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Bureau of Rural Sciences

Australia's

PLANTATION LOG SUPPLY

2005 – 2049

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

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Bureau of Rural Sciences
GPO Box 858
Canberra ACT 2601

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GPO Box 858
Canberra ACT 2601

P: 1800 020 157
F: 02 6272 4747
E: salesbrs@brs.gov.au
www.brs.gov.au

AUTHORS
Parsons, M., Frakes, I. and Gavran, M.

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WhiteFox Communications

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FOREWORD

About two-thirds of the 26 million cubic metres of logs currently harvested each year in Australia are grown in plantations.

These logs are used to make products including sawn timber and panels for home building and furniture construction, a wide range of writing, packaging, tissue and other paper products. Most are sold to the Australian domestic market, but the manufacture of plantation products for export is also a major industry. Employment and wealth flow directly from the growing of plantations and the conversion of logs into products for domestic use and export.

This report by the National Plantation Inventory forecasts the future supply of sawlogs and pulpwood from plantations, by region and nationally. The trends that this information reveal will help companies, governments, community groups, researchers and others to assess issues and opportunities for the plantation timber industry.

The National Plantation Inventory has been collecting data and reporting on Australia's plantations since 1993. This is the third forecast of future log supply. It is based mainly on data on plantation area for 2005 published by the Bureau of Rural Sciences in the report *Australia's Plantations 2006*.

National Plantation Inventory reports and data are available from the Plantation Information Network website (www.brs.gov.au/plantations).

Dr Colin J. Grant
Executive Director
Bureau of Rural Sciences

Acknowledgements

Information for this report was provided by the many companies, government agencies, other organisations and individuals who own, manage or otherwise have interests in plantations. The plantation and timber industry associations that represent plantation owners on the National Plantation Inventory Reference Committee assisted with data collection and provided constructive comments on a draft of this report. These people and organisations are listed on page 47. Their support and assistance are gratefully acknowledged.

KEY POINTS

This is the third forecast of log supply from Australia's plantations produced by the National Plantation Inventory.

In this report, the supply of logs from Australian plantations is forecast to increase from nearly 18 million cubic metres per year in 2005–06 to nearly 30 million cubic metres per year in 2010 (and thereafter), an increase of 67%. Forecast supply in 2010 comprises hardwood pulpwood (46%), softwood sawlogs (35%), softwood pulpwood (18%) and hardwood sawlogs (1%).

Changes in log supply have important implications for Australia's wood and paper product manufacturing industries, for the rural economies where those industries are based, and for the national supply of forest products. They also affect export income and the national balance of payments.

A majority of the forecast volumes in this report were derived directly from data provided by the owners and managers of large plantation estates and the remainder were developed by the National Plantation Inventory using existing data.

KEY POINTS – HARDWOODS

Hardwood pulpwood production from plantations is soaring. Supply is forecast to reach nearly 14 million cubic metres per year by 2010, about four times the volume harvested in 2005–06. Average supply beyond 2010 is forecast to be about 14 million cubic metres per year.

Most plantation hardwood pulpwood is currently produced in Western Australia, Tasmania and Central Gippsland. By 2010, the major hardwood pulpwood-producing regions will be the Green Triangle and Western Australia (33% each of the national total), Tasmania (19%) and Central Victoria (5%).

By 2010, the total national supply of hardwood plantation sawlogs will be about 358,000 cubic metres per year. Tasmania will produce about 53% of the total and Central Gippsland and North Coast New South Wales about 20% each. Hardwood plantation sawlog supply is forecast to exceed 1 million cubic metres per year after about 2020 and to peak at around 1.8 million cubic metres per year in 2030. However, this volume may not be reached if plantations established for sawlog production are not thinned and pruned.

KEY POINTS – SOFTWOODS

The supply of softwood sawlogs, currently around 9 million cubic metres per year, is expected to be steady at 10–10.5 million cubic metres per year for the next 15–20 years and to increase to around 12 million cubic metres per year beyond 2030.

The major softwood sawlog-producing regions are the Green Triangle, South East Queensland and the Murray Valley. In 2010, the Green Triangle and the Murray Valley will each produce an estimated 20% of the national softwood sawlog total, South East Queensland will produce 17% and Western Australia, Central Tablelands New South Wales and Tasmania 7% each.

Softwood pulpwood supply, currently around 5.0 million cubic metres per year, is forecast to be steady at around 5.4 million cubic metres per year until the mid 2020s. It will then decline to about 4.7 million cubic metres per year before increasing again after 2030.

Further information about Australia's plantations is available by calling 1800 020 137 and from www.brs.gov.au/plantations.

Woodchips produced from pulpwood grown in plantations in the Green Triangle region are exported from Portland, Victoria. Supply of pulpwood in this region is forecast to more than treble between 2005 and 2010

PAST AND FUTURE LOG SUPPLY FROM AUSTRALIA'S PLANTATIONS

WHY FORECAST LOG SUPPLY?

Australia's plantation estate has grown rapidly since the early 1990s. Annual plantation log supply almost tripled between 1990 and 2005, from about 6 million cubic metres to just under 18 million cubic metres. Plantations are expected to produce about 30 million cubic metres of logs from 2010 (Figure 1).

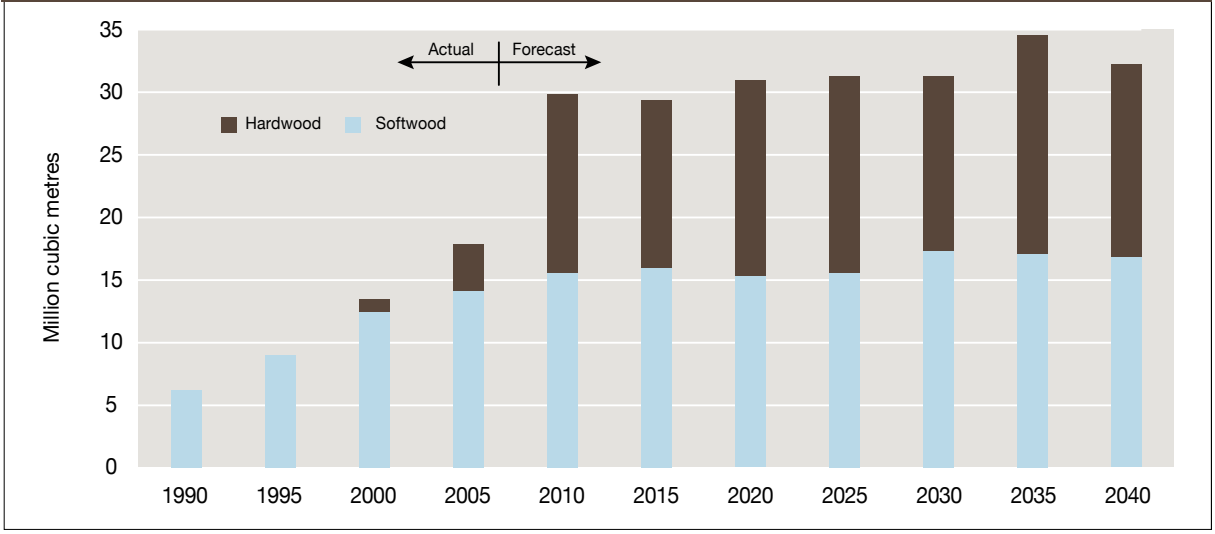
These changes in log supply have important implications for Australia's wood and paper product manufacturing industries, for the rural economies where those industries are based and for the national supply of forest products. They also have implications for export income and the national balance of payments. To help understand likely future changes, this report provides forecasts of the future supply of logs from plantations, by region and nationally.

SOURCES AND ASSUMPTIONS

Most of the forecasts in this report were derived directly from data provided by the owners and managers of large plantation estates. Discrepancies and anomalies were clarified with the owner or manager. For example, some owners and managers only provided data for currently established areas and did not assume replanting. Where growers' data were incomplete for later periods, a three-year moving average or other method was used to estimate future log supply. Estimates derived in this way were checked by comparing with modelled scenarios.

Where plantation owners and managers did not provide log supply forecasts, estimates are based on a yield model developed by the National Plantation Inventory using data on plantation areas by species

FIGURE 1: PAST AND FUTURE PLANTATION LOG SUPPLY



and region, as reported in *Australia's Plantations 2006* (Parsons *et al*. 2006). These areas are summarised in graphs accompanying the regional forecasts. Yield tables for the model were either taken from Ferguson *et al*. (2002), obtained from plantation owners and managers, or developed by the National Plantation Inventory. These yield tables are provided in Appendix 1.

The forecasts are based on the assumption that harvested areas will usually be replanted with the same type of plantation. In fact, some recently harvested plantations have not been replanted, some softwood plantation sites have been replanted with hardwoods and some hardwood plantation sites have been replanted with softwoods. These factors have been allowed for in a few regions where there is an adequate understanding of likely changes. Such changes are described in the relevant regional sections. In other regions, changes are assumed to be insignificant.

Supply forecasts take into account the area of plantations by year of establishment as well as the assumed production period and growth rate for a given type of plantation. The areas planted in each five-year period are shown in graphs accompanying the regional forecasts. Variations in the area planted from year to year lead to peaks and troughs in forecast supply. Market demand will determine the actual volumes that are harvested at a particular time and plantation managers will adjust silviculture, scheduling and operational management accordingly. This usually leads to a smoothing of supply over time.

Some plantation owners and managers provided smoothed forecasts. However, rather than make arbitrary decisions about how such smoothing would eventually be undertaken, in most cases the forecasts developed by the National Plantation Inventory simply reflect current plantation age. Users of the data can assess for themselves how the forecast supply may be adjusted in practice. The exceptions are described in the relevant regional sections.

Softwood plantations in Australia are managed primarily to produce sawlogs and veneer logs. Pulpwood, posts, poles and low-quality sawlogs are harvested from thinning operations that aim to remove suppressed and poorly-formed trees and to provide more space for the remaining trees. Hardwood plantations are managed either for sawlog and veneer log production or for pulpwood production.

Research and operational experience show that hardwood plantations must be thinned and pruned and grown for longer periods if they are to produce substantial volumes of sawlogs (Nolan *et al*. 2005).

A trainee learns to operate mechanical harvester in blue gum plantation.
Photo courtesy of the Forest Training Centre (WA) Ltd

The forecasts in this report assume that such thinning and pruning will be undertaken at an optimal level; future sawlog yields will be substantially lower than forecast if this does not happen. Hardwood plantations managed for sawlog production may also produce some pulpwood from thinnings, defective stems and unpruned higher sections of stems. This pulpwood is included in the forecasts.

Potential changes in the productivity of future rotations have not been considered in the forecasts developed by the National Plantation Inventory. Productivity will be increased by ongoing tree-breeding and the development of improved silvicultural techniques and may be reduced by factors such as increased insect damage and reduced water availability.

Other assumptions that apply to all forecasts include:

- volumes given for sawlogs include logs suitable for veneer and plywood manufacture. Sawlog quality ranges widely. It was not feasible to provide forecasts for individual sawlog quality classes;
- volumes shown for pulpwood include logs suitable for pulp, paper, particleboard, fibreboard, other reconstituted fibre products, posts and poles. Pulpwood volumes do not account for sawmilling and other residues that are used for woodchips, pulp, paper, particleboard and other reconstituted fibre products; and
- the volumes shown are gross harvestable volumes and do not allow for losses during harvesting.

