivered preliminary results so far, and many criteria, particularly for biodiversity and social acceptability, have not been fully investigated at this point in time. Further information will be available from the Warra silviculture trial in 2007, when all experimental coupes will be at least three years old. A major review of experimental results is planned for that time. Five additional coupes across Tasmania have recently been harvested to a variable retention prescription under normal operational conditions and will be used to validate findings from the Warra trial. Safety, fire management and cost outcomes can be assessed at establishment but regeneration outcomes can only be assessed after three years. Implications for yield and biodiversity will take decades to fully assess. There is a strong need for ongoing research and adaptive management based on outcomes from early implementation of alternatives. Ongoing research and operational implementation will benefit greatly from international experience, and opportunities to capture such inputs will be an important element of a future change in strategy.
3.3 Maintaining eucalypt sawlog and veneer log supplies

As outlined in the Issues Papers, changes in silviculture to retain oldgrowth elements of the native forest stands will invariably affect the availability of wood to meet legislative and/or contractual supply requirements. The only practical method identified to address these losses is through establishment of a faster growing plantation resource, of which a proportion will need to be high pruned to produce a sawlog replacement component. The development of such a resource has been a key element in the wood supply strategy since the RFA.

Various sectors of the community and industry have expressed concerns about the ongoing plantation establishment strategy. These concerns include conversion of native forest, chemical use (particularly 1080), water usage by plantations, visual landscape issues, social impacts and the unknown suitability of a future plantation sawlog resource relative to current sawlog processing technologies.

Issues Paper 2 indicated the broad parameters and silviculture required for production of high-pruned, Category 3 equivalent sawlog. A high site-quality land base is required. This generally means high rainfall (> 1000 mm/hr), fertile and friable soils, and good access. To an extent, fertiliser and cultivation can be used to improve the fertility of land and increase water-use efficiency. However, it is difficult to substitute absolute rainfall and/or significantly change underlying soil structure, and therefore plantation land is restricted to certain parts of the landscape under the current prescriptions. Forestry Tasmania has developed strict selection protocols for plantation sites based on location, soil and climate factors. Despite these protocols, it has been found that a very high proportion of the plantation estate developed on native forest sites requires additional fertiliser input to reach commercial productivity. Ex-pasture sites, compared with native forest sites on the same soil type, may have higher productivity attributable to residual fertiliser benefits from earlier agricultural management.

As outlined in Issues Paper 2, the availability of suitable quality land is limited, particularly as much of it has long been used for agricultural purposes. Following the signing of the RFA, Forestry Tasmania embarked on a program of plantation land purchase and acquired over 6000 ha at an average cost in excess of $2000/ha. Limited availability, competition from other plantation growers, high land costs and public disquiet about the conversion of agricultural land have limited the success of this program. Forestry Tasmania has
not purchased land for such purposes, other than in exceptional circumstances, for several years. It had to exit the market when costs started to exceed $3000/ha. Since that time, land prices generally have risen significantly. While additional land might be acquired at a cost, it is not likely that this could be relied upon solely to provide more than moderate areas suitable for the production of high quality sawlog material over an extended number of years.

Thus land, in terms of its availability and productivity, is a key element. Forestry Tasmania has a view based on operational experience of the type of land required, given its knowledge of the biological and economic performance of *Eucalyptus nitens* and *E. globulus*. The preferred species from native forests for sawmilling, *E. obliqua*, *E. regnans* and *E. delegatensis*, have all been extensively trialled as plantation species but the growth rates achieved were unsatisfactory and could not justify further investment.

Plantations grown to produce high quality sawlogs of *E. nitens* (Photo 3) and *E. globulus* are expected to have a rotation length of about 25–35 years (mean annual increment of 23 m$^3$/ha/yr under a high-pruned regime) compared to a regrowth native forest with a harvest age range of 80–90 years. The faster growth rates achieved in plantations, together with thinning to enhance growth on final crop trees, will make plantation trees considerably larger than native forest trees of a similar age. The plantations would be commercially thinned for pulpwood at 7–10 years of age.

While plantations can produce logs that meet the technical specifications for high quality sawlogs (i.e. minimum small-end diameter of 30 cm and length of 3.6 m), there are very significant differences in the nature of this resource compared to native forest sawlogs. This can be demonstrated by considering log-diameter distributions, as shown in Figure 3. Clearly the plantation logs represent a completely different type of resource that will require different processing and marketing strategies for efficient and profitable utilisation. This will have implications for future industry investment.

Selected stems will be pruned to ensure production of clear wood. Current practice is to prune to a height of 5.4 m in two lifts. However, the adoption of a higher prune height using three lifts to 6.4 m, while incurring higher initial cost, will increase the volume of pruned log per hectare, and more efficiently use available land. At final harvest, the approximate percentage of the timber volume harvested that has been high pruned and would produce high quality sawlogs is 34%. The remaining 66% of volume would produce peeler logs and some pulpwood (see Appendix 1).
Photo 3. A high-pruned, plantation-grown *Eucalyptus nitens*.

Figure 3. Sawlog diameter distribution: native forest and eucalypt plantation. (— = native forest; ----- = plantation)
3.4 Maintaining special species timber supply

Special species timbers, including ‘very special timbers’ (the decorative end of the spectrum, see below), are an important component of the Tasmanian timber industry. Special species include such icon Tasmanian species as blackwood, myrtle, Huon pine, celery-top pine and sassafras. Studies conducted for Forestry Tasmania have clearly identified that special species supply is very largely dependent upon harvesting in oldgrowth forest and, in the case of ‘very special species’, almost solely reliant on it. Special species sawlogs are currently sold to 13 sawmillers across Tasmania who produce sawn timber or veneer for use in the furniture and joinery industries.

Very special timbers are generally sourced as small sections from logs or stumps that do not meet sawlog specifications. They include much of the figured, heart-stained and burled rainforest and eucalypt timbers. About 400 specialist furniture manufacturers (excluding major furniture manufacturers) and 2000 income-earning craftwood hobbyists (estimated to represent about 300 full-time jobs) salvage very special timbers from harvested coupes containing oldgrowth or purchase such timber from Island Specialty Timbers at Geeveston who also salvage this timber from harvested oldgrowth coupes in the southern forests (Brueckner Leech 1999).

Products made from very special timbers include design furniture, musical instruments and numerous craftwood products. In recent years, very special timber products made from tiger myrtle, blackheart sassafras and/or birds-eye Huon pine have become highly valued. These products are uniquely Tasmanian.

With ongoing access to oldgrowth forest, the long-term supply of special species is based on a strategy of utilising these species when they occur as understorey trees in tall oldgrowth forest, and identifying special areas of mixed forest and rainforest, zoned as Special Timbers Management Units (STMUs). These areas are rich in special species timbers, and management is specifically focussed on their long-term production.

As STMUs are already managed through non-clearfell regimes, there will be no impact of a shift to non-clearfell regimes on the long-term sustainable production from these areas.

In addition to this long-term supply from STMUs, there is currently a short- to medium-term source from tall oldgrowth forest managed mainly for ongoing production of eucalypt timbers. Based on recent
work, ‘coupes containing oldgrowth’ (as defined in Section 3.1 above) currently yield over half of the 18,000 m³ of special species timber sawlogs and about 5000 m³ of salvaged very special timbers per year (Figure 4).

![Figure 4. Reliance of special species timbers on oldgrowth forest.](image)

Cessation of harvesting in oldgrowth forest would effectively end the availability of several special species timbers. Sawlogs from special species would drop by more than 50%, with ongoing supply being primarily limited to blackwood and silver wattle, which are faster growing species and less confined to oldgrowth. Reductions in the availability of very special timbers are estimated to be as high as 85%. In the short-term, the availability of both blackwood and silver wattle sawlogs would still be greatly diminished as these species are currently mainly sourced as arisings from harvesting in tall oldgrowth forest.

It could be anticipated that the very special timbers component of the harvest from tall oldgrowth forest would be reduced in the short-term by up to 20–30% with the introduction of non-clearfell systems such as variable retention. Variable retention or selection regimes will provide for greater certainty of regeneration of these species within the harvest area and may therefore retain more options for special species management in the future. The potential for selective recovery of special species from retained areas in subsequent rotations may also provide a marginal addition to the future sustainable yield based mainly on STMUs.
The total area of STMUs on State forest is currently 143,100 ha\(^1\), or about 10% of multiple-use State forest area. Much of the forest in STMUs is classified as oldgrowth (89,600 ha) and is available for selective harvesting. This represents 33% of oldgrowth on State forest and 7% of oldgrowth in Tasmania. STMUs are managed through partial-harvest or selective systems, and clearfelling is specifically excluded from such forests. STMU distribution by District is detailed in Table 2.

<table>
<thead>
<tr>
<th>STMU area (ha)</th>
<th>Forest District</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bass</td>
</tr>
<tr>
<td>Gross area</td>
<td>2400</td>
</tr>
<tr>
<td>Oldgrowth</td>
<td>1,800</td>
</tr>
</tbody>
</table>

The area of forest in STMUs will continue to increase in the short to medium term as provisional coupes are individually assessed for their timber values. Viable, high value, special species areas will be excised from provisional coupes for eucalypt harvesting and will become STMU coupes. Commercial considerations, in relation to the quantity, quality and value of both mature special species timbers and eucalypts, will influence decisions in this regard.

Studies done for Forestry Tasmania have shown that Island Specialty Timbers at Geeveston has produced significant benefits by salvaging special species timber from eucalypt harvest coupes in the south and ensuring it is not wasted. Additional opportunities for improved timber recovery and industry marketing of these iconic Tasmanian species are also now recognised. Initiatives include:

- Training and accreditation of special species timber contractors, with recognition of these additional skills through associated incentives for achievement.
- Development of a new harvesting and marketing strategy to ensure maximum utilisation and value recovery through increased market prices. This strategy should aim at obtaining ‘whole of supply chain’ support.

\(^{1}\) It can be anticipated that the Australian Government Forestry Policy to enhance oldgrowth protection in Tasmania will significantly impact on the area of STMUs available for future production of special timbers.
• Reviewing the operation and success of Island Specialty Timbers, with a view to replicating the model in the special species rich north-west of the State.

• Marketing of these Tasmanian special species, focussing on their unique qualities to ensure maximum financial return to Tasmania.

• Stratification of the production forest (not currently in STMUs) to determine potentially high yielding special species/very special species areas.

3.5 Residue management

The management of harvest residues in non-clearfell coupes remains a major issue. Unless viable mechanisms for the removal of this material can be proven, there is no doubt that the adoption of non-clearfell techniques on a large scale cannot proceed.

Burning, which can be safely and efficiently conducted in clearfell operations, poses significant challenges when trees are retained in the stand and must be protected from damage. While there has been some limited success in research trials at Warra, experience indicates that large-scale operational feasibility is still very problematic. The implications for future increased wildfire hazard and inadequate regeneration of the forest are such that this issue is one that must be resolved before any progress can be made at an operational scale.

The major opportunity currently apparent for residue management is for the removal and commercial utilisation of logging debris as fuelwood. The feasibility of a biomass energy plant is currently under evaluation for the Huon Wood Centre and would provide a potential solution for residue problems, at least in the south of the State. For this initiative to proceed, there will need to be a high level of commitment to the establishment of a bio-energy market based on sustainable forest residues, and confirmation of its recognition under the Mandatory Renewable Energy Targets scheme. A program of operational level research and development, aimed at establishing efficient fuelwood harvesting technology, will also be required.