PLANTATION EXPANSION

The total land area dedicated to timber plantations in Australia has increased steadily for many years (Figure 2). Currently reported project targets collated by the National Plantation Inventory indicate that the total area of plantations could reach 2.3–2.4 million hectares by about 2020. This estimate takes into account most currently planned new timber plantations, although some plantation managers and investors may not have specific area targets in mind. The estimate only includes reforestation primarily aimed at commercial timber production.

Whether plantation managers reach their expansion targets depends on a range of factors, most importantly the availability of investment funds and suitable land. The former depends on the relative attractiveness of plantations compared to other investment options. Taxation arrangements can have a large impact on this and have led to significant variations in the area of new plantations established. For example, Figure 3 shows a spike in plantation establishment in the late 1990s and early 2000s in response to changes in taxation arrangements. The same factors may affect the extent to which plantations are replanted after harvesting.

The price and availability of suitable land are limiting plantation expansion in several regions and prompting plantation companies to seek new regions for plantation development. The establishment of plantations on farmland has led to community concerns that could lead to companies looking elsewhere.

The emphasis on short-rotation plantations is also changing. A larger proportion of new plantations in the future is likely to be aimed at sawlog production, which may suit land outside the traditional plantation regions. This trend will be helped by new taxation arrangements that removed an impediment to the buying and selling of immature plantations funded through managed investment schemes.

The above factors make it difficult to assess the future rate of plantation expansion or where and in what form such expansion will occur. The forecasts of log supply in this report are therefore based mainly on areas of plantation already established. Some new planting is factored in where forecasts were provided by plantation owners and managers; these are explained in the regional sections of the report.

FIGURE 2: AREA OF TIMBER PLANTATIONS, 1996–2006

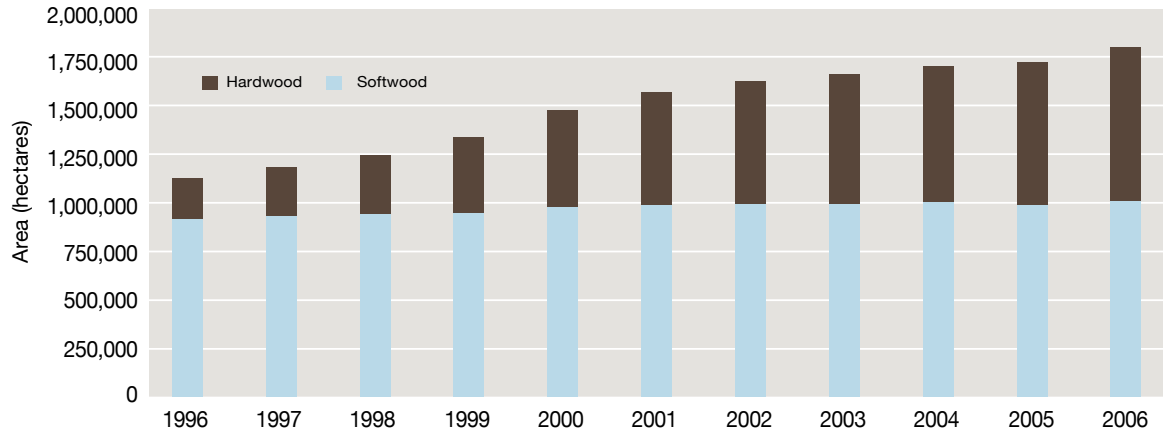
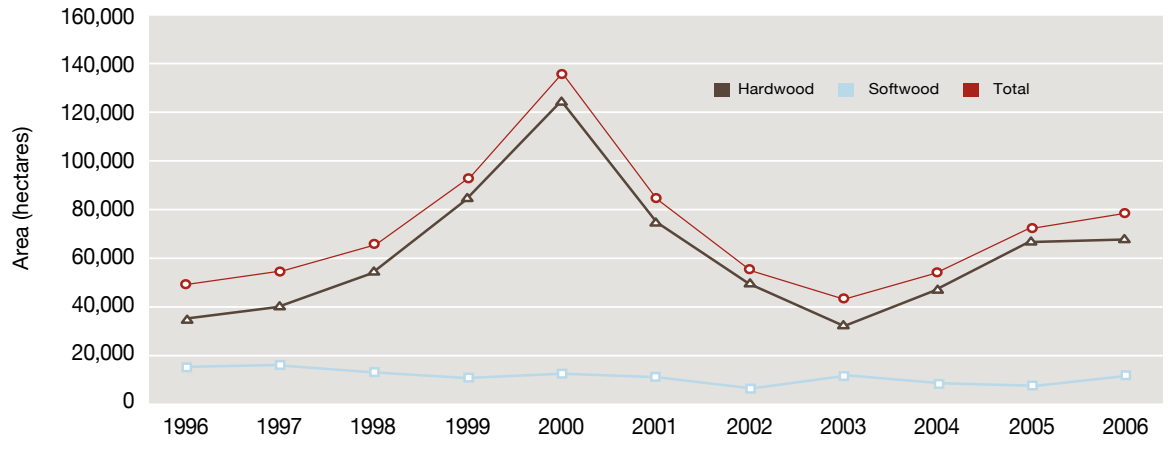


FIGURE 3: NEW PLANTATIONS SINCE 1996



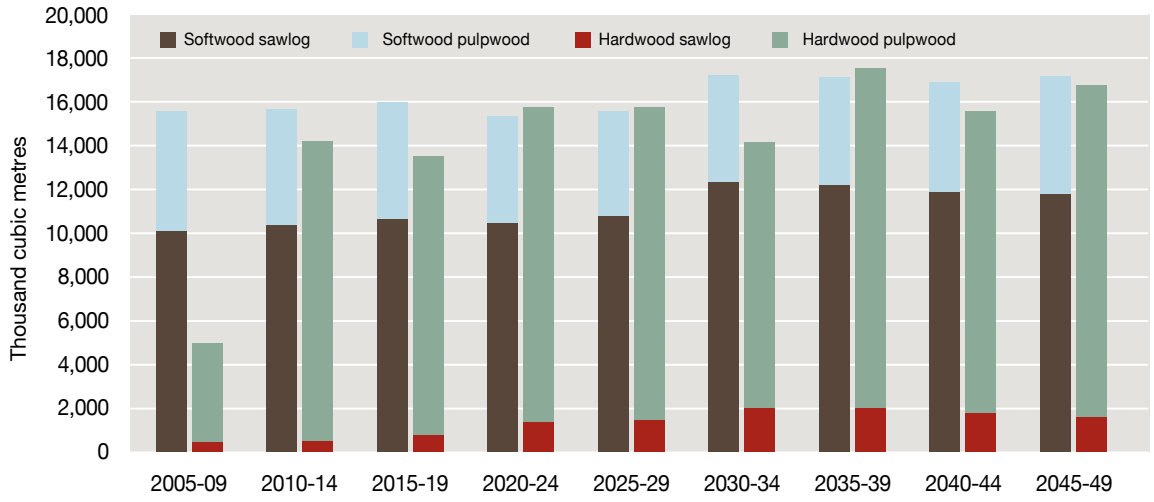
SUMMARY TABLES

Table 1 and figures 4–8 show forecast log supply in nine five-year periods between 2005 and 2049.

TABLE 1: FORECAST PLANTATION LOG SUPPLY, AUSTRALIA
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	4,596	13,759	12,823	14,599	14,402	12,313	15,658	13,928	15,260
– sawlog	224	358	582	1,110	1,238	1,766	1,819	1,625	1,397
– total	4,819	14,118	13,405	15,709	15,639	14,079	17,477	15,553	16,657
Softwood									
– pulpwood	5,444	5,308	5,376	4,896	4,723	4,868	4,933	5,042	5,341
– sawlog	10,079	10,303	10,544	10,395	10,775	12,292	12,150	11,791	11,854
– total	15,524	15,611	15,920	15,291	15,498	17,160	17,083	16,833	17,195
Overall total	**20,342**	**29,729**	**29,325**	**31,000**	**31,137**	**31,239**	**34,560**	**32,389**	**33,852**

FIGURE 4: FORECAST PLANTATION LOG SUPPLY, AUSTRALIA



1. Sawlogs include logs used to manufacture veneer, plywood and sawn timber
2. Pulpwood includes logs used to manufacture posts and poles, fibreboard, particleboard and paper products