Fuelwood harvesting raises issues in respect of the maintenance of coarse woody debris as a substrate for biodiversity. These issues are being addressed following studies undertaken by Grove et al. (2002) and Grove and Meggs (2003) and a review by Raison et al. (2002) (CSIRO), with the expectation that they can be managed through the incorporation of retention prescriptions and a program of adaptive management.
3.6 Basis for the estimate of economic and employment impacts

Symetrics (2004) provided the following information on the most recent employment estimates.

Recent work undertaken by FAFPESC, the National Skills Council for the Forestry & Forest Products, Furnishing and Pulp & Paper Industries Ltd, reports on the Tasmanian industry as part of a national review. Information generated from the initial phone survey response demonstrates that the total workforce of the Tasmanian Forest and Wood Products Industry is approximately 10,693. This figure includes all enterprises that base their business around forest growing and management, tree harvesting, timber processing, any timber manufacturing and merchandising and panel, board, paper and manufacturing production. FAFPESC reports that their figure is likely to be understated. The industry defined in this way contains far more employees than the currently quoted figure based on ABS numbers.

Tasmania employs 7.8% of the total workforce employed in the Australian forest industry. This compares with Tasmania’s proportion of the total Australian population, which currently stands at 2.5%. The 10,693 people employed in Tasmania’s Forest and Wood Products Industry represents 5% of the total Tasmanian workforce of 212,700 (ABS 6202.0 dated 13/05/04). By comparison nationally the Forest and Wood Products Industry employs 137,111 people, 1.4% of the total Australian workforce. These figures demonstrate that the Forest and Wood Products Industry is much more significant to the Tasmanian economy than to the overall Australian economy.

In discussing the potential effects of a cessation of clearfelling in oldgrowth forests, Symetrics (2004) noted that:

... the full extent of job losses in the industry and throughout the Tasmanian community is largely dependent upon how the market responds to reduction in the quality and volume profile of timber produced in Tasmania.

Specifically, Symetrics suggest that a switch to variable retention with smaller logs from 2010–2020 will result in a minimum 5% reduction in final sales in forestry and timber processing. This will decrease the GVP by $39 million per year, with employment losses estimated at 300–370 jobs.

In further analysis completed for Forestry Tasmania, Symetrics undertook a job impact statement on a mixed silviculture strategy where 80% of RFA mapped oldgrowth would not be in clearfell coupes. Symetrics states that this mixed silviculture scenario:

... results in only marginal change to the current harvesting profile (in terms of volume and quality) and associated costs. As a result, input/output approaches forecast there will be no final demand driven job losses.
Issues Paper 3 (Forestry Tasmania 2004c) provided a broad estimate of the impact on the State of introducing alternatives to clearfelling in oldgrowth forest. This was based on the Gross Value of Production (GVP) and a related employment impact calculation, assuming no mitigating actions were taken. GVP values ascribed are the final values of prepared timber in the value chain to the extent that they relate to Tasmanian enterprises only. The final values in the chain did not extend to tertiary manufactured products such as furniture, pulp or paper. Paper 3 also acknowledged the limitations of the data used to make employment estimates.

For the purposes of economic and employment impacts, the data and methodology of Symetrics (2004) are preferred. These estimates capture the full economic effects, including both mill door and processing costs, and final product values within the Tasmanian economy. This is the basis for estimates provided in the scenario discussions, and the GVP figures quoted relate to these final sales values. Symetrics (2004) estimated the total sales for 2002/03 at $1.19 billion.

3.7 Notes concerning the modelling of scenarios

In the following sections, we present the results of modelling four alternative scenarios against a base case of current practice. The framework used to model and report information is the WOODSTOCK (Remsoft 2002) software package. The major model assumptions underpinning each scenario are as follows:

- Current practice is assumed until 2010, the date from which any new or alternative silvicultural techniques will be applied.
- The model is, however, constrained to ensure it does not accelerate the harvest area of oldgrowth (including cable harvest) prior to 2010.
- The model is also constrained to provide for currently contracted volumes for both sawlog and pulpwood products, as well as to provide for 300,000 m³/yr of high quality sawlog indefinitely.
- Additional areas of plantation beyond the 2004/05 program are established as necessary to offset any losses in production of high quality sawlogs from native forest. These plantations are assumed to be targeted to high-pruned regimes, as outlined in Appendix 1, on lands of productivity consistent with recent experience.
- Additional plantation land requirements are minimised by assuming the recycling and improvement of all existing plantations into second rotations as far as possible.
• New plantation establishment is assumed to occur only up to 2010, although the recycling and improvement of existing plantations continues beyond that date.

• Conversion to plantation of coupses containing oldgrowth is not permitted beyond the current planting season (2004/05).

While the models have been run over a 90-year planning horizon, results are presented for the period to 2035, when the most significant effects are apparent. Beyond that time, changes in technology, society and values are likely to render any predictions irrelevant.
4
CURRENT PRACTICE UNDER THE RFA

4.1 Projections on current practice

In evaluating future scenarios, it is important that a basis for comparison is established which, as far as possible, projects current management and policy settings into the future. The following projections relating to current practice are based on the framework established by the RFA. In terms of timber supply, they are based on the 2002 review of sustainable high quality eucalypt sawlog supplies (Forestry Tasmania 2002). This has been updated to reflect activities and modelling refinements since 2002.

4.2 Current practice

4.2.1 Management regimes

The basic State forest land allocations upon which current practice is based are presented in Table 3. This reflects the position which is projected for the year 2010.

Under current practice:

- 42% of State forest is unavailable for harvest in conservation reserves (forming part of the State’s CAR reserve system), or outside coupes and generally unavailable for timber harvesting.

Table 3. Land allocation on State forest under current practices (at July 2010).

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves and non-harvest areas</td>
<td>627 000</td>
</tr>
<tr>
<td>STMUs</td>
<td>143 000</td>
</tr>
<tr>
<td>Softwood plantation coupes</td>
<td>54 000</td>
</tr>
<tr>
<td>Eucalypt coupes</td>
<td></td>
</tr>
<tr>
<td>non-oldgrowth/plantations</td>
<td>551 000</td>
</tr>
<tr>
<td>coupes containing oldgrowth</td>
<td></td>
</tr>
<tr>
<td>– partial harvest</td>
<td>58 000</td>
</tr>
<tr>
<td>– clearfell, burn and sow</td>
<td>69 000</td>
</tr>
<tr>
<td>– variable retention</td>
<td>0</td>
</tr>
<tr>
<td>– single tree/small group selection</td>
<td>0</td>
</tr>
<tr>
<td>Total State forest</td>
<td>1 502 000</td>
</tr>
</tbody>
</table>

1 Figures rounded to the nearest whole number.
• STMUs are managed under low impact SGS regimes.
• Coupes containing oldgrowth are not differentiated from other forest and both are managed using clearfell, burn and sow (tall wet eucalypt) and partial harvest (dry eucalypt) regimes depending on the character of the stands.

4.2.1  Eucalypt timber supply

Projected future timber supply under current practice is illustrated in Appendix 2, with Figure 11 showing high quality sawlog supply and Figure 12 showing pulpwood and related products.

High quality sawlog supply is maintained at 350 000 m³/yr until 2011, reflecting current contracts, and then reduces to a long-term sustainable level of 300 000 m³/yr, as required under the Forestry Act 1920. The make-up of this supply changes significantly in subsequent years, reflecting the outcomes of the RFA.

Supply from coupes containing oldgrowth makes up around one-third of production from native forest and continues to make a significant contribution over the next 30 years. Most of this comes from clearfell, burn and sow operations.

From around 2020, one-quarter of high quality sawlog will come from high-pruned eucalypt plantations—a significantly different resource from high quality sawlogs from native forests, both in terms of log size and species.

The plantation estate required to support this high quality sawlog yield will, at the end of the 2004/05 planting season, be substantially complete, with the establishment of only a small additional area being required. The total area of hardwood plantation on State forest will then amount to about 43 000 ha, although 10 500 ha are owned by third parties under Forestry Rights. Over time, the area of high-pruned plantation will need to increase from the current area of about 6000 ha to a total of 16 000 ha.

Pulpwood and related products, which include low quality sawlog (Category 2/8 and peeler logs), decline over time as harvesting moves to forests with higher sawlog to pulpwood ratios. This in particular applies to plantations, thinned native forests and regrowth where estimated sawlog proportions exceed 30% compared to around 10% for more mature native forests.
Additional plantation development, particularly for pulpwood production, is desirable to enable other potential industrial developments to occur and to maintain economies of scale in the forest land management, harvesting and processing industries. This is further discussed in Section 5.5.

4.2.3 Special species timber supply

Special species timber supply is projected to be maintained at existing levels for the short to medium term, reflecting ongoing recovery from eucalypt coupes containing oldgrowth (Figure 5). In the longer term, supply will be sustained by production from the 143 000 ha of STMUs and, in the case of blackwood, from specifically managed blackwood swamps and fenced regeneration areas.

![Figure 5. Annual production of special species timbers under current practice.](image)

4.2.4 Socio-economic implications

To drive the transition from oldgrowth to regrowth and plantations, Forestry Tasmania is currently actively seeking investors for the following forest industry projects:
- A rotary veneer mill and associated merchandising yard at the Huon Wood Centre;
- A wood fired power station at the Huon Wood Centre;
- A rotary veneer mill and associated merchandising yard at Smithton.
The direct employment effects of these projects are foreshadowed in Felmingham’s (2002) report and are shown in Table 4. The employment figures ignore the indirect flow-on effects and the jobs created during the construction phase.

Table 4. The direct employment effects, as foreshadowed by Felmingham (2002), from new forest industry projects proposed by Forestry Tasmania.

<table>
<thead>
<tr>
<th>Project</th>
<th>Number of jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huon Wood Centre rotary veneer mill</td>
<td>126</td>
</tr>
<tr>
<td>Huon Wood Centre merchandising yard</td>
<td>14</td>
</tr>
<tr>
<td>Huon Wood Centre wood-fired power station</td>
<td>30</td>
</tr>
<tr>
<td>Smithton rotary veneer mill</td>
<td>126</td>
</tr>
<tr>
<td>Smithton merchandising yard</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>310</strong></td>
</tr>
</tbody>
</table>
5

ALTERNATIVE SCENARIOS

The following four alternative scenarios have been developed to indicate the potential costs and benefits of phasing out clearfelling in oldgrowth forest and to evaluate them against the six performance criteria established by the Government in their request for advice (see Section 1 above). The scenarios are compared against current practice (Section 4) and include the mitigation measures possible and necessary to meet the performance criteria. While not required by the Government’s request, Scenario 4 evaluates the position should harvesting in coupes containing oldgrowth be phased out completely. This will assist community understanding of some issues.

5.1 SCENARIO 1—Mixed silviculture

5.1.1 Management regimes

Scenario 1 responds to a variety of submissions and expert opinion which suggested that there should be a range of silvicultures applied that could continue to include a small component of clearfell, burn and sow (CBS). Under this scenario, coupes containing oldgrowth, which previously would have been identified for CBS, are instead predominantly harvested using variable retention regimes (see Scenario 2) but with up to 20% (based on oldgrowth area) remaining available for CBS.