FIGURE 5: FORECAST PLANTATION HARDWOOD PULPWOOD SUPPLY, BY REGION

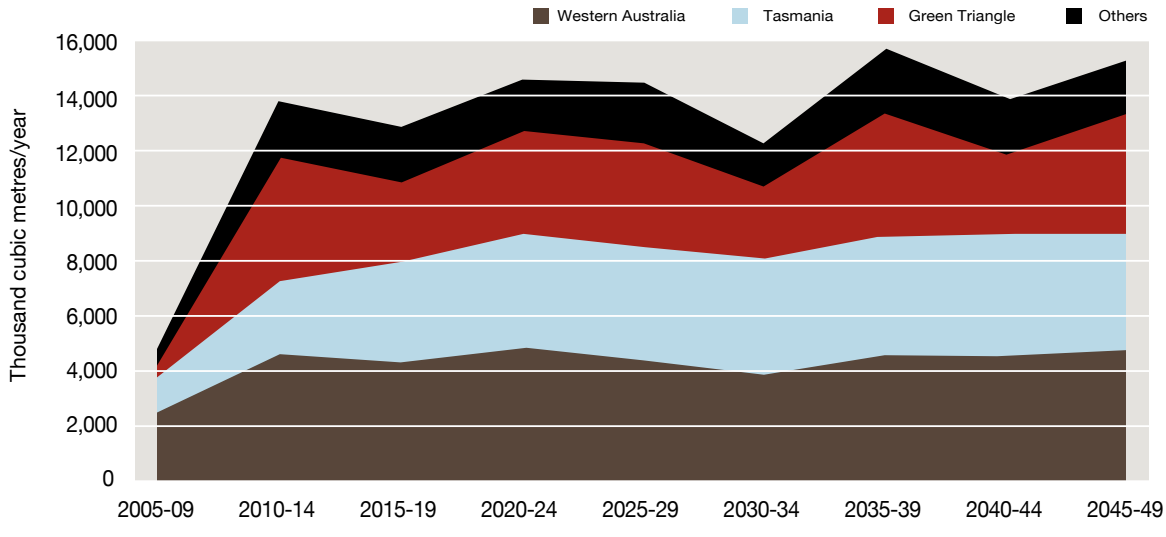


FIGURE 6: FORECAST PLANTATION HARDWOOD SAWLOG SUPPLY, BY REGION

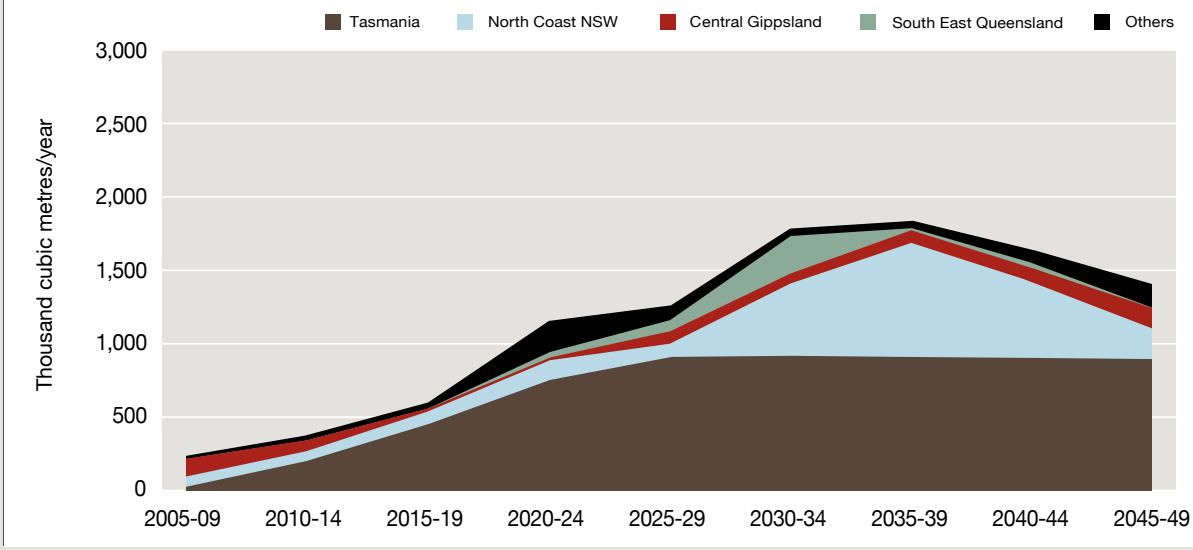


FIGURE 7: FORECAST PLANTATION SOFTWOOD PULPWOOD SUPPLY, BY REGION

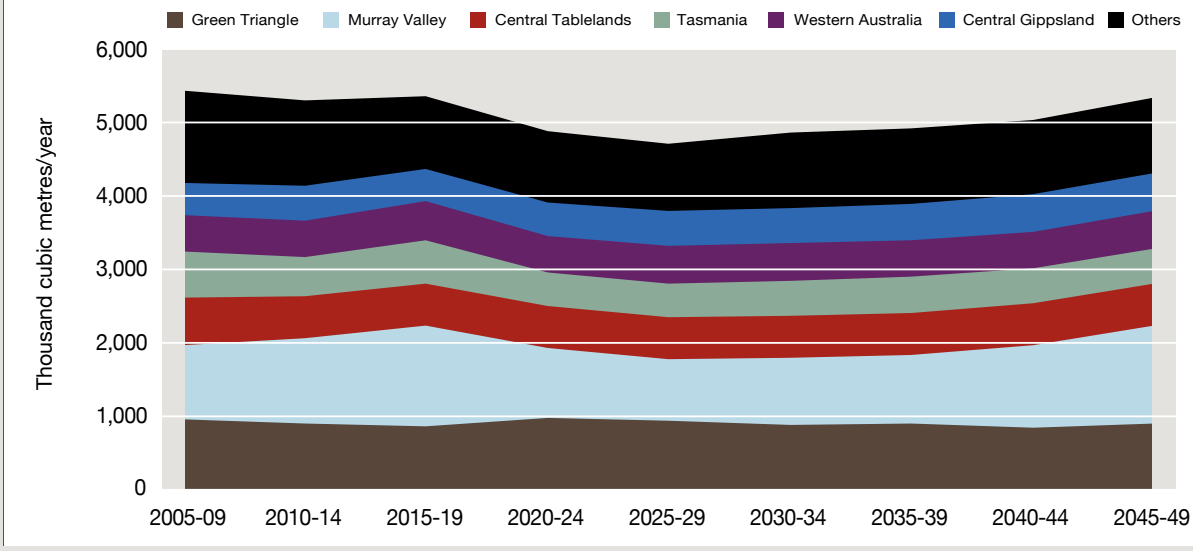
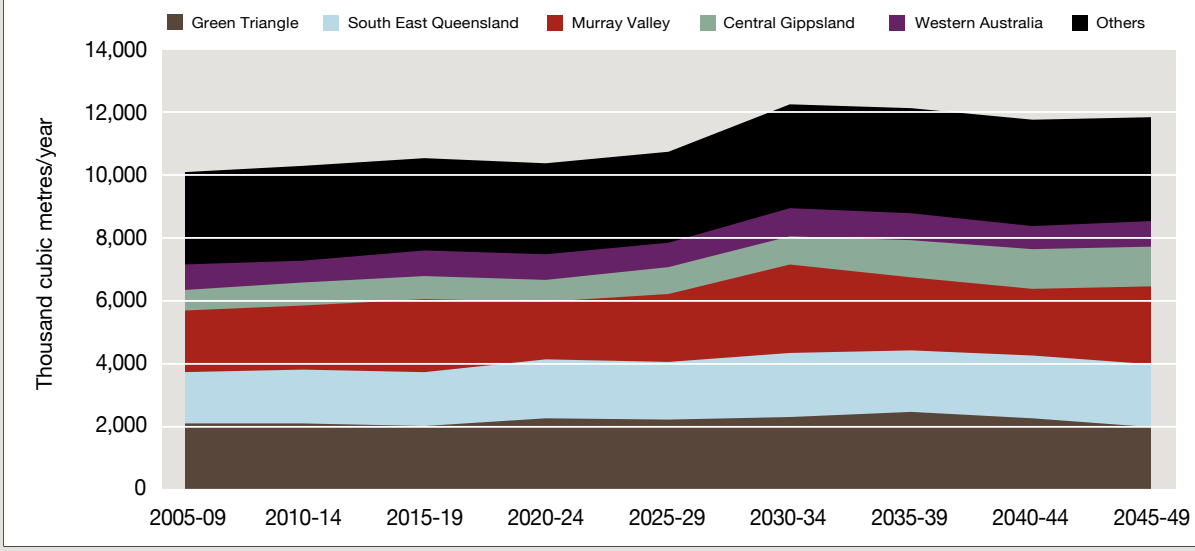


FIGURE 8: FORECAST PLANTATION SOFTWOOD SAWLOG SUPPLY, BY REGION



WHAT DO THE FORECASTS TELL US?

The surge in industrial plantation establishment over the past decade or more is beginning to yield large volumes of logs. Log supply from plantations is forecast to increase from nearly 18 million cubic metres per year in 2005–06 to nearly 30 million cubic metres per year in 2010, an increase of about 67%. Forecast supply in 2010 comprises hardwood pulpwood (46%), softwood sawlogs (35%), softwood pulpwood (18%) and hardwood sawlogs (1%). Trends and issues for hardwood and softwood plantations are discussed below.

Hardwood plantation forecast

Hardwood plantation supply is soaring. Supply by 2010 is forecast to be nearly 14 million cubic metres per year, about four times the volume harvested in 2005–06.

Pulpwood constitutes nearly all of the increase in production from hardwood plantations. By 2010, Western Australia, the Green Triangle and Tasmania will each be able to produce over 3 million cubic metres per year of hardwood pulpwood, sufficient to supply a world-scale pulp and paper industry in each region. Proposals to build pulp mills are currently being assessed in Tasmania and the Green Triangle.

Most plantation hardwood pulpwood is currently produced in Western Australia, Tasmania and Central Gippsland. By 2010, the major hardwood pulpwood-producing regions will be the Green Triangle and Western Australia (each 33% of the national total), Tasmania (19%) and Central Victoria (5%).

In contrast to the escalation in hardwood pulpwood supply, the supply of hardwood sawlogs is low and not expected to increase significantly for many years. This reflects the lower level of investment in hardwood plantations aimed at sawlog production. Most of the hardwood sawlog plantations are in northern New South Wales, Tasmania, South East Queensland and Central Gippsland and were predominantly established by governments, although the Central Gippsland plantations are now privately owned. Private investment in hardwood sawlog plantations has increased in recent years and may increase further due to recent changes to taxation arrangements aimed at removing impediments to the buying and selling of established plantations.

Hardwood sawlog supply will be lower than forecast if plantations that are currently managed for sawlog production are not thinned and pruned.

Central Gippsland and North Coast New South Wales are the main sources of hardwood plantation sawlogs, producing an annual average of about 120,000 and 72,000 cubic metres, respectively. By 2010, the total national supply of hardwood plantation sawlogs is forecast to be about 365,000 cubic metres per year. Tasmania will produce 53% of the total and Central Gippsland and North Coast New South Wales about 20% each. Hardwood plantation sawlog supply is forecast to exceed 1 million cubic metres per year after 2020, peaking at around 1.8 million cubic metres per year in 2030.

Slash pine. Photo courtesy of Kieran Lewis, Forestry Plantations Queensland

Softwood plantation forecast

The supply of softwood sawlogs, currently around 9 million cubic metres per year, is forecast to be steady at 10–10.5 million cubic metres per year for the next 15–20 years and to increase to around 12 million cubic metres per year from 2030. This trend is important because most sawn timber used for housing and general construction in Australia is derived from softwood sawlogs. The increased supply in the longer term is due to some replanting of hardwood plantation sites with softwoods, better silviculture and an expansion of the softwood plantation estate in a few regions.

The major softwood sawlog-producing regions are — and will remain – the Green Triangle, South East Queensland and the Murray Valley. In 2010, the Green Triangle and the Murray Valley will each produce an estimated 20% of the national softwood sawlog total, South East Queensland will produce 17% and Western Australia, Central Tablelands New South Wales and Tasmania 7% each.

Softwood pulpwood supply, currently 5.0 million cubic metres per year, will sit at around 5.4 million cubic metres per year until the mid 2020s. It will then decline to about 4.7 million cubic metres per year before increasing again after 2030.

For many years, a surplus supply of softwood pulpwood in several regions meant that thinning operations were delayed or never carried out, with the effect of reducing long-term sawlog yields. However, improved market opportunities for softwood pulpwood over the last ten years have reduced or eliminated this surplus in several major plantation regions and encouraged an increase in thinning. One effect of this may be to limit expansion in the Australian manufacture of medium density fibreboard, particleboard and softwood-based pulp and paper products. However, further market changes, such as a decline in softwood woodchip export demand or increased timber recovery and recycling, may act to increase supply for Australian manufacturers.