Land allocation on State forest, adopting Scenario 1, is shown in Table 5. Under Scenario 1:

- 42% of State forest remains unavailable for harvest in conservation reserves (forming part of the State’s CAR reserve system) or generally outside coupes.
- STMUs are managed under low impact SGS regimes.
- Areas available for harvest using CBS are constrained to account for no more than 20% of oldgrowth forest harvested in any year. The model optimises this constraint by choosing coupes with low proportions of oldgrowth. Since variable retention is not practicable on steeper cable coupes, much of the CBS will occur on these areas.
• Harvesting in dry oldgrowth forest coupes continues to use partial harvest (non-clearfell) techniques. Non-oldgrowth coupes are managed in accordance with current practice, using both CBS (tall wet eucalypt) and partial harvest (dry eucalypt) regimes, depending on the character of the stands.

The modelled areas of harvest for coupes containing oldgrowth are shown in Figure 13 (Appendix 2). This demonstrates how, after 2010, the area of CBS of oldgrowth within these coupes falls to around 400 ha/yr to 2020 and then further decreases to around 200 ha/yr.

Reference to variable retention includes both aggregated and dispersed retention, depending on the suitability of individual stands. In practice, it is likely that aggregated retention will prove more suitable on most stands, but dispersed retention may prove applicable on some drier and shorter stands.

CBS coupes containing oldgrowth could be reduced in size as far as practicable, down to about 20 ha instead of the current practice of up to 100 ha. The option of managing these particular coupes over longer rotations could be further explored.

Table 5. Land allocation on State forest under mixed silviculture (at July 2010).

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves and non-harvest areas</td>
<td>627 000</td>
</tr>
<tr>
<td>STMUs</td>
<td>143 000</td>
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<tr>
<td>Softwood plantation coupes</td>
<td>54 000</td>
</tr>
<tr>
<td>Eucalypt coupes</td>
<td>551 000</td>
</tr>
<tr>
<td>non-oldgrowth/plantations coupes containing oldgrowth</td>
<td>58 000</td>
</tr>
<tr>
<td>clearfell, burn and sow</td>
<td>24 000</td>
</tr>
<tr>
<td>variable retention</td>
<td>45 000</td>
</tr>
<tr>
<td>single tree/small group selection</td>
<td>0</td>
</tr>
<tr>
<td>Total State forest</td>
<td>1 502 000</td>
</tr>
</tbody>
</table>

1 Figures rounded to the nearest whole number.

5.1.2 Eucalypt timber supply

Eucalypt timber supply under Scenario 1 is shown in Figures 11 and 12.

High quality sawlog supplies to meet short-term contracts and longer term requirements for 300 000 m³/yr can continue to be
maintained. Coupes containing oldgrowth provide around 32% of sawlog supply for the next 20 years, a slight reduction from 33% under current practice. Volumes from partial harvest (dry forest) and variable retention make up the major component from 2010. From 2022, the reliance on plantation sawlogs increases from around 75 000 m$^3$/yr under current practice to around 111 000 m$^3$/yr, an increase of 50%.

To meet this volume of high quality sawlogs will require the additional establishment and high pruning of about 5000 ha of new eucalypt plantation between 2005 and 2010, together with the high pruning of existing and second rotation plantations assumed under current practice.

Supply of pulpwood and related products is somewhat lower than under current practice, reducing by about 200 000 m$^3$/yr to 2 700 000 m$^3$/yr for the period 2010–2020. After 2020, there is further overall reduction in availability to 1 600 000 m$^3$/yr; the difference compared to current practice is 200 000 m$^3$/yr.

5.1.3 Special species timber supply

Under Scenario 1, there is a small reduction in the availability of special species, reflecting the retention of about 20% of the trees within the coupes now being managed under variable retention regimes (Figure 6). Production from STMUs will be unaffected and will maintain supplies for the longer term.

![Figure 6. Annual production of special species timbers under mixed silviculture compared with that from current practice.](image)
5.1.4 Residue management

Disposal of logging residue to provide a seedbed for regeneration and to minimise potential future fire hazard is a critical issue. Weather conditions are more constraining for variable retention regimes than for CBS and the operation is more labour intensive and as a consequence more costly. The protection of retained trees or groups of trees is a priority. Burning is possible and has been successfully undertaken on a research scale at Warra. However, the operational and weather constraints are such that significant uncertainty remains about the ability to successfully undertake such burning on a large scale.

Under Scenario 1, around 1200 ha/yr of variable retention harvesting would be required. Excavator heaping (piling of harvest residues into heaps) may need to be used to remove residue away from edges of aggregates and retained trees to minimise potential fire damage, and may open up greater flexibility in achieving the burning task. Nevertheless, the successful establishment of a market for harvest residues remains an important pre-condition for a confident adoption of this scenario.

5.1.5 Biodiversity and landscape conservation

Biodiversity and landscape outcomes will be somewhat improved from current practice through the retention of oldgrowth elements in the 45 000 ha of forest that would otherwise have been managed under the CBS regime. A reduction in coupe size on the 24 000 ha which will continue to be managed under CBS will also improve the recolonisation of harvest coupes and improve biodiversity and landscape outcomes. This is weighed against the establishment of a further 5000 ha of plantation, which could be on converted native forest and/or acquired cleared land.

5.1.6 Worker safety

Subject to the discussion in Section 2.4, the safety hazard to workers posed by aggregated retention may not be significantly greater than for clearfelling providing the minimum spacing between aggregates is greater than a tree length. It is recommended that average spacing should be at least two tree lengths or about 80 m.

Dispersed retention poses a greater risk due to the need for careful manoeuvring of machinery, directional felling of trees and the time
spent working under retained trees. A 20% dispersed retention rate results in 10–15 oldgrowth trees per hectare being retained at a spacing of about 30 m, making it extremely difficult to fell trees without breaking limbs on retained trees. For these reasons, dispersed retention cannot be recommended from a safety perspective, except at low retention rates or in forests with low tree heights and sparse understoreys.

5.1.7 Socio-economic impacts

This scenario will allow high quality sawlog production to be maintained at 300 000 m³/yr.

Existing contracts can be honoured but there will need to be some discussions regarding the increased costs of variable retention compared to CBS. From 2010, there will be some increased roading expense to access less productive coupes in order to augment the reduced supplies from variable retention coupes. It is estimated that delivered mill-door costs would increase by around 10–20% for logs sourced from variable retention. These represent about 10% of total log supply and therefore represent an overall average log cost increase of only around 1–2%. It will, however, be the marginal effects on individual customers that will be important.

Additional funds will be required to establish, high prune and manage the additional 5000 ha of plantations needed for high quality sawlog production.

The impact on short- to medium-term (2010–2020) wood quality is marginal. Wood from coupes containing oldgrowth reduces slightly from around 100 000 m³/yr to about 97 000 m³/yr. An analysis of log diameter distribution, based on the methodology used by Symetrics (2004), indicates differences are small. It is likely that this is assisted by the fact that Scenario 1 allows access to the bigger logs found on some steeper cable coupes containing oldgrowth (Figure 7).

From 2020, the proportion of high quality sawlog production sourced from plantations instead of native forest increases from 75 000 m³/yr, or 25% of total production, to 111 000 m³/yr, representing 37% of production. This is a major shift in resource quality.

Based on the Symetrics (2004) and further analysis undertaken for Forestry Tasmania, it is estimated that the impacts of Scenario 1 over the period 2010–2020 on the costs and values of timber production,
and hence on GVP, are likely to be within the order of 1%. Average margins for sawn timber could be reduced by about 4–5%. The industry will therefore be marginally less efficient, increases in cost structures may result in firms reducing supply to achieve optimal profit and, as a result, minor job losses may occur where firms are unable or unwilling to sustain the reduction in margins. It cannot be assumed that margins on lower value products can be maintained when higher value products form a reduced component of overall production. This adds greater risk of some job losses.

Scenario 1 will not impede the current industry development plans (Section 4.2.4). The employment growth associated with those plans will more than balance any losses generated as a result of implementing this scenario, and the jobs created will require similar skills to those that may be lost. In addition, jobs will be created by additional plantation establishment, including longer term pruning and thinning.

Beyond 2020, effects cannot easily be estimated because they will depend heavily on the nature of processing investments made to efficiently handle the increased plantation log resource.

Figure 7. Estimated diameter distributions of high quality sawlogs from native forest for four modelled scenarios compared to current practice.
5.1.8 Financial impacts for Forestry Tasmania

This scenario impacts on Forestry Tasmania costs and revenues and requires additional capital investment in plantations and some extra, or at least earlier, road construction. Over the period until 2035, the cumulative impact is to reduce cashflow to Forestry Tasmania by $24 million, while contributions through tax and dividend to the State’s consolidated fund is reduced by $25 million. This represents a total cash impact of nearly $50 million. The main impact on cashflow results from the additional capital investment which amounts to $24 million in the first 10 years.

5.1.9 Forest regeneration

Regeneration establishment from variable retention may be less reliable than under CBS silviculture due to incomplete burning/removal of logging residue and a less receptive seedbed. This is a critical consideration as discussed under residue management above (5.1.4) and will only be confidently addressed with the establishment of a commercial market for harvest residues. Regeneration growth rates are estimated to be about 10% less due to shading effects from coupe edges, individual trees and aggregates. This growth factor has been incorporated into the scenario model.
SCENARIO 1

Summary

A mixed silviculture scenario based on variable retention, in particular aggregated retention, together with limited clearfelling and with SGS harvesting in STMUs, is a feasible scenario which meets the performance criteria, albeit with some additional costs and operational difficulties compared to current practice. A major condition will be the establishment of a commercially viable mechanism for the management of harvest residues, whether by burning or, more desirably, through recovery and utilisation; for example, for biomass energy. With this proviso, eucalypt regeneration for future sawlog production will generally be achieved. It provides positive benefits for biodiversity and landscape conservation by maintaining oldgrowth structural elements at the coupe level.

The continuation of limited clearfelling will enable some harvesting to continue on steeper slopes, which limits economic impacts. The scenario can be achieved with only a small additional area of plantation required (5000 ha) after 2005. This could be achieved by the continuation of the current conversion program for one year and/or a land purchase program.

Scenario 1 is estimated to have a small adverse impact on industry compared to current practice but has a total adverse cash impact for Forestry Tasmania and the State Government of $50 million over the next 30 years.
5.2 SCENARIO 2—Variable retention

5.2.1 Management regimes

Scenario 2 responds directly to the objective of phasing out clearfelling in oldgrowth forest and advocates variable retention regimes for harvesting in coupes containing tall oldgrowth forest being managed primarily for eucalypt sawlog production. As variable retention silviculture is not practicable on steeper slopes normally harvested using cable systems, these coupes will become unavailable for harvesting for the foreseeable future.

Land allocation on State forest, adopting Scenario 2, is shown in Table 6. Under Scenario 2:

- An increased area of 43% of State forest is unavailable for harvest in conservation reserves (forming part of the State’s CAR reserve system), or generally outside harvestable coupes. This latter now includes an additional 24 000 ha of steep coupes, which become unavailable for harvest.
- STMUs are managed under low impact SGS regimes.
- Harvesting in dry oldgrowth forest coupes continues to use partial harvest (non-clearfell) techniques. Non-oldgrowth coupes are managed according to current practice using both CBS (tall wet eucalypt) and partial harvest (dry eucalypt) regimes, depending on the character of the stands.

Table 6. Land allocation on State forest under variable retention (at July 2010).

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves and non-harvest areas</td>
<td>651 000</td>
</tr>
<tr>
<td>STMUs</td>
<td>143 000</td>
</tr>
<tr>
<td>Softwood plantation coupes</td>
<td>54 000</td>
</tr>
<tr>
<td>Eucalypt coupes</td>
<td></td>
</tr>
<tr>
<td>non-oldgrowth/plantations</td>
<td>551 000</td>
</tr>
<tr>
<td>coupes containing oldgrowth</td>
<td></td>
</tr>
<tr>
<td>- partial harvest</td>
<td>58 000</td>
</tr>
<tr>
<td>- clearfell, burn and sow</td>
<td>0</td>
</tr>
<tr>
<td>- variable retention</td>
<td>45 000</td>
</tr>
<tr>
<td>- single tree/small group selection</td>
<td>0</td>
</tr>
<tr>
<td>Total State forest</td>
<td>1 502 000</td>
</tr>
</tbody>
</table>

1 Figures rounded to the nearest whole number.
Variable retention systems include both aggregated and dispersed retention and their application will depend upon the type of stand. It is likely that aggregated retention will prove more suitable on most stands, but dispersed retention may prove applicable on some drier and shorter stands.

5.2.1 *Eucalypt timber supply*

Eucalypt timber supply under Scenario 2 is illustrated in Figures 11 and 12.

High quality sawlog supplies to meet short-term contracts and longer term requirements for 300,000 m³/yr can again be maintained. Coupes containing oldgrowth now provide about 22% of sawlog supply for the next 20 years compared to 33% under current practice and 32% under Scenario 1, made up entirely of volumes from partial harvest (dry forest) and variable retention. From 2022, the reliance on plantation sawlogs increases from around 75,000 m³/yr under current practice to nearly 120,000 m³/yr, an increase of 60%.

To meet this volume of high quality sawlogs will require the establishment and high pruning of a minimum area of 8000 ha of new eucalypt plantation between 2005 and 2010, together with the high pruning of existing and second rotation plantations assumed under current practice.

Under Scenario 2, the availability of pulpwood and related products is 300,000 m³/yr less than current practice. It is 100,000 m³/yr less than under Scenario 1 for the period 2010–2020 and similar to Scenario 1 beyond 2020.

5.2.3 *Special species timber supply*

Under Scenario 2, there is a reduction of 14% in the availability of special species sawlogs and a reduction of 21% in very special timbers, reflecting the retention of trees within coupes being managed under variable retention regimes (Figure 8). The total impact on available volumes is slightly more than for Scenario 1, which has increased access to special species timber from the limited clearfelling coupes.

In the longer term, production from STMUs will be unaffected, and will maintain supplies.
5.2.4 Residue management

As for Scenario 1, disposal of logging residue to provide a seedbed for regeneration and to minimise potential future fire hazard remains a critical issue. Weather conditions are more constraining for variable retention regimes than for CBS, and the operation is more labour intensive and as a consequence more costly. The protection of retained trees or groups of trees is a priority. Burning is possible and has been successfully undertaken on a research scale at Warra. However, the operational and weather constraints are such that significant uncertainty remains about the ability to successfully undertake such burning on a large scale.

Under Scenario 2, around 1500 ha/yr of variable retention harvesting would be required. This is an increase over mixed silviculture (Scenario 1), and further increases the risks of achieving acceptable outcomes. Excavator heaping may need to be used to remove residue away from edges of aggregates and retained trees to minimise potential fire damage, and may open up greater flexibility in achieving the burning task. Nevertheless, the successful establishment of a market for harvest residues remains an important pre-condition for a confident adoption of this scenario.

5.2.5 Biodiversity and landscape conservation

Biodiversity and landscape outcomes will be improved from current practice through the retention of oldgrowth elements in the 69 000 ha of forest that would otherwise have been managed under the CBS regime, including 24 000 ha that cannot be harvested at all. This is weighed against the establishment of a further 8000 ha of plantation, which could be on converted native forest and/or acquired cleared land.

Figure 8. Annual production of special species timbers under variable retention compared with that from current practice.
5.2.6 Worker safety

Subject to the discussion in Section 2.4, the safety hazard to workers posed by aggregated retention may not be significantly greater than for clearfelling, providing the minimum spacing between aggregates is greater than a tree length. It is recommended that average spacing should be at least two tree lengths or about 80 m.

As previously discussed (5.1.6), dispersed retention cannot be recommended from a safety perspective.

5.2.7 Socio-economic impacts

Under Scenario 2, high quality sawlog production is maintained at 300 000 m³/yr.

As for Scenario 1, existing contracts can be honoured. However, there will need to be some discussions regarding the now significantly higher costs of variable retention. From 2010, there will be some increased roading expense to access less productive coupes which will augment the reduced supplies from variable retention coupes. It is estimated that overall delivered mill-door costs would increase by around 10–20% for logs sourced from variable retention. Under this scenario, these make up around 15% of total log supply and therefore represent an overall average log cost increase of 2–3%. Again, it will be the marginal effects on individual customers that will be important.

Additional funds will be required to establish, high prune and manage the additional 8000 ha of plantations needed for high quality sawlog production.

There is a significant impact on short- to medium-term (2010–2020) wood quality. Wood from coupes containing oldgrowth reduces from around 100 000 m³/yr to about 65 000 m³/yr, and log sizes decrease. This is exacerbated by the loss of production from steeper, cable coupes (Figure 7).

The effect of the introduction of variable retention, including the production of smaller logs and the higher cost of harvesting with variable retention, has been modelled in some detail by Symetrics (2004) (Table 7).

Symetrics (2004) suggest a switch to variable retention with smaller logs from 2010–2020 will result in a 5% reduction in final sales in
forestry and timber processing. This will decrease the GVP by $39 million per year, with employment losses estimated at 300–370 jobs. Again, this does not include the added risks to the maintenance of margins in the sawmilling sector, where high value products form a lesser component of the product mix.

Scenario 2 will make implementation of the current industry development plans (Section 4.2.4) more difficult due to higher wood costs and some restriction on access to wood. This may mean potential employment growth will not eventuate, although jobs will be created by additional plantation establishment and subsequent pruning and thinning.

From 2020, the proportion of high quality sawlog production sourced from plantations instead of native forest increases from 75 000 m³/yr or 25% of total production to 120 000 m³/yr, representing 40% of production. This is a major shift in resource quality.

Beyond 2020, effects cannot easily be estimated, as they will depend heavily on the nature of processing investments made to efficiently handle the increased plantation log resource.

<table>
<thead>
<tr>
<th>Impact factor</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log recovery rate</td>
<td>–4.5</td>
</tr>
<tr>
<td>Log price</td>
<td>+12.0</td>
</tr>
<tr>
<td>Effective mill-door price per cubic metre</td>
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</tr>
<tr>
<td>Average cost per cubic metre dressed timber to market</td>
<td>+6.2</td>
</tr>
<tr>
<td>Average revenue per cubic metre of timber sold</td>
<td>–6.5</td>
</tr>
<tr>
<td>Average margin</td>
<td>–52.0</td>
</tr>
</tbody>
</table>

5.2.8 Financial impacts for Forestry Tasmania

This scenario has increased impacts on costs and revenues, and increased additional capital investment in plantations and extra or earlier road construction. Over the period until 2035, the cumulative impact is to reduce cashflow to Forestry Tasmania by $29 million, while contributions to the State’s consolidated fund decrease by $22 million. The total adverse cash impact is about $50 million, which is similar to Scenario 1 (mixed silviculture). However, in this scenario, the upfront capital requirements increase to $38 million in the first 10 years, a significant increase compared to Scenario 1.
5.2.9 Forest regeneration

Regeneration establishment from variable retention may be less reliable than under CBS silviculture due to incomplete burning/removal of logging residue and a less receptive seedbed. This is a critical consideration, discussed under residue management above (5.2.4), and will be confidently addressed only with the establishment of a commercial market for harvest residues. Regeneration growth rates are estimated to be about 10% less due to shading effects from coupe edges, individual trees and aggregates. This growth factor has been incorporated into the scenario model.

### Scenario 2

#### Summary

The variable retention scenario, in particular aggregated retention, with SGS harvesting in STMUs, is feasible and meets many of the performance criteria, albeit with some additional costs and operational difficulties compared to current practice. However, there are some unavoidable economic and job impacts. A major condition will be the establishment of a commercially viable mechanism for the management of harvest residues, whether by burning or, more desirably, through recovery and utilisation; for example, for biomass energy. With this proviso, eucalypt regeneration for future sawlog production will generally be achieved. It provides positive benefits for biodiversity and landscape conservation by maintaining oldgrowth structural elements at the coupe level.

Without some clearfelling there is an inability to continue harvesting on steeper slopes, which increases economic impacts.

Scenario 2 can be achieved with a moderate additional area of plantation required (8000 ha) after 2005. This could be achieved by the continuation of the current conversion program for up to two years and/or a land purchase program.

Scenario 2 is estimated to adversely impact on industry compared to current practice to the extent of $39 million per year and the loss of 300–370 jobs. It has an adverse cash impact on Forestry Tasmania and the State Government of $50 million over the next 30 years.
5.3 SCENARIO 3—Single tree/small group selection

5.3.1 Management regime

Scenario 3 responds directly to the objective of phasing out clearfelling in oldgrowth forest and to those submissions advocating single tree/small group selection (SGS) for harvesting in all coupes containing tall oldgrowth forest. Because SGS silviculture is not practicable on steeper slopes normally harvested using cable systems, these coupes will become unavailable for harvesting for the foreseeable future.

Land allocation on State forest, adopting Scenario 3, is shown in Table 8. Under Scenario 3:

- 43% of State forest is unavailable for harvest in conservation reserves (forming part of the State’s CAR reserve system), or generally outside harvestable coupes. This includes an additional 24 000 ha of steep coupes, which become unavailable for harvest.
- STMUs are managed under low impact SGS regimes.

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves and non-harvest areas</td>
<td>651 000</td>
</tr>
<tr>
<td>STMUs</td>
<td>143 000</td>
</tr>
<tr>
<td>Softwood plantation coupes</td>
<td>54 000</td>
</tr>
<tr>
<td>Eucalypt coupes</td>
<td></td>
</tr>
<tr>
<td>non-oldgrowth/plantations</td>
<td>551 000</td>
</tr>
<tr>
<td>coupes containing oldgrowth</td>
<td></td>
</tr>
<tr>
<td>– partial harvest</td>
<td>58 000</td>
</tr>
<tr>
<td>– clearfell, burn and sow</td>
<td>0</td>
</tr>
<tr>
<td>– variable retention</td>
<td>0</td>
</tr>
<tr>
<td>– single tree/small group selection</td>
<td>45 000</td>
</tr>
<tr>
<td>Total State forest</td>
<td>1 502 000</td>
</tr>
</tbody>
</table>

1 Figures rounded to the nearest whole number.

5.3.2 Eucalypt timber supply

Eucalypt timber supply under Scenario 3 is shown in Figures 11 and 12.

High quality sawlog supplies to meet short-term contracts and longer term requirements for 300 000 m³/yr can theoretically be maintained for up to one rotation. However, because of the
practicality and economics of harvesting, this scenario is unlikely to be feasible. Sawlog supply from coupes containing oldgrowth over the next 20 years is reduced to 13% compared to 33% under current projections and 32% and 22% under Scenarios 1 and 2 respectively. This represents a very significant reduction in log quality. From 2022, the reliance on plantation sawlogs increases from 75 000 m$^3$/yr under current practice to 155 000 m$^3$/yr, an increase of over 100%.

To meet this volume of high quality sawlogs will require the establishment of a minimum area of 15 000 ha of new eucalypt plantation between 2005 and 2010, together with the high pruning of existing and second rotation plantations assumed under current practice.