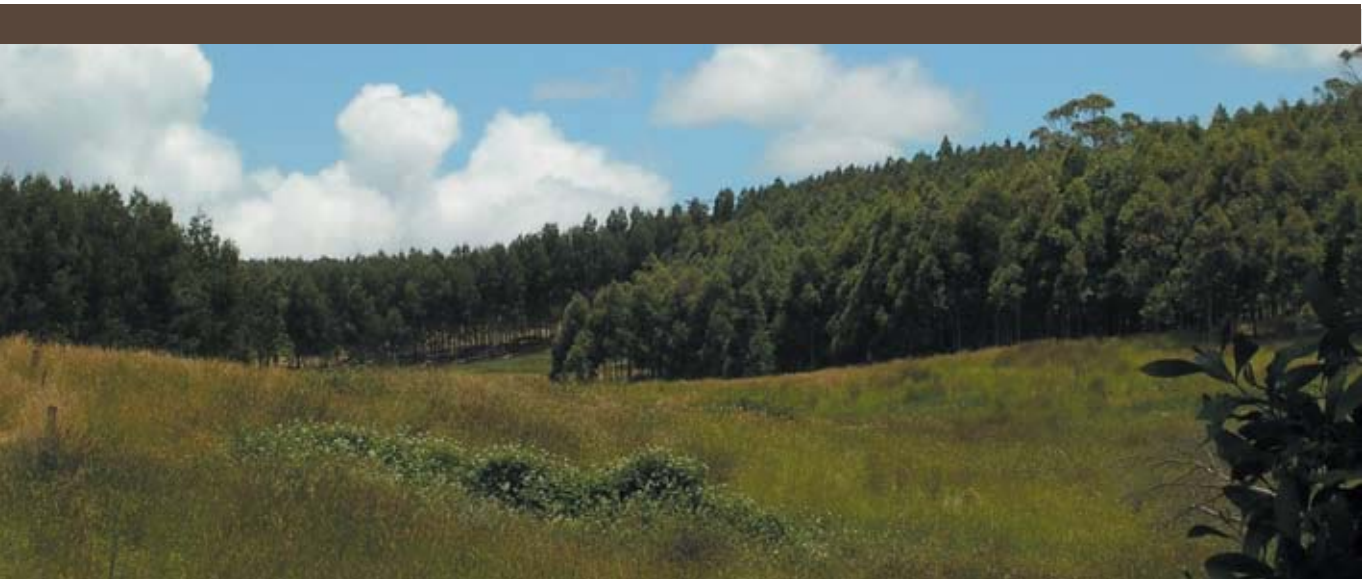
HOW DOES THE 2007 FORECAST COMPARE WITH THE 2002 FORECAST?

The previous Australian plantation log supply forecast (Ferguson *et al*. 2002) was based on plantation areas recorded by the National Plantation Inventory as at 2000. This new forecast is based mainly on areas recorded as at 2005.

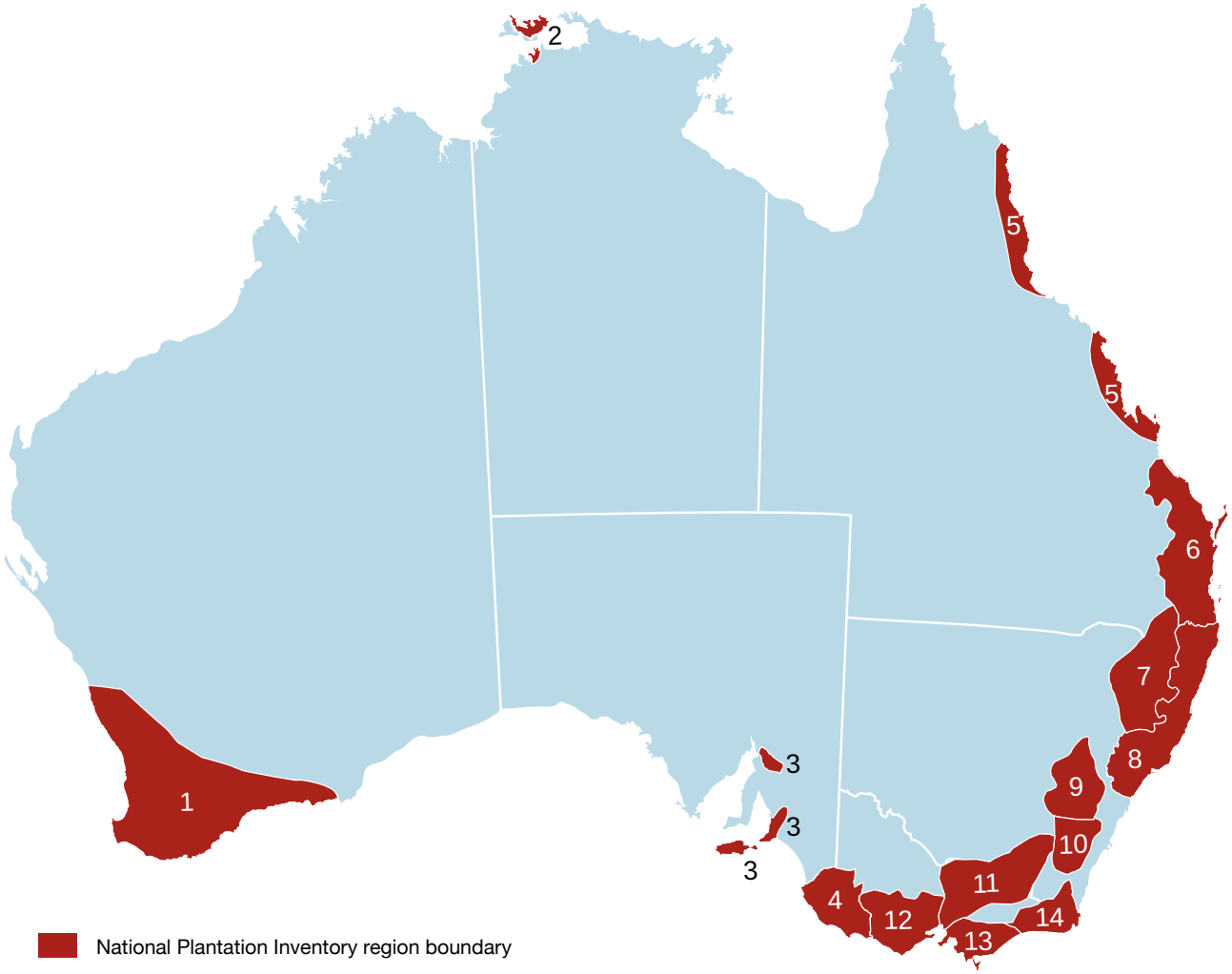
The 2007 forecast predicts a slightly lower short-term national hardwood supply compared to the 2002 forecast but a 20–30% increase over the 2002 estimate beyond 2010. The lower short-term estimate is due to delays in the harvesting of some hardwood pulpwood plantations, while the increase from 2010 simply reflects the large areas of new hardwood plantations that were established between 2000 and 2005. These new plantations are nearly all managed for pulpwood production on rotations of 10–15 years.

The new softwood supply forecast is a few per cent higher than the 2002 forecast in the short and medium terms (2010–2029) and about 10% higher in the longer term. The short-term increase is mainly a function of data quality; the new softwood log supply forecast is based on data provided directly by plantation owners and managers, while the earlier estimate was based on growth models.

The total national area of softwood plantations increased by about 2% between the two forecasts, with decreases in some regions more than offset by increases in others. For some regions (including Tasmania, Central Gippsland and North Queensland), information provided by plantation managers for the 2007 forecast implied future increases in softwood plantation area; the forecast 10% increase in long-term log supply is due to these increases.



REGIONAL FORECASTS

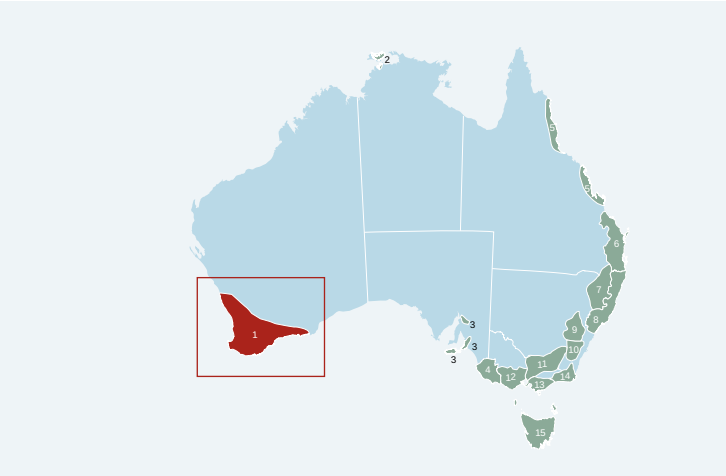


National Plantation Inventory region boundary

1. Western Australia
2. Northern Territory
3. Mount Lofty Ranges and Kangaroo Island
4. Green Triangle
5. North Queensland
6. South East Queensland
7. Northern Tablelands
8. North Coast NSW
9. Central Tablelands NSW
10. Southern Tablelands NSW
11. Murray Valley
12. Central Victoria
13. Central Gippsland
14. East Gippsland-Bombala
15. Tasmania

Source: National Plantation Inventory 2006

WESTERN AUSTRALIA



Plantations in Western Australia occur in an arc from the north of Perth to east of Esperance as well as in some small areas of the Ord River irrigation area in the far north of the State. Major plantation timber-processing industries are located at Welshpool, Dardanup, Manjimup, Collie, Neerabup and Albany. Woodchips are exported from ports at Bunbury and Albany. A planned strandboard mill near Albany would also use plantation hardwood pulpwood.

Western Australia's hardwood plantations include several thousand hectares of brown mallet (*Eucalyptus astringens*) and an assortment of other slow-growing species that were established on public land in the early 20th century. These produce very small volumes of sawlogs.

The vast majority — over 95% — of Western Australia's hardwood plantations are composed of blue gum (*E. globulus*) and have been established since 1990. Forecasts of log volumes in this report were made on the assumption that all these plantations are managed for pulpwood production. Some farm foresters manage their blue gum plantations for sawlog production but the potential supply from these is very small. Of the other recently planted hardwood species, the forecasts assume that only the sugar gum (*E. cladocalyx*), Sydney blue gum (*E. saligna*) and flooded gum (*E. grandis*) plantations would produce an economic sawlog yield.

Production from the blue gum plantations commenced in 2004 and is increasing rapidly. Exceptionally large areas established in 1999–2001 will reach harvest age early in the next decade. Supply from this large area has been smoothed in the forecasts to better reflect the likely rate of harvesting.

Western Australia's softwood plantations, comprising radiata pine (*Pinus radiata*) and maritime pine (*P. pinaster*), have been producing sawlogs and pulpwood for many years. A substantial area of maritime pine plantation is located at Gnangara, near Perth, on land above an aquifer that is used for urban water supply. These plantations are not being replanted after harvesting in an attempt to increase aquifer recharge. The area of softwood plantations is increasing in other areas, primarily in the wheat belt where reforestation with maritime pine is a salinity management strategy. The resulting changes in plantation area are allowed for in the log-supply forecast.

Plantation owners and managers provided over 80% of the data on forecast softwood plantation supply and about 40% of the data on forecast hardwood plantation log supply.