Under the SGS scenario, the availability of pulpwood and related products is 400 000 m$^3$/yr less than current practice. It is 200 000 m$^3$/yr less than under Scenario 1 for the period 2010–2020 and similar to Scenarios 1 and 2 beyond 2020.

5.3.3 Special species timber supply

Under Scenario 3, there is a very significant reduction in the availability of special species, amounting to 47% in sawlog supply and 70% for very special timbers availability (Figure 9). This reflects the small groups harvested in each coupe (up to 16% of each coupe) and return periods of at least 20 years.

Production from STMUs will be unaffected and will maintain supplies at the long-term sustainable levels.
5.3.4 Residue management

Under Scenario 3, disposal of logging residue in SGS coupes to provide a seedbed for regeneration and to minimise potential fire hazard is a major issue and considerably more difficult than under Scenarios 1 and 2. Burning of residue is virtually impossible to achieve because moisture gradients between logged and unlogged areas are not as distinct as those in clearfelling or variable retention silviculture. Under SGS silviculture, the residue is slow to dry out due to less exposure. As a result, when the residue is dry enough to burn, it is not possible to stop the burn spreading to retained forest.

Under Scenario 3, around 1000–1500 ha/yr of SGS harvest would be required. If SGS is to be implemented at this scale, it will need to be accompanied by a slash reduction program using mechanical means because within-coupe burning is considered impracticable. Forestry Tasmania considers the fire risk of leaving harvesting residues on site at the scale required as unacceptably high.

The successful establishment of a market for harvest residues remains an important pre-condition for any further consideration of Scenario 3.

5.3.5 Biodiversity and landscape conservation

Biodiversity and landscape outcomes will be improved from current practice in the medium term through the retention of old growth elements in the 69 000 ha of forest that would otherwise have been managed under the CBS regime. This figure includes 24 000 ha that cannot be harvested at all. This is weighed against the establishment of a further 15 000 ha of plantation. While this could be a mixture of converted native forest and acquired cleared land, the latter would be unlikely to provide more than a minor proportion of this large area.

5.3.6 Worker safety

Worker safety is at greatest risk under Scenario 3 due to the need to fell and extract large trees from small gaps amongst a dense understorey. While individual trees may be felled safely by experienced operators, productivity drops considerably due to the extra care required. Even if every possible care is taken and the operators are well trained, it is not possible to eliminate or minimise risk compared to the alternative scenarios.
SGS generally means using gap sizes of less than 0.2 ha (50 m in diameter). Gap sizes less than two tree lengths in diameter (about 80 m) cannot be recommended for tall oldgrowth forests in Tasmania under normal operating conditions.

In STMUs, where the focus is on the harvesting of smaller understorey rainforest trees, the risk remains but is reduced relative to the size of the trees being felled.

5.3.7 Socio-economic impacts

Scenario 3 will theoretically allow high quality sawlogs to be maintained at 300 000 m³/yr. However, because of the practicality and economics of harvesting, this scenario is unlikely to be feasible.

As for Scenarios 1 and 2, existing contracts can be honoured, although industry may well feel unfairly disadvantaged if SGS logs are supplied on a full cost-recovery basis. From 2010, there will be increased roading expenses to access both the less productive coupes which replace oldgrowth coupes and the higher number of coupes required under SGS.

Additional funds will be required to establish, high prune and manage the additional 15 000 ha of plantations needed for high quality sawlog production.

The impact on short- to medium-term (2010–2020) wood production is significant. Wood from coupes containing oldgrowth decreases from about 100 000 m³/yr under current practice to about 40 000 m³/yr.

Wood quality will drop from 2010 as sawmillers lose access to large diameter, oldgrowth logs (Figure 7). From 2020, more than half of the high quality sawlog (155 000 m³/yr) will come from high-pruned plantation logs. This is a major shift in resource quality.

Beyond 2020, effects cannot be easily estimated, as they will depend heavily on the nature of processing investments made to efficiently handle the increased plantation log resource.

It is estimated that delivered mill-door costs would increase by about 120–180% from SGS areas. It is doubtful if individual sawmills would be able or willing to absorb the full cost of production of SGS logs. If the full costs are passed on, the recovery of lower valued logs such as pulpwood appears unlikely. It is more probable that production will
be largely foregone due to unacceptably high roading and harvesting costs relative to the small volume to be harvested. SGS operations may only proceed in coupes with large volumes of very high quality logs.

The SGS scenario does not lend itself readily to the economic modelling methodology adopted for the other scenarios. Assuming that some production is foregone, and taking into account the further decline in log quality with less oldgrowth logs available, the impact of this scenario will exceed that for Scenario 2 (variable retention), although it will not be as severe as that for Scenario 4 (no oldgrowth logging). It is considered that the impact will be at least double that for Scenario 2, resulting in a GVP reduction of around $100 million per year, and employment losses of around 700–900 jobs.

Scenario 3 will probably lead to the abandonment of the current industry development plans (Section 4.2.4) due to wood cost and log availability issues, with a resulting loss of the employment growth anticipated. Jobs will be created by additional plantation establishment.

5.3.8 Financial impacts on Forestry Tasmania

The impacts on cost, in particular, and revenue are dramatic, as a result of both additional plantations and extra or earlier road construction. Over the period until 2035, the cumulative impact is to reduce cashflow to Forestry Tasmania by $115 million, while contributions to the State’s consolidated fund decrease by $130 million. The total adverse cash impact is therefore nearly $250 million. The additional capital expenditure requirement over the first 10 years amounts to $69 million, compared to $23 million and $38 million respectively for Scenarios 1 (mixed silviculture) and 2 (variable retention).

5.3.9 Forest regeneration

Eucalypt regeneration establishment from SGS will be much less reliable than under CBS silviculture due to incomplete removal of logging residue, a less receptive seedbed and shading. This is a critical consideration as discussed under residue management above (5.3.4), and will be confidently addressed only with the establishment of a commercial market for harvest residues. Regeneration growth rates are estimated to be about 50% less due to shading effects from coupe edges and the retained overstorey.
This silviculture has the least congruence with natural wildfire disturbance and, in the absence of wildfire, is likely to result in the loss of fire-dependent species including eucalypts. The forest will gradually convert from eucalypt forest to rainforest. While this may benefit longer term special species production, it will significantly reduce eucalypt production.

**Scenario 3**

**Summary**

While the SGS scenario can theoretically meet some performance criteria, it is not likely to prove feasible on a practical basis. Additional planning and operational costs are highest under this scenario, safety is compromised, residue management is a major concern and, although the establishment and development of regeneration may be achieved to some extent, it is unlikely to maintain stand productivity.

Without some clearfelling, there is an inability to continue harvesting on steeper slopes, which increases economic impacts.

This scenario requires the greatest area of plantation (15 000 ha) to be established after 2005 if high quality sawlog requirements are to be achieved. This could be achieved by the continuation of the current conversion program for three years and/or a land purchase program.

Scenario 3 is estimated to adversely impact on industry compared to current practice to the extent of around $100 million per year and the loss of 700–900 jobs, together with an adverse cash impact of nearly $250 million on Forestry Tasmania and the State Government over the next 30 years.
5.4 SCENARIO 4—No logging in oldgrowth coupes

5.4.1 Management regime

Scenario 4, while outside the criteria in the State Government’s request for advice, responds to submissions calling for an end to the logging of all oldgrowth forest. Under this scenario, all coupes with 15% or more of oldgrowth are excluded from harvest. This is a stricter definition of coupes than used in the foregoing scenarios, reflecting the stricter intent of such a scenario. No additional plantations are assumed as this is judged to be inconsistent with any context within which this scenario would be contemplated.

Land allocation on State forest, adopting Scenario 4, is shown in Table 9. Under Scenario 4:

- The area of State forest unavailable for harvest increases to 62%. These areas are in conservation reserves (forming part of the State’s CAR reserve system), and areas generally outside harvestable coupes. This latter now includes an additional 308 000 ha of coupes containing oldgrowth, which become unavailable for harvest.
- It should be noted that about 8000 ha of oldgrowth forest are estimated to remain in harvest coupes. These are coupes with less than 15% oldgrowth forest. The exclusion of this remaining area would capture an additional 130 000 ha of non-oldgrowth forest in coupes, unless recouping could be successfully achieved.
- STMUs generally contain coupes with oldgrowth, so these now become unavailable for harvest.

Table 9. Land allocation on State forest with no logging of coupes containing oldgrowth (at July 2010).

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves and non-harvest areas</td>
<td>935 000</td>
</tr>
<tr>
<td>STMUs</td>
<td>0</td>
</tr>
<tr>
<td>Softwood plantation coupes</td>
<td>54 000</td>
</tr>
<tr>
<td>Eucalypt coupes</td>
<td></td>
</tr>
<tr>
<td>non-oldgrowth/plantations coupes containing oldgrowth</td>
<td>513 000</td>
</tr>
<tr>
<td>– partial harvest</td>
<td>0</td>
</tr>
<tr>
<td>– clearfell, burn and sow</td>
<td>0</td>
</tr>
<tr>
<td>– variable retention</td>
<td>0</td>
</tr>
<tr>
<td>– single tree/small group selection</td>
<td>0</td>
</tr>
<tr>
<td>Total State forest</td>
<td>1 502 000</td>
</tr>
</tbody>
</table>
Non-oldgrowth coupes would continue to be managed using current practice using both CBS (tall wet eucalypt) and partial harvest (dry eucalypt) regimes depending on the character of the stand.

5.4.2 Eucalypt timber supply

Eucalypt timber supply under this scenario is illustrated in Figures 11 and 12.

It is no longer possible to maintain the supply of high quality sawlog and, after 2010, the sustainable supply reduces to less than 230 000 m³/yr, a 24% reduction from the required supply level.

After 2010, no high quality sawlogs would be sourced from coupes containing oldgrowth. This represents a very severe reduction in log quality. After 2020, about 41% of the available high quality sawlog resource of about 230 000 m³/yr would be obtained from currently existing plantation areas.

Under Scenario 4, with no logging of coupes containing oldgrowth, the availability of pulpwood and related products is 600 000 m³/yr less than current practice for the period 2010–2020. Beyond 2020, 500 000 m³/yr less pulpwood and related products are available than current practice.

While there is no further conversion of native forest to plantations after 2004/05, high pruning of existing and second rotation plantations will be maximised to produce high quality sawlogs.

5.4.3 Special species timber supply

Under Scenario 4, there is a dramatic reduction in the availability of special species, amounting to 60% in sawlog supply and 90% for very special timbers availability (Figure 10). This reflects the unavailability of those coupes containing tall oldgrowth previously being managed for eucalypt sawlog production as well as the STMUs which contain high levels of oldgrowth forest.

Future availability of special species timbers with the exception of blackwood and silver wattle will be minimal.
5.4.4 Residue management

Residue management is not applicable because there will be no harvesting in coupes containing oldgrowth.

5.4.5 Biodiversity and landscape conservation

Biodiversity and landscape outcomes will be improved under Scenario 4 because an additional 270 000 ha will not be harvested at all.

5.4.6 Worker safety

Worker safety is not an issue because there will be no oldgrowth harvesting.

5.4.7 Socio-economic impacts

There are significant reductions in both wood volume and quality under Scenario 4. Existing contractual obligations cannot be satisfied beyond 2010 and many customers who could reasonably have expected to have their contracts renewed will instead lose access to Forestry Tasmania timber.

Wood quality will drop from 2010 as sawmillers lose access to large diameter oldgrowth logs. Around 2020, the sawmilling sector will

Figure 10. Annual production of special species timbers with no logging of oldgrowth compared to production under current practice.
then be faced with an additional change of a much smaller pool of high quality sawlogs, with plantation logs making up around 41% of that pool (Figure 7).

No calculation of effects on mill-door log costs has been undertaken. With significantly reduced volume, overheads will increase, particularly for roads. Based on volume reduction alone, this could be around 20–25%.

Based on the Symetrics (2004) methodology, the projected decrease in the GVP is $326 million per year, with employment losses estimated at 1800 jobs. This more severe impact reflects the reduction in overall production, together with the reduction in log quality of that reduced production.

Scenario 4 will lead to the abandonment of the current industry development plans (Section 4.2.4) due to wood availability issues.

5.4.8 Financial impacts for Forestry Tasmania

In this scenario, costs do not increase in total (although cost/m³ of timber produced clearly does), and the major impacts are on revenues. There are no additional requirements for capital investment, and in fact in the longer term there are capital investment savings, although these are not evident for at least 20 years. The cumulative impact is to reduce cashflow to Forestry Tasmania by $72 million, while contributions to the State’s consolidated fund decrease by $233 million. The total adverse cash impact of $305 million is $60 million more than in Scenario 3 (SGS). This cash estimate does not include any allowance for industry restructuring (e.g. business exit or workforce retraining).

5.4.9 Forest regeneration

With no harvesting of oldgrowth forest, this will not be a forest management issue, with ultimate regeneration of the forest dependent on natural processes.
**SCENARIO 4**

**Summary**

This scenario is not feasible because it does not meet the Government’s requirement under the *Forestry Act 1920* to maintain a minimum annual sawlog supply of 300,000 m³ of high quality sawlogs. There will be contractual difficulties and reduced potential for contract renewal to some existing customers.

The cessation of harvesting of oldgrowth forests withdraws 308,000 ha of timber resource from industry access and will result in a significant reduction in the size and contribution of the forest industry to the Tasmanian economy. The socio-economic impacts on some regional communities in Tasmania would be severe.

Scenario 4 is estimated to adversely impact on industry compared to current practice to the extent of $326 million per year and the loss of 1800 jobs, with an adverse cash impact on Forestry Tasmania and the State Government of $305 million, without making any allowance for industry restructure assistance.
5.5 Alternative plantation scenarios

The previous scenarios and, indeed, the outline of current practice are based on a minimum area of plantation required to maintain contracts and longer term supply requirements, consistent with the performance criteria established by the State Government in seeking this Advice. These are driven mainly by high quality sawlog supplies, with pulpwood and associated products simply arising from that supply. As a result, in each of the scenarios, pulpwood and associated products decrease in volume in comparison to current practice projections.

The Forestry Growth Plan sets broader goals for resource development. These include development of a world-class resource of an extent and quality which would be competitive in terms of scale and economic efficiency in attracting processing investment to Tasmania. This will also maximise the benefits of downstream processing to the Tasmanian community. The supply projections incorporated into the 2002 review of sustainable yields reflected these Growth Plan objectives.

In this context, which includes the current proposal for the establishment of a pulp mill in Tasmania, it is desirable to at least maintain the production of pulpwood and associated products and therefore to consider additional plantation development. Such additional development would underpin the longer term competitiveness of the plantation resource, support the establishment of a pulp mill, and provide an effective safety margin into the scenario modelling described earlier in this Advice.

For this purpose, a variation of Scenario 2 (variable retention) has been evaluated. The results of this evaluation can be equally applied to Scenario 1 (mixed silviculture).

Under this scenario variation, an additional 30 000 ha of plantation is assumed; that is, 6000 ha/yr from 2005/06 to 2009/10. This area represents an additional 22 000 ha over that assumed in Scenario 2 or 25 000 ha over that in Scenario 1.

The estimated additional capital cost for this scenario is $140 million compared to current projections, not including any provision for land purchase.
5.5.1 Eucalypt timber supply

The supply of high quality sawlogs does not differ significantly under this variation from the base Scenarios 1 and 2, at least in the short to medium term. In reality, the extra plantations introduce a greater margin for error, or poorer plantation performance, and therefore greater security for the required supply. In the longer term, the opportunity to high prune a larger area would provide options to increase the supply of high quality sawlog above 300 000 m³/yr.

The main implications are for medium-term pulpwood and associated solid wood products (including peeler logs), as illustrated in Figure 12. Compared to the base Scenario 2 (variable retention), supply is increased by around 100 000 m³/yr in the period 2010–2020, which is closer to the outcomes expected from current practice. If the same variation were applied to Scenario 1 (mixed silviculture), pulpwood supply would also increase by 100 000 m³. Beyond 2020, supply is increased by 600 000 m³, to about 2.2 million cubic metres, which exceeds the estimate based on current practice of 1.6 million cubic metres.

5.5.2 Biodiversity and landscape conservation

The major consideration in this scenario is the acquisition of land for plantation establishment. On the one hand, it would require the conversion of an additional 30 000 ha of native forest. This can be achieved within current Permanent Forest Estate constraints for maintaining over 95% of native forest cover on public lands. However, as demonstrated in submissions on the Issues Papers, it raises significant concerns for biodiversity and landscapes. On the other hand, the ability to source such a volume of land from existing cleared agricultural land is severely constrained. The additional cost of land purchase would also significantly increase the required capital investment. As an example, at $3500/ha, the cost of 20 000 ha, if achievable, would be a further $70 million.

5.5.3 Financial impacts for Forestry Tasmania

Under this variation, the capital requirements for the first 10 years increase by $96 million, compared to $23 million and $38 million respectively under the base Scenarios 1 (mixed silviculture) and 2 (variable retention). This investment, however, pays dividends over time and, for the period until 2035, cumulative cashflow impacts are reduced by only $8 million, and contributions to the
State’s consolidated fund actually increase by $120 million compared to current practice. This represents a total positive cash impact over this period of $112 million.

**ALTERNATIVE PLANTATION SCENARIOS**

**Summary**

This variation to Scenarios 1 and 2 (mixed silviculture/variable retention) indicates the nature of the investment that would be required to maintain the supply of pulpwood and associated products, consistent with current projections.

The capital cost is high, and will be even greater if further native forest conversion at this level is deemed unacceptable.
## 6 Evaluation of Scenarios

The evaluation of the four scenarios against the performance criteria established by the State Government is summarised below (also see Table 12). Tables 10 and 11 provide relevant data on which this summary is based.

### Table 10. Resource impacts compared. (Abbreviations: OG = oldgrowth; SGS = single tree/small group selection; n/a = not applicable)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>High quality sawlogs from OG coupes 2010–20 ('000 m³)</th>
<th>Plantation 2020+ ('000 m³)</th>
<th>Total pulpwood 2010–20 ('000 m³)</th>
<th>2020+ area (ha)</th>
<th>New plantation area (very special species) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current practice</td>
<td>100 (33%)</td>
<td>75 (25%)</td>
<td>2 900</td>
<td>1 800</td>
<td>0</td>
</tr>
<tr>
<td>Mixed silviculture</td>
<td>97 (32%)</td>
<td>111 (37%)</td>
<td>2 700</td>
<td>1 600</td>
<td>5 000 (11)</td>
</tr>
<tr>
<td>Variable retention</td>
<td>65 (22%)</td>
<td>120 (40%)</td>
<td>2 600</td>
<td>1 600</td>
<td>8 000 (14)</td>
</tr>
<tr>
<td>SGS</td>
<td>40 (13%)</td>
<td>155 (52%)</td>
<td>2 500</td>
<td>1 700</td>
<td>15 000 (47)</td>
</tr>
<tr>
<td>No OG logging</td>
<td>0</td>
<td>93 (41%)</td>
<td>2 300</td>
<td>1 300</td>
<td>n/a (60)</td>
</tr>
</tbody>
</table>

1 Per cent of total high quality sawlog supply.

### Table 11. Economic impacts compared. (Abbreviations: OG = oldgrowth; SGS = single tree/small group selection; CAPEX = capital expenditure; GVP = gross value of production)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Forestry Tasmania impacts ($ million)</th>
<th>Industry impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAPEX requirement to 2014</td>
<td>Cash flow reduction</td>
</tr>
<tr>
<td>Mixed silviculture</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Variable retention</td>
<td>38</td>
<td>29</td>
</tr>
<tr>
<td>SGS</td>
<td>69</td>
<td>115</td>
</tr>
<tr>
<td>No OG logging</td>
<td>0</td>
<td>72</td>
</tr>
</tbody>
</table>

1 For logs from variable retention and single tree/small group selection only.
PERFORMANCE CRITERION 1

Maintain a minimum supply level of 300 000 m³ of high quality eucalypt veneer and sawlog material as provided in the Forestry Act 1920

For each of the scenarios, except a complete phase-out of oldgrowth logging, it is theoretically possible to meet this criterion, albeit with significant implications for wood quality. During the period 2010 to 2020, the proportion of the eucalypt wood supply from coupes containing oldgrowth is reduced across the four scenarios from the current projection of 33% to between 0–32%. In the period beyond 2020, the proportion of supply which will be sourced from plantations will increase from the current projection of 25% to between 37% and 52%.

For Scenario 4 (no logging in oldgrowth), no further plantation establishment is assumed, as this seemed to be inconsistent with any reasonable context within which such a scenario would be contemplated, and the areas involved would be very large. This scenario does not meet the performance criterion.

For Scenario 3, while the scenario model indicates the possibility of maintaining sawlog supply, the costs of extraction under the SGS regime are such that it is very unlikely that it would make any economic sense to recover the volumes, and the volumes would be foregone. On this basis, it is must be concluded that this scenario would not meet the performance criterion.

The impacts on special species supply are larger than on other sawlog products, since supply is directly linked to oldgrowth forest. Scenarios 3 and 4 severely reduce supplies.

PERFORMANCE CRITERION 2

Maintain contracted commitments to veneer, sawlog and pulpwood customers

By maintaining supply levels in the short term, it is potentially possible to meet formal contractual volume commitments under each of the scenarios except Scenario 4, albeit with significant implications for log quality and cost, as indicated above. Whether such changes in log cost and quality could lead to contractual issues has not been determined at this stage.
It is apparent that under Scenario 1 (mixed silviculture), log quality/cost issues are minimised and probably marginal, and this scenario can be considered to meet the criterion.

Scenarios 2–4 raise concerns of increasing magnitude. For the same reasons as outlined immediately above, it could be inferred that Scenario 3 (SGS) would increase harvest costs to such a degree as to constitute a failure to reasonably supply under any existing contract. This scenario could not be considered to meet the performance criterion. Similarly, Scenario 4 fails to meet the performance criterion, with volumes unable to be maintained beyond 2010.

Industry expectations based on current agreements for future pulpwood supply, on which pulpmill feasibility studies are being based, will be affected by each of the scenarios. Scenario 4 (no oldgrowth logging) would raise serious concerns in this regard. Scenarios 1 and 2, with an additional 30,000 ha of plantation adequately provide for these expectations.

**Performance Criterion 3**

**Maintain and enhance occupational health and safety in forest operations**

While there is a need for further analysis and expert input, there is at least a reasonable chance that variable retention can be designed and implemented with no reduction in occupational health and safety standards. This would need to be thoroughly tested before routine implementation and each step of the change would need to be accompanied by a full safety audit and publicly reported. With this qualification, it can be tentatively concluded that Scenarios 1 and 2 could meet this performance criterion.