FIGURE 9: AREA PLANTED BY FIVE-YEAR PERIOD, WESTERN AUSTRALIA

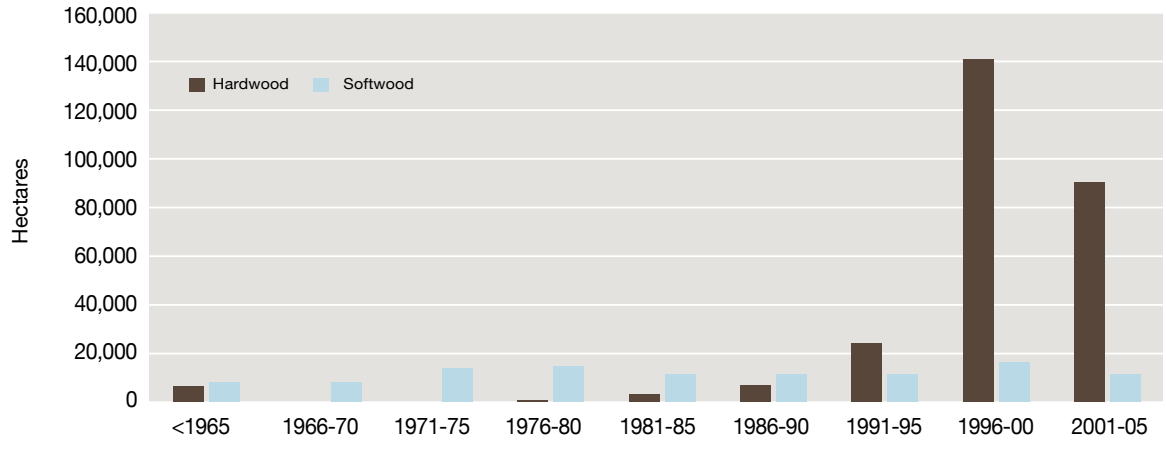


TABLE 2: FORECAST PLANTATION LOG SUPPLY, WESTERN AUSTRALIA
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	2,442	4,531	4,293	4,816	4,319	3,852	4,542	4,537	4,716
– sawlog	5	1	0	33	6	1	0	33	6
Softwood									
– pulpwood	490	495	541	498	506	513	503	504	519
– sawlog	816	725	822	811	799	912	852	743	825

FIGURE 10: FORECAST PLANTATION LOG SUPPLY, WESTERN AUSTRALIA (HARDWOOD)

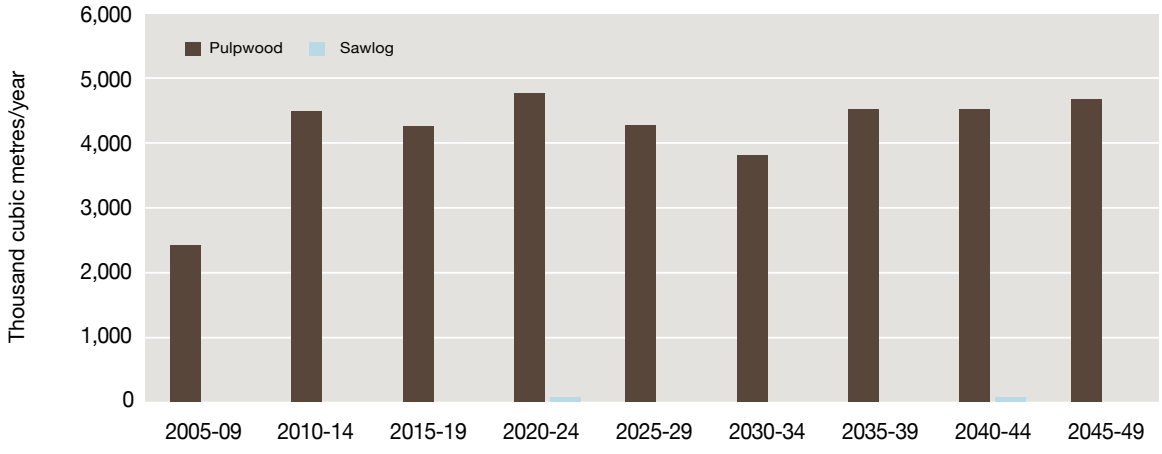
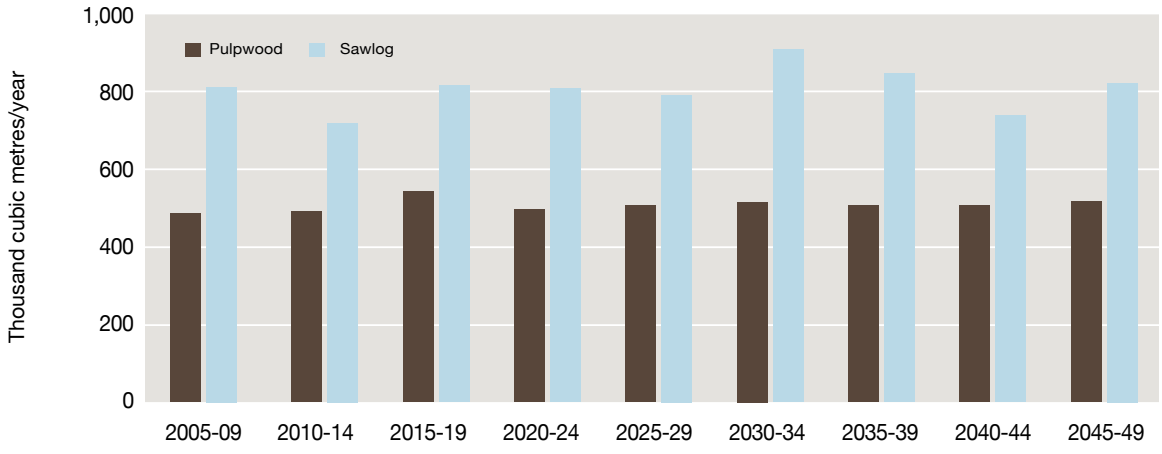
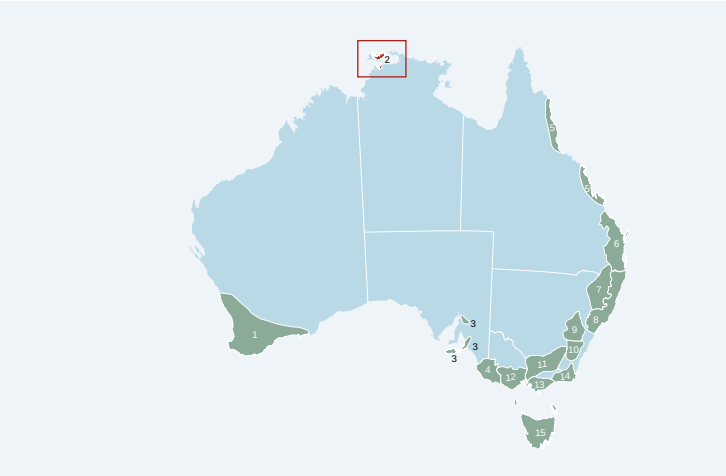


FIGURE 11: FORECAST PLANTATION LOG SUPPLY, WESTERN AUSTRALIA (SOFTWOOD)



NORTHERN TERRITORY



Plantations in the Northern Territory comprise substantial areas located on Melville Island and some small areas in northern parts of the mainland. Softwood plantation establishment began on Melville Island in the 1960s, initially using blue cypress pine (*Callitris intratropica*), a native softwood tree, and then, from the mid-1970s until the early 1990s, the faster-growing Caribbean pine (*Pinus caribaea*). The capacity of the blue cypress pine plantations to produce commercial volumes of timber is currently being assessed. The Caribbean pine plantations are already producing timber commercially and after harvesting are being replaced with mangium (*Acacia mangium*).

The development of mangium plantations in the Northern Territory began in the late 1990s and continues at a rapid pace. Located on Melville Island, they are managed solely for pulpwood and amount to about 98% of the region's hardwood plantations. The estimates given here are based on the area of plantations established up to 2005. At the currently planned rate of planting, pulpwood production will reach around 1.5 million cubic metres per year by 2015.

The Northern Territory's other hardwood plantations are on the mainland and include research and demonstration sites and plantations of red mahogany (*Eucalyptus pellita*) and African mahogany (*Khaya senegalensis*) aimed at sawlog production. Due to their small current area and young age and the difficulty of estimating growth rates, the potential contribution of these plantations to log supply is not included in this report. They are unlikely to produce a significant volume until at least 2020.

The log supply forecasts for the Northern Territory are based largely on supplied data.

FIGURE 12: AREA PLANTED IN EACH FIVE-YEAR PERIOD, NORTHERN TERRITORY

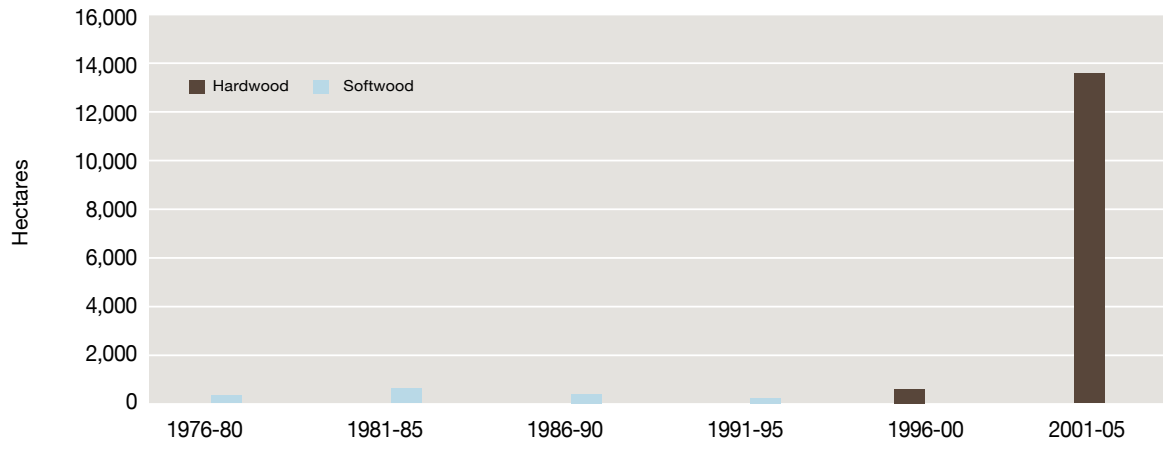


TABLE 3: FORECAST PLANTATION LOG SUPPLY, NORTHERN TERRITORY
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	0	212	306	306	306	306	306	306	306
Softwood									
– pulpwood	56	0	0	0	0	0	0	0	0
– sawlog	24	0	0	0	0	0	0	0	0

FIGURE 13: FORECAST PLANTATION LOG SUPPLY, NORTHERN TERRITORY (HARDWOOD)