Scenario 3 cannot be considered to meet this criterion. Scenario 4 meets the criterion by default, as no logging in coupes containing oldgrowth is undertaken.

**Performance Criterion 4**

**Safe processing and removal of forest harvesting residues**

There is no definitive answer to this criterion. In the absence of a commercial market for harvest residues, and the unproven practicality of achieving successful burning on a large scale in
variable retention regimes, no scenario can be said to meet this criterion (recognising that Scenario 4 is not relevant in this context).

If a market for residues can be established and/or the practicality of burning of residues on an operational scale can be proven, then Scenarios 1 (mixed silviculture) and 2 (variable retention) could meet this performance criterion. Given the smaller areas involved in variable retention in Scenario 1, the criterion will more likely be met under this scenario.

Scenario 3 (SGS) raises even more significant issues in respect of commercial recovery and is the least likely to meet this criterion.

**Performance Criterion 5**

**Regeneration which meets stocking standards for sustainable forest management**

While each of the alternatives will result in reduced growth, it is considered that variable retention can achieve required stocking standards. Scenarios 1 (mixed silviculture) and 2 (variable retention), subject to confirmation of research results, can be considered to meet this criterion.

Scenario 3 (SGS) remains uncertain in this regard. While the scenario model has assumed regeneration, albeit with a 50% reduction in growth, there remains considerable doubt whether eucalypt regeneration will in fact meet stocking standards. A more likely scenario is that other species will dominate the sites and the forest will gradually convert from eucalypt forest to rainforest with very little or no eucalypt. While such a forest conversion may have other benefits (e.g. for long-term special species production), it cannot be considered to meet Performance Criterion 5.

**Performance Criterion 6**

**Maintain the jobs of Tasmanian timber workers**

Each of the scenarios will have effects on costs and log quality and, without mitigation, are likely to lead to adverse economic and job impacts within the forest sector. In Scenario 1, there may be small effects on log quality, together with real reductions in pulpwood and special species production levels. Scenarios 2–4, in increasing degree,
have measurable and significant effects on GVP and jobs. This results from reduced value of sawn timber output, reduced pulpwood volumes, and reduced special species timber production. These are unlikely to be significantly ameliorated by increased plantation establishment. Current industry development plans provide for future growth in forest sector jobs. These plans remain viable under Scenario 1, somewhat more difficult under Scenario 2, and are not viable under Scenarios 3 and 4.

Scenarios 2–4 cannot be considered to meet Criterion 6.

The management of economic and job impacts requires a strategy which goes beyond a mere acceptance of proportional impacts across the industry. An appropriate strategy would be to work with selected firms within the existing industry to develop new opportunities for investment and technologies targeted to the increased regrowth and plantation sawlog components of the future resource. This will allow the traditional resource component to be processed in more traditional ways. Such a strategy could avoid the otherwise inevitable economic and job impacts associated with the resource quality changes which are already in train and will be exacerbated under each of the Scenarios. Within such a strategy, Scenario 1 could be considered to meet Criterion 6.

Table 12. Summary of scenarios against the performance criteria. (SGS = single tree/small group selection; OG = oldgrowth; n/a = not applicable)

<table>
<thead>
<tr>
<th>Performance criterion</th>
<th>1 Sawlogs</th>
<th>2 Contracts</th>
<th>3 OH&amp;S</th>
<th>4 Residues</th>
<th>5 Regeneration</th>
<th>6 Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed silviculture</td>
<td>yes</td>
<td>yes</td>
<td>yes (?)</td>
<td>?</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Variable retention</td>
<td>yes</td>
<td>yes</td>
<td>yes (?)</td>
<td>?</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>SGS</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>??</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>No OG logging</td>
<td>no</td>
<td>no</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>no</td>
</tr>
</tbody>
</table>
7

RECOMMENDATIONS

In the context of the foregoing analysis of scenarios and the degree to which they meet the performance criteria established by the State Government, Forestry Tasmania makes the following Recommendations for consideration by the Government. The Advice and Recommendations have been delayed so that they can be finalised concurrently with discussions between the Tasmanian and Australian Governments on the implementation of the latter’s Tasmanian Forest Policy published during the recent Federal election. The foregoing analysis has been developed without complete knowledge of the final outcomes of those discussions, although it seeks as far as possible to encompass relevant aspects of the Australian Government’s Policy so as to facilitate, where possible, an integrated solution to the issues involved. The Advice does not provide for the resource impacts of any additional reservation of forests arising out of the current policy discussions.

This Advice is based on the fundamental premise outlined in the Tasmanian Government’s request to Forestry Tasmania to provide advice on alternatives to clearfelling in oldgrowth forests on public land from 2010. The strategy outlined below provides for significant changes in the management of oldgrowth forest, enhancing the maintenance of biodiversity values. It represents an immense challenge, with significant risks, and would put Tasmania at the forefront of new knowledge in managing native forests for sustainable wood production. It has a strong emphasis on research and development, and adaptive management, in order to manage and minimise risks to all parts of the supply chain.

The Advice proposes a strategy which will ensure the maintenance of at least one million hectares of oldgrowth forest within Tasmania in perpetuity. With implementation of the Australian Government’s proposals, this maintenance may be achieved through additional reserves of oldgrowth forest.

Reliance on clearfell silviculture will be substantially reduced in those relatively small areas of oldgrowth forest remaining in production forest, achieving significant enhancement in biodiversity outcomes across the landscape. Clearfell silviculture will not be completely phased out in oldgrowth forest; rather an outcome has
been identified which optimises the desired objective, while reducing social and economic impacts to reasonably low and ultimately avoidable levels.

A detailed investment strategy is recommended which is designed to mitigate these social and economic impacts in terms of industry jobs and profitability, including associated special species and minor products industries. It will encourage the establishment of high value engineered wood processing to facilitate the profitable transition of industry to a future more dependent on hardwood plantation and regrowth wood resources.

The Advice incorporates existing and new policy positions to ensure enhanced environmental outcomes, including State forest free of 1080 and Atrazine use, the auditing and reporting of water quality, enhanced plantation hydrology research focussed on water yields, immediate cessation of oldgrowth forest conversion to plantation, and the phase-out of all plantation conversion on State forest by 2010. State forest managed by Forestry Tasmania will continue to maintain certification under the internationally recognised Australian Forestry Standard (AS 4708), which requires continuous improvement in sustainable forest management and public reporting of outcomes.

The Advice provides for the maintenance, and indeed the enhancement, of regional employment and hence the economic base for communities in regional Tasmania.

Part of the adaptive management strategy recommended is to establish a key review point in 2007 to confirm the operational implementation of research results, and to ensure that the pre-conditions, without which the strategy cannot successfully proceed long term, have been or are being sustainably met. This is critical to industry stakeholder support.

The strategy requires significant funding commitment from governments, not simply to fund the capital investments identified in the Scenario analysis, but for the additional research and development, institutional processes, and studies identified below. In the absence of such investments, the strategy cannot be successful against the State Government’s assessment criteria.

The essential elements of the strategy are listed below.
Silvicultural regimes

1. Adopt a strategy of mixed silviculture which seeks to significantly reduce the reliance on clearfelling as a silvicultural system in defined oldgrowth coupes (i.e. coupes containing > 25% oldgrowth forest), with about 80% oldgrowth harvesting to be non-clearfell silviculture. Such silviculture would include SGS applied to nominated mixed forest/rainforest (designated STMUs), variable retention, and limited CBS in steeper eucalypt forest, and partial/selective systems (including variable retention) as currently practised in drier forest (i.e. essentially Scenario 1).

A cost of $4.8 million for increased operational costs, estimated as follows:

(a) $1.8 million, calculated as $2.50/tonne to cover the additional forest management costs (planning, supervision, roading and burning) of routine variable retention harvesting over the first 750 000 tonnes from variable retention operations during the phase-in period to 2010;

(b) $1.8 million calculated as $2.50/tonne to cover the additional costs of harvesting over the first 750 000 tonnes from variable retention operations during the phase-in period to 2010;

(c) $1.2 million for sawmill costs for any significant log diameter changes, as a result of the phasing-in of variable retention harvesting to 2010.

2. The target for full implementation of the strategy to be 2010, subject to a publicly reported review in 2007 and confirmation that necessary prerequisite conditions, particularly worker safety, have been achieved or are being achieved, at that date, as identified below.

$0.5 million to fund a process of assessment, public reporting and consultation on outcomes and progress.

Safety and jobs

3. Immediate establishment of an expert panel to review and work with contractors in operational trials of non-clearfell silviculture and to report by 2007 on safety and job impacts and the success of mitigation strategies.

A cost of $0.25 million.
4. Commitment and funding to implement the worker training requirements of the Tasmanian Log Supply Charter objectives to improve log segregation and utilisation for both eucalypt and special species timbers, and to ensure a contractor workforce competent in undertaking alternative harvest practices in oldgrowth forests. This would build on the recent State Government decision to fund forest practices training for all forest harvest contractors.

A cost of $2.0 million.

**Intensive forest management**

5. A program to establish and high prune an additional 10 000 ha of hardwood plantation on State forest be immediately initiated, to be completed before 2010. This will provide for the long-term maintenance of the annual supply of a minimum 300 000 m$^3$ of hardwood veneer and sawlog, as calculated for Scenario 1, with sufficient safety margin to secure that supply, and underpin future industry development. Results to be evaluated in 2007 against benchmarks identified in this Advice and reported publicly.

The cost of $60 million for solidwood plantations is estimated at $6000/ha, including establishment of $3500/ha, high pruning (three lifts) of $1800, and fertilising (1xNP and 2xN) of $700.

6. No further plantation conversion of ‘coupes containing oldgrowth’ from 2005 and a phase-out of all native forest conversion to plantations on State forest by 2010.

7. An accelerated program to upgrade existing hardwood plantation on State forest to high-prune, high-value solidwood status, as far as possible (6000 ha).

The cost of $15 million includes high pruning (three lifts) at $1800/ha, and fertilising at $700/ha.

8. An accelerated program of eucalypt regrowth thinning, with technical/financial support for improved thinning technology commencing 2005 to 2010.

Cost of $4 million based on 500 ha for five years.
**Forest practices**


*Cost of $2 million to assist with increased transition costs over the first two years.*

**Industry investment**

10. Commitment to the establishment of a bio-energy market for harvest residues from variable retention silviculture and other managed forest. Results to be evaluated in 2007.

*Cost of $2 million to assist start-up costs for environmental monitoring for a bio-energy plant at the Newood Huon site.*

11. Investment strategy following an Expressions-of-Interest from existing contractual customers of Forestry Tasmania’s hardwood sawlog for accelerated transition to regrowth and plantation wood, including marketing, sawing, drying trials and industry training.

*$42 million program.*

12. Accelerated development of the Newood (Huon) Wood Centre.

*Cost of $7.5 million for the development of basic shared site infrastructure to facilitate rotary peeling and biomass energy investment.*

**Special species**

13. Development and funding of a new focus on special species management and marketing strategy to maximise value recovery in Tasmania and utilisation of Tasmania’s signature special timbers to market and brand the State. Improved low impact roading access to STMUs, with greater security for leatherwood apiary sites.

*An investment of $5.7 million made up as follows:*  
(a) Development of access and new marketing strategy—$3 million;  
(b) Fencing of blackwood over three years—$1.2 million;  
(c) Development and extension of Island Specialty Timbers to maximise recovery (new yard in the north-west) and e-marketing opportunities—$1.5 million.
14. Support for new small business start-up in special species value-adding, working with existing wood craft and furniture groups; for example, the Wood Craft Guild, the Wooden Boat School and Tasmanian fine furniture stakeholders.

$2 million fund.

Roading infrastructure

15. Investment in additional roading infrastructure to operationalise the new harvest and subsequent hardwood plantation establishment programs.

Cost of $23 million based on the construction of an additional 150 km of roading over three years.

Science, research and development

16. Research and operational level trials of aggregated retention be accelerated and expanded across all Forestry Tasmania Districts.

Cost of $2 million for accelerated research and to provide detailed monitoring of variable retention harvesting in various forest types across Tasmania prior to 2007.

17. A scientific panel of internationally recognised experts in forest and conservation science be established to review and provide advice to Forestry Tasmania on the progress in practical implementation of silvicultural alternatives against international best practice standards. Reports to be regularly published on Forestry Tasmania’s website.

$0.2 million to support panel costs.

18. A full scientific review of the results of the Warra alternative silvicultural trials and associated operational trials be conducted and reported publicly in 2007. Results in this report to be evaluated against identified benchmarks for environment, economics, productivity, landscape and safety.

$0.3 million to support the science review.
19. An international conference be hosted by Tasmania in 2007 to bring together relevant forest scientists to consider outcomes of the Warra research, and compare relevant international experience in comparable forest management settings.

$0.1 million to subsidise conference costs, and ensure wide international participation.

20. Accelerated and expanded program of research into plantation and water quality, and yield issues.

$1.5 million over five years to accelerate Forestry Tasmania’s program of hydrology research.

This recommended strategy is summarised in Table 13, together with timeframes and indicative costings.

It is recommended that the Governments adopt this strategy and provide the necessary funding for its implementation.
Table 13. Summary of recommendations.

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REFERENCES AND ACRONYMS

References


Felmingham, B. (2002). The Economic Contribution of the Southwood Project. School of Economics, University of Tasmania.


management in the wet eucalypt production forests of Tasmania. Forestry Tasmania, Hobart.


**Acronyms**

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<tr>
<td>CAR</td>
<td>Comprehensive, adequate and representative</td>
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<tr>
<td>CBS</td>
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<td>CSIRO</td>
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<td>GVP</td>
<td>Gross value of production</td>
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<td>JANIS</td>
<td>Joint Australian and New Zealand Environment and Conservation Council and Ministerial Council on Forestry, Fisheries and Aquaculture National Forestry Policy Statement implementation sub-committee</td>
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<td>MAI</td>
<td>Mean annual increment</td>
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<td>Single tree/small group selection</td>
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<td>Special Timbers Management Unit</td>
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Appendix 1: Plantation assumptions

1. There are three main regimes assumed for future plantation development.
   - A thinned, high-pruned regime (three pruning lifts to 6.4 m) to produce Category 3 sawlogs.
   - A thinned, low-pruned regime (one pruning lift to 2.7 m) to produce solid wood for peeler products.
   - An unthinned and unpruned regime for the production of peeler and pulpwood.

2. Higher value products require longer rotations.
   - High-pruned regimes are assumed to have rotations of 25 to 35 years.
   - Low-pruned regimes are assumed to have rotations of 18 to 22 years.
   - Unpruned regimes are assumed to have rotations of greater than 15 years.

3. A range of sites (land) is available for plantation production. As higher value products require longer rotations, these rotations can be minimised and economics improved by targeting the more intensive silviculture to the most productive sites. For example:
   - High-pruned regimes are targeted to sites with a mean annual increment (MAI) greater than 23 m³/ha. (MAI = mean annual increment of total production)
   - Low-pruned regimes are targeted to sites greater than 19 m³/ha MAI.
   - Unpruned regimes are generally focussed on sites between 10 and 19 m³/ha MAI; the mid point of this range has been used for the purposes of modelling.

4. Models and assumptions are based on averaging of the individual models for *Eucalyptus nitens* and *E. globulus*. 
5. An example output of a regime is as follows:

- **Regime:** High-pruned Category 3
- **Species:** *E. nitens*
- **Productivity:** 23 m$^3$/ha MAI
- **Thinning:** Commercially thin at age 9, producing 72 m$^3$ of pulpwood
- **Final Harvest:** Clearfell at age 25, producing
  - 180 m$^3$ of Category 3 log
  - 270 m$^3$ of solid wood (peeler)
  - 57 m$^3$ of pulpwood
Appendix 2. Woodflow charts.

Figure 11. Eucalypt timber supply: high quality sawlog from current practice and for each scenario.
Appendix 2: Continued.

Figure 12. Eucalypt timber supply: pulpwood and related products from current practice and for each scenario.
Appendix 2: Continued.

Figure 13. Area of clearfell and variable retention harvested under Scenario 1 (mixed silviculture) in coupes containing oldgrowth.
**Appendix 3:** List of individuals or organisations providing submissions to the five Issues Papers published by Forestry Tasmania in April 2004.

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ADDENDUM

A1. Background

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) represents 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 embodies the main elements of this Advice, with the further inclusion of an additional 140 000 ha of formal and informal conservation reserves on State forest land, and investment of around $220 million in forest and forest industry related initiatives to mitigate wood supply effects.

A2. Integrated Forest Strategy—Mixed silviculture

A2.1 Management regimes

The Integrated Forest Strategy generally adopts the Mixed Silviculture scenario (Scenario 1) identified within this Advice but varied to reflect the proposed new conservation reserves. The Strategy provides for the harvest of remaining coupes containing oldgrowth forest by 2030 so as to maintain hardwood log quality to industry, and retain regrowth stands for additional growth as far as other constraints allow. An additional 6000 ha have been added to the area of plantation recommended in Section 7 of the Advice to mitigate the effects of the proposed new reserves (making a total of 16 000 ha of new hardwood plantation). A mitigation strategy to ensure continued availability of special timbers has been developed. Figures 14 and 15 present the distribution of oldgrowth forest under the new strategy, including the new conservation reserves, and can be compared with Figures 1 and 2 (page 3). Land allocation on State forest is shown in Table 14.
Figure 14. Tenure and management of oldgrowth forest in Tasmania under the Integrated Forest Strategy.

Figure 15. Area of oldgrowth forest in Tasmania under the Integrated Forest Strategy.
Under this Strategy:

- 47% of the area of State forest is unavailable for timber harvest in conservation reserves (forming part of an enhanced State CAR reserve system) or generally outside coupes, an increase from the current 42%.
- The area of STMUs has been reduced by 50% to 71 000 ha. These areas will be developed and managed for the long-term production of special species timbers using SGS regimes.
- Areas available for harvest using CBS are constrained to account for no more than 20% of oldgrowth forest harvested in any year. Wood yield is optimised by choosing coupes with low proportions of oldgrowth. Since variable retention is not practicable on steeper cable coupes, much of the CBS will occur on these areas.
- Harvesting in dry oldgrowth forest coupes will continue to use partial harvest (non-clearfell) techniques. Non-oldgrowth coupes will be managed in accordance with current practice, using both CBS (tall wet eucalypt) and partial harvest (dry eucalypt) regimes, depending on the character of the stands.

The modelled areas of harvest for coupes containing oldgrowth are shown in Figure 16. This demonstrates that, after 2010, the area of CBS of oldgrowth within these coupes falls to less than 300 ha/yr for the ensuing 20 years.
A2.2 Eucalypt timber supply

Projected future eucalypt timber supply under the Strategy is shown in Figures 17 and 18.

High quality sawlog supplies to meet short-term contracts and longer term requirements for a minimum of 300 000 m³/yr will continue to be maintained. Coupes containing oldgrowth will continue to provide around one-third of sawlog supply for the next 20 years, maintaining the proportion under current practice. Volumes from partial harvest (dry forest) and variable retention will make up the major component from 2010. From 2022, the reliance on plantation sawlogs will increase from around 75 000 m³/yr under current practice to around 115 000 m³/yr, an increase of 53%.
Figure 17. Eucalypt timber supply: high quality sawlog under the Integrated Forest Strategy.

Figure 18. Eucalypt timber supply: pulpwood and related products under the Integrated Forest Strategy.
An additional 16 000 ha of eucalypt plantation will be established on State forest before 2010, together with high pruning and fertilising of existing and second rotation plantations.

Supply of pulpwood and related products will be somewhat lower than projected under current practice until 2010, decreasing by about 100 000 m³/yr to 2 800 000 m³/yr, and then maintaining 2 400 000 m³/yr for the following 10 years.

A2.3 Special species supply

Under the Strategy, there will be a small reduction in the availability of special species, reflecting the retention of about 20% of the trees within the coupes being managed under variable retention regimes (see Figure 6, p. 34).

The new conservation reserves reduce the area of STMUs from 143 000 ha to 71 000 ha, and this will reduce long-term supplies available from these areas. However, provision for improved access into remaining areas will mitigate this reduction and ensure continuing long-term supplies of these species.

A2.4 Residue management

Disposal of logging residue to provide a seedbed for regeneration and to minimise potential future hazard will remain a crucial issue. Around 1200 ha/yr of variable retention harvesting will be required initially. The Strategy includes initiatives to facilitate the establishment of a market for harvest residues to ameliorate the significance of this issue.

A2.5 Biodiversity and landscape conservation

Biodiversity and landscape outcomes will be greatly improved by the adoption of this Strategy through the additional reservation of 140 000 ha of State forest and the retention of oldgrowth elements in the 42 000 ha of forest that would otherwise have been managed under the CBS regime.

Further conversion of State forest to plantation will be capped, and completely phased out by 2010, with conversion of coupes containing oldgrowth being discontinued immediately.
A2.6 Worker safety

Safety will remain a priority issue, and the Strategy provides for additional expert assessment and advice and a significant effort in workforce training.

A2.7 Socio-economic impacts

The Strategy will allow high quality sawlog production to be maintained at 300 000 m$^3$/yr. Existing contracts can be honoured and provision has been made for addressing the increased costs of variable retention compared to CBS.

Additional funds have been committed to establish, prune and manage an extra 16 000 ha of plantations to secure future industry supply.

Under the Strategy, there will be a gradual ramp-up between 2005 and 2010 in variable retention harvesting to achieve the desired level by 2010. Funding to address increased costs over this five-year transition period will avoid any immediate negative effects.

There should be little, if any, significant impact on short- to medium-term wood quality, with wood from coupes containing oldgrowth increasing from around 100 000 m$^3$/yr to about 104 000 m$^3$/yr. Provision has been made in the Strategy for mill retooling and new investment to facilitate industry accommodation to any minor resource changes that might nevertheless eventuate.

From 2020, the proportion of high quality sawlog production sourced from plantations instead of native forest is projected to increase to about 115 000 m$^3$/yr, representing 38% of production. Provision has been made in the Strategy to facilitate industry transition to this new resource.

Investment of around $50 million in industry retooling and restructure, and facilitation of new industry based on regrowth and plantations means that industry will have at least 10 to 15 years lead time to achieve adjustments to future resource changes.

Symetrics (2005) have undertaken further analysis of the Strategy, including the investment initiatives, and have concluded that it will be significantly jobs positive. Small, potentially negative
impacts on log quality in the period 2010–2020 will be significantly mitigated by the investment strategy, which will enhance job growth in each period.

Under the Strategy, current industry development plans, including investments in rotary veneer plants, biomass energy and a new pulp mill, will be facilitated and lead to further positive job growth.

A2.8 Forest regeneration

Regeneration establishment from variable retention will remain an important issue, and continued research and monitoring will be undertaken to ensure that adequate regeneration levels can be assured on these areas.