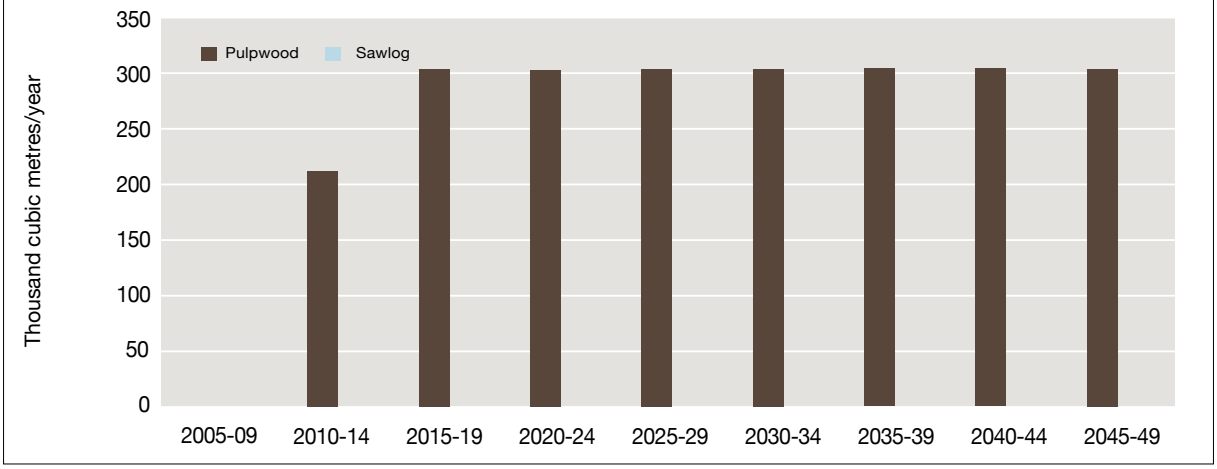
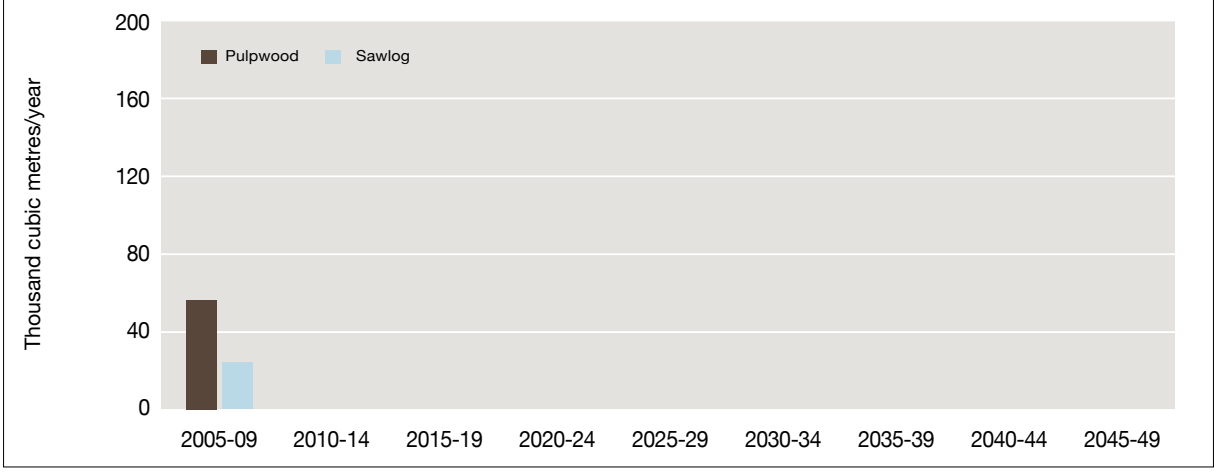
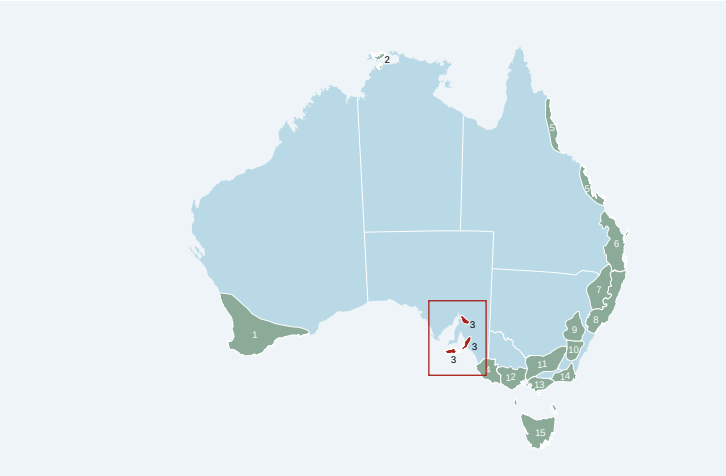


FIGURE 14: FORECAST PLANTATION LOG SUPPLY, NORTHERN TERRITORY (SOFTWOOD)



MT LOFTY RANGES AND KANGAROO ISLAND



The Mt Lofty Ranges and Kangaroo Island plantation inventory region extends to the north and east of Port Pirie and includes the Fleurieu Peninsula to the south of Adelaide as well as Kangaroo Island.

The softwood plantations in this region supply sawlogs and pulpwood to processing industries near Adelaide at Wirrabara and Kuitpo. Logs can be exported from the Port of Adelaide.

The softwood sawlog supply is currently higher than the long-term potential supply. This is due to an expected reduction in supply from small private plantations, the early harvesting and replanting of poor-performing stands, and management decisions to reduce rotation length and harvest in the short to medium term at a rate higher than the long-term sustainable rate.

About 90% of the hardwood plantations are blue gum established by investment schemes and aimed at pulpwood production. The other 10% is a farm forestry resource, the owners of which are aiming at sawlog production; it comprises a range of hardwood species and is nearly all less than ten years' old. Given its small total area, wide range of species and large variability in growth, forecast sawlog supply from the farm forestry resource should be considered indicative.

Plantation owners and managers provided about 80% of the data on forecast softwood plantation log supply and 60% of the data on forecast hardwood plantation log supply.

FIGURE 15: AREA PLANTED IN EACH FIVE-YEAR PERIOD, MT LOFTY RANGES AND KANGAROO ISLAND

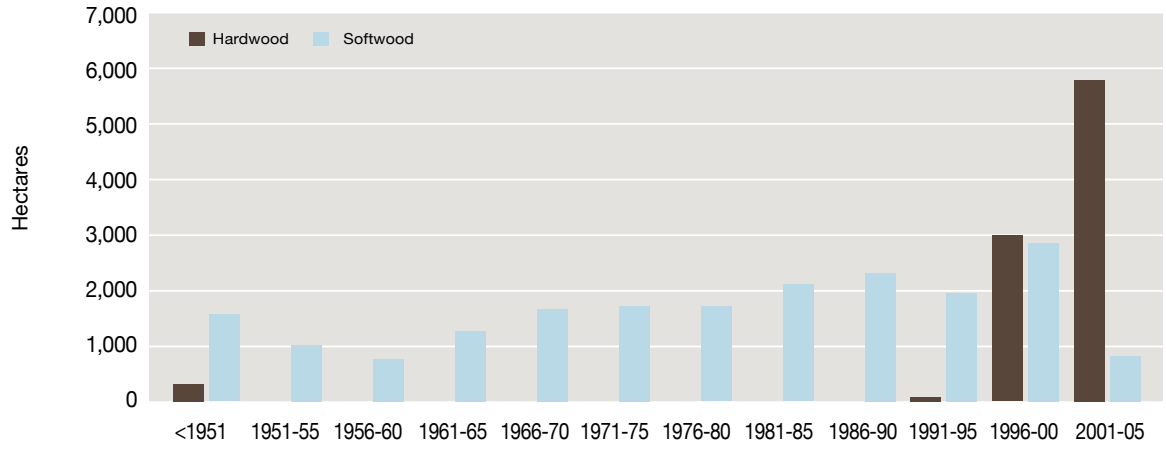


TABLE 4: FORECAST PLANTATION LOG SUPPLY, MT LOFTY RANGES AND KANGAROO ISLAND
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	12	112	226	108	240	17	119	215	108
– sawlog	0	0	0	14	7	0	0	0	14
Softwood									
– pulpwood	10	10	8	10	13	9	9	11	10
– sawlog	182	135	92	119	134	92	110	113	113

FIGURE 16: FORECAST PLANTATION LOG SUPPLY, MT LOFTY RANGES AND KANGAROO ISLAND (HARDWOOD)

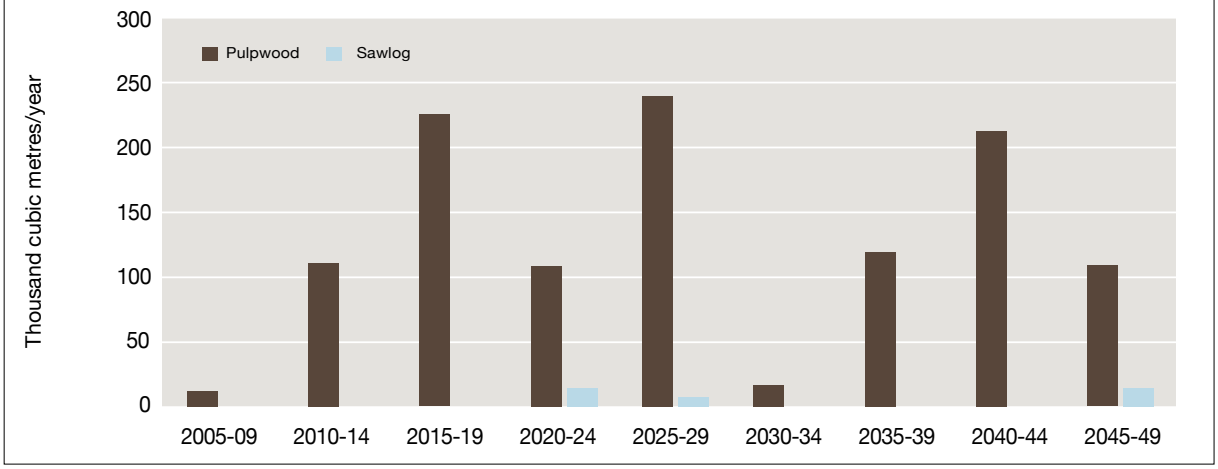
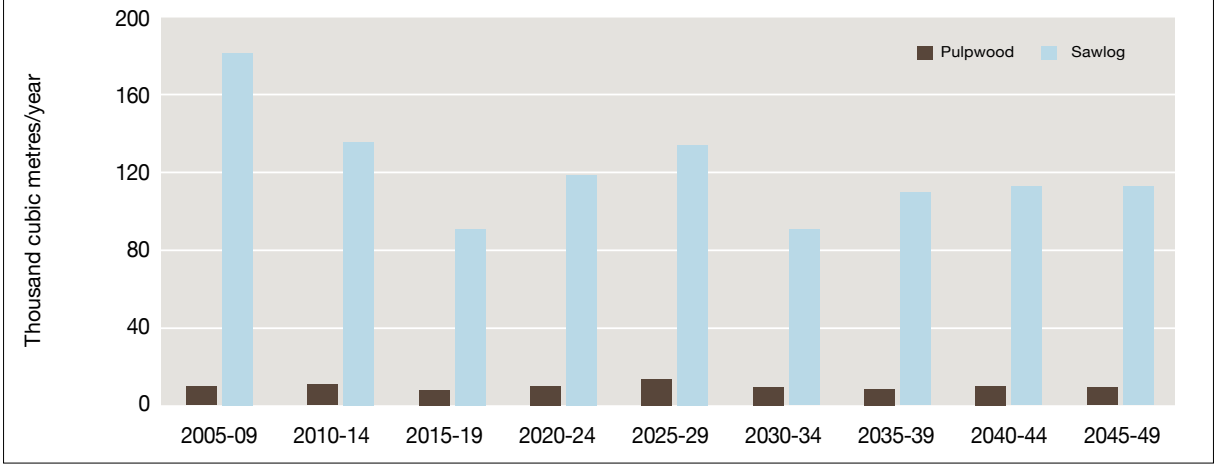
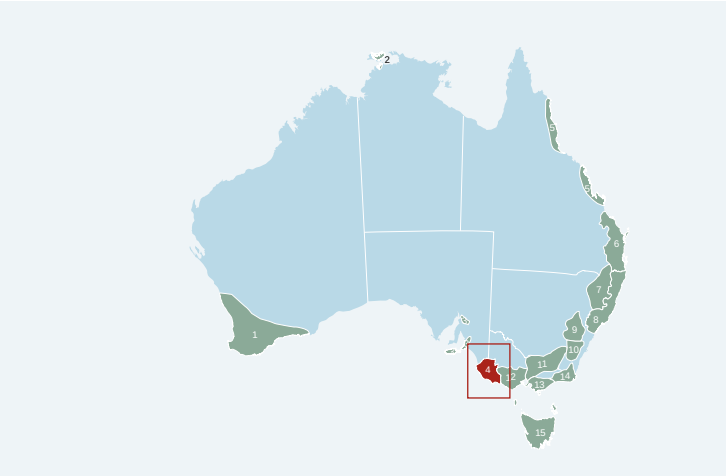


FIGURE 17: FORECAST PLANTATION LOG SUPPLY, MT LOFTY RANGES AND KANGAROO ISLAND (SOFTWOOD)



GREEN TRIANGLE



The Green Triangle straddles the border between south-east South Australia and south-west Victoria. It has been a major softwood plantation region since the early 20th century and includes some of Australia's most productive radiata pine plantations. Many are into their third rotation.

The Green Triangle softwood plantations of mostly radiata pine provide a steady supply of sawlogs, veneer logs and pulpwood to large-scale integrated processing industries at Mount Gambier, Tarpeena, Dartmoor, Millicent and other locations. These industries produce sawn timber, laminated veneer lumber, particleboard, treated posts and poles and pulp for tissue manufacture. Sawlogs and woodchips are exported from Portland.

The first commercial-scale blue gum plantations were established around 1990 and the area has expanded rapidly since the late 1990s. The fraction managed for sawlog production is very small and few reliable data were available with which to forecast the potential supply. The hardwood plantation forecast below therefore includes only pulpwood production.

Hardwood pulpwood harvesting has commenced on a small scale and will increase rapidly in the next few years. Large areas planted in 2000–01 are reflected in the peak supply forecast for 2010–15, although it is likely that this peak will be smoothed by harvesting delays in some stands. Allowing for that smoothing, the long-term stable supply appears to be around 3.7 million cubic metres per year, which is consistent with previous estimates (Green Triangle Plantation Committee 2005). Export markets are currently the only option for selling this material but a proposal to develop a pulpmill at Penola that would use blue gum pulpwood is being considered.

Plantation owners and managers provided 100% of the data on forecast softwood plantation log supply and about 70% of the data on forecast hardwood plantation log supply.

FIGURE 18: AREA PLANTED IN EACH FIVE-YEAR PERIOD, GREEN TRIANGLE

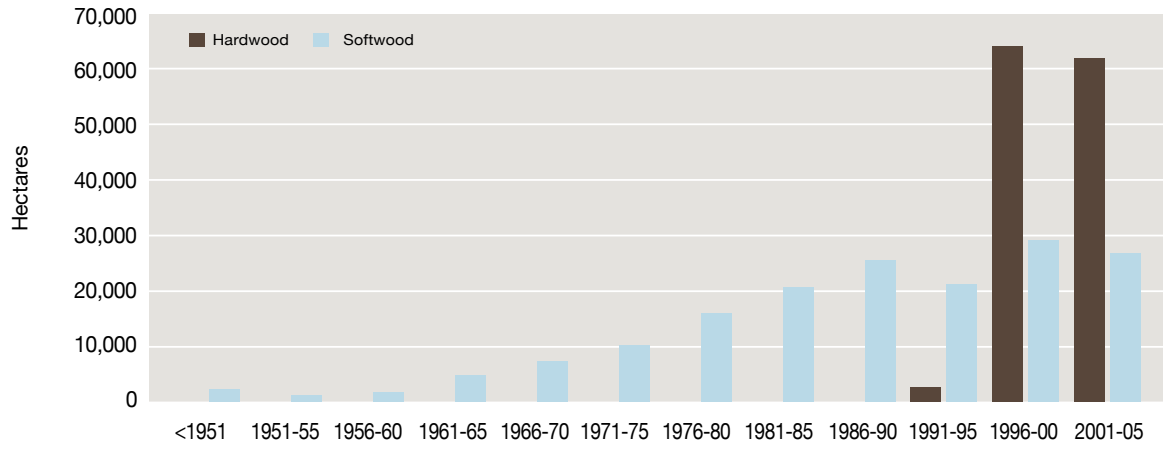


TABLE 5:	FORECAST PLANTATION LOG SUPPLY, GREEN TRIANGLE (Thousand cubic metres per year average for each five year period)								
Period	**2005-09**	**2010-14**	**2015-19**	**2020-24**	**2025-29**	**2030-34**	**2035-39**	**2040-44**	**2045-49**
Hardwood									
– pulpwood	388	4,555	2,923	3,790	3,815	2,623	4,518	2,870	4,381
Softwood									
– pulpwood	938	886	847	960	918	866	887	830	891
– sawlog	2,058	2,059	1,978	2,221	2,167	2,270	2,416	2,227	1,946

FIGURE 19: FORECAST PLANTATION LOG SUPPLY, GREEN TRIANGLE (HARDWOOD)

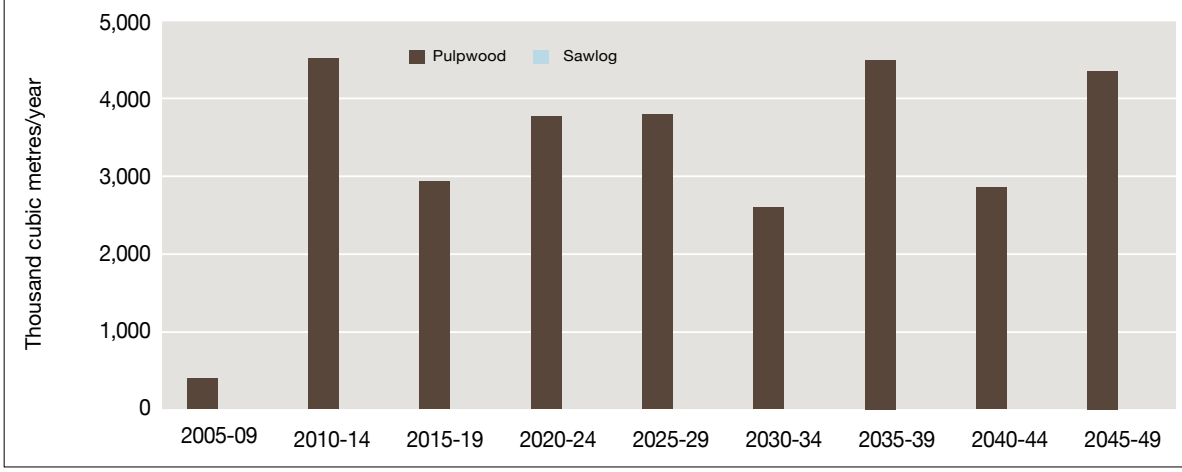
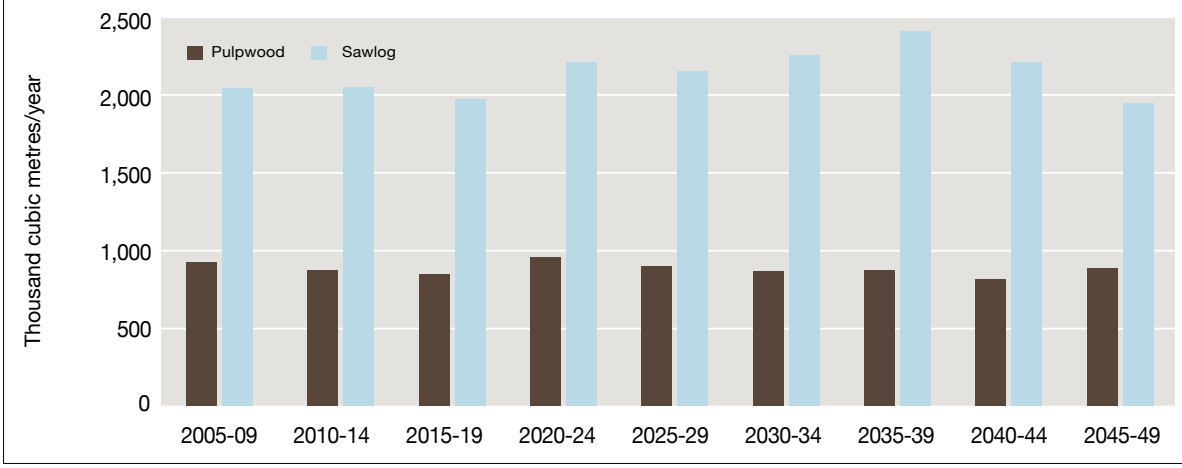
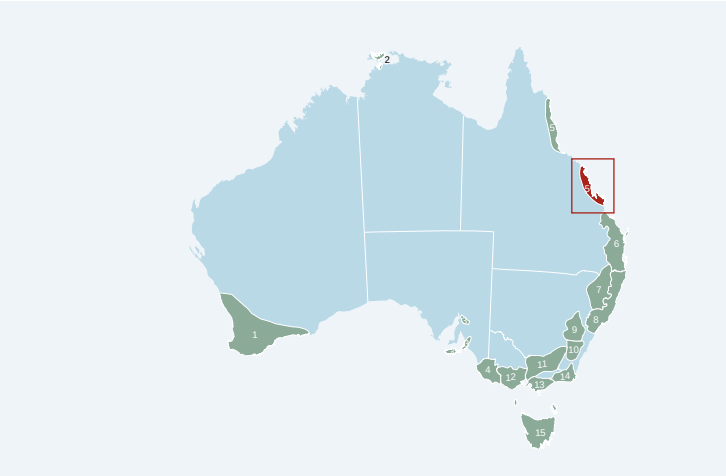


FIGURE 20: FORECAST PLANTATION LOG SUPPLY, GREEN TRIANGLE (SOFTWOOD)



NORTH QUEENSLAND



The North Queensland plantation region lies north of Gladstone, generally in a strip along the coast as far north as Cooktown. The softwood plantations are concentrated between Ingham and Tully, near Yeppoon, and on the Atherton Tableland. They comprise Caribbean pine and native hoop pine (*Araucaria cunninghamii),* mainly on public land, and have been established for many years. They supply sawmills at Ravenshoe and Bondoola. Softwood sawlogs (mainly Caribbean pine) are exported from Townsville.

Current softwood log supply is higher than can be sustained in the medium term due to a backlog of plantations that are now ready for harvest. The salvage of logs from sites near Atherton damaged by Cyclone Larry in 2006 has added to the higher short-term rate of harvesting. Forestry Plantations Queensland is increasing the total plantation area in the region. Supply is forecast to increase substantially after 2030 when the new plantations and the second rotation of recently harvested sites begin to reach harvest age.

The hardwood plantations in North Queensland are dispersed more widely than the softwood plantations and are nearly all on private land. They include farm forests of a range of native hardwoods established in the 1990s with funding from the Community Rainforest Reforestation Program. More recently, private investment schemes have established eucalypts for pulpwood production and tropical hardwoods, including teak (*Tectona grandis*) and African and red mahogany, for sawlog production. The hardwood plantations are currently too young to produce commercial timber. The peaks in forecast pulpwood supply reflect the first, second and third crops of pulpwood from several thousand hectares of eucalypt plantation established between 2001 and 2005.

About 60% of the hardwood plantations in North Queensland are managed for pulpwood production and the balance is managed solely for sawlogs. Due to the small current area, wide range of species and large variability in growth rates of these hardwood plantations, the forecast volumes of sawlog supply from hardwood farm forests and plantations should be considered indicative.

Plantation owners and managers provided nearly all of the data on forecast softwood plantation log supply. Most of the data on forecast hardwood plantation log supply is based on growth models developed by the National Plantation Inventory.

FIGURE 21: AREA PLANTED IN EACH FIVE-YEAR PERIOD, NORTH QUEENSLAND

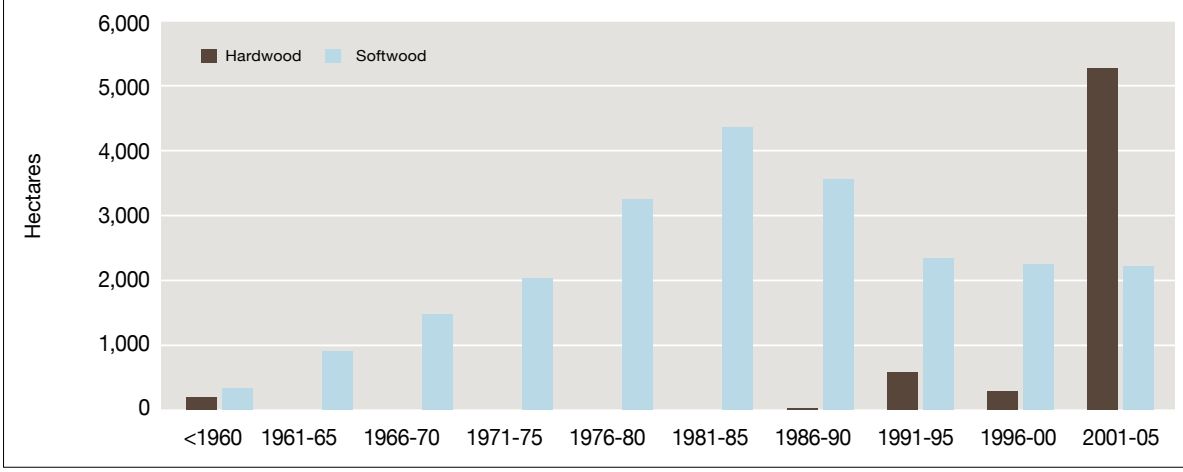


TABLE 6:	FORECAST PLANTATION LOG SUPPLY, NORTH QUEENSLAND (Thousand cubic metres per year average for each five year period)								
Period	**2005-09**	**2010-14**	**2015-19**	**2020-24**	**2025-29**	**2030-34**	**2035-39**	**2040-44**	**2045-49**
Hardwood									
– pulpwood	0	0	179	0	179	0	0	179	0
– sawlog	3	5	5	9	3	5	14	0	7
Softwood									
– pulpwood	9	12	11	23	15	30	31	29	29
– sawlog	323	299	285	231	244	389	414	414	414

FIGURE 22: FORECAST PLANTATION LOG SUPPLY, NORTH QUEENSLAND (HARDWOOD)

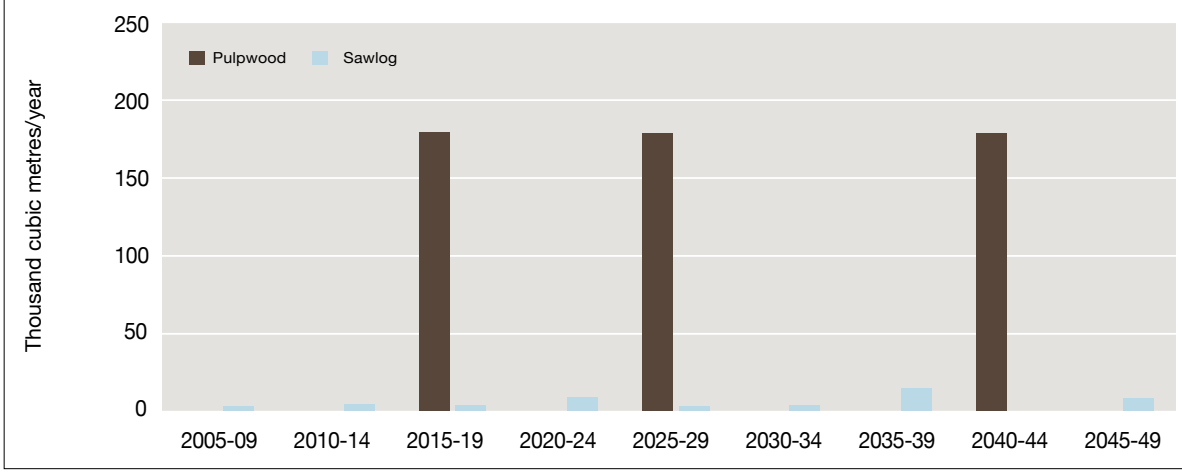
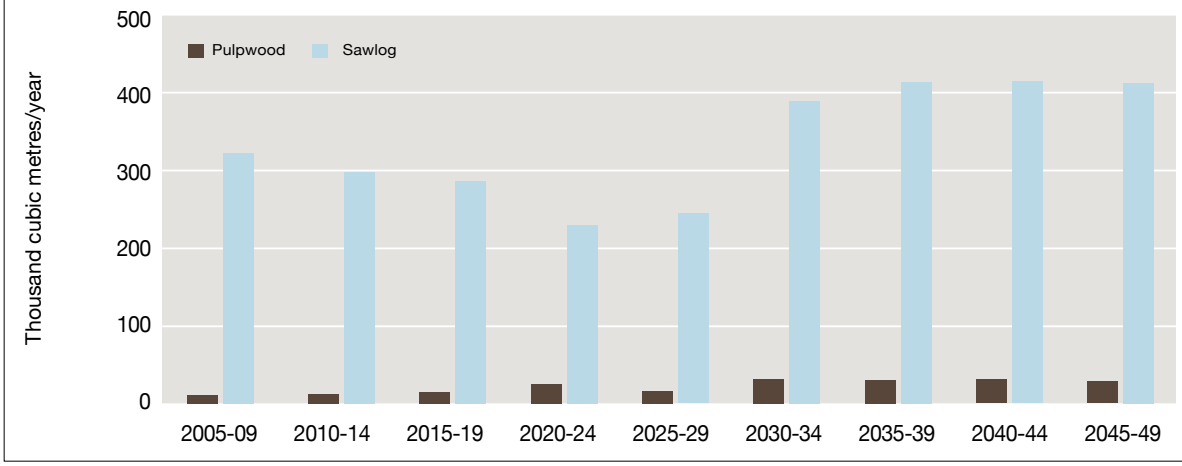
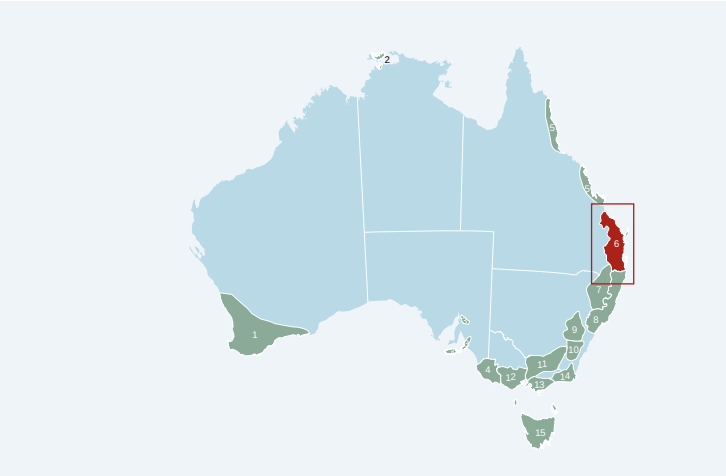


FIGURE 23: FORECAST PLANTATION LOG SUPPLY, NORTH QUEENSLAND (SOFTWOOD)



SOUTH EAST QUEENSLAND



The South East Queensland plantation region extends north from the New South Wales border to Gladstone and west past Toowoomba and Kingaroy. Of the many sawmills that process softwood plantation logs in this region, the largest are at Caboolture, Tuan, Imbil and Maryborough. Medium density fibreboard is manufactured at Kingston and Toolara, particleboard at Yeerongpilly and Gympie, plywood and hardboard at Ipswich, and laminated beams, pallets and other manufactured products at Brisbane. Woodchips are exported from the Brisbane port.

The softwood plantations are almost all publicly owned. They consist mostly of exotic pines — slash pine (*Pinus elliottii*) and *P. elliottii/caribaea* hybrids — and some native conifers, mainly hoop pine and small areas of bunya pine (*Araucaria bidwillii*). These plantations are mature and production is forecast to increase due to improved productivity and some increase in area.

South East Queensland's hardwood plantations have been established mostly since 1995. Some privately funded plantations are aimed mainly at producing pulpwood and others at sawlog production. A joint-venture scheme funded by the Queensland Government is designed to produce sawlogs to replace supply from public native forests. About 37% of the hardwood plantations are managed for sawlog production and 63% solely for pulpwood.

Sawlog production from the Government-funded plantations is forecast to begin around 2025. However, it appears that the sustainable supply from the established area will be considerably less than the current supply from native forests.

Plantation owners and managers provided over 95% of the data on forecast softwood plantation log supply and less than 20% of the data on forecast hardwood plantation log supply.

FIGURE 24: AREA PLANTED IN EACH FIVE-YEAR PERIOD, SOUTH EAST QUEENSLAND

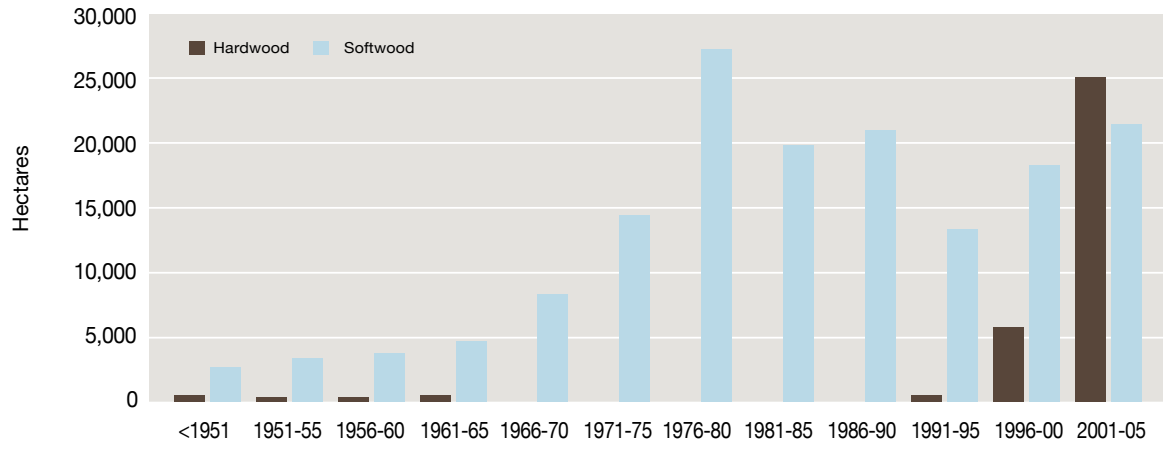


TABLE 7: FORECAST PLANTATION LOG SUPPLY, SOUTH EAST QUEENSLAND
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	0	405	435	339	339	339	526	342	302
– sawlog	0	9	12	28	72	250	15	25	11
Softwood									
– pulpwood	315	281	340	353	322	318	291	297	305
– sawlog	1,640	1,724	1,735	1,887	1,862	2,050	1,983	1,986	1,987

FIGURE 25: FORECAST PLANTATION LOG SUPPLY, SOUTH EAST QUEENSLAND (HARDWOOD)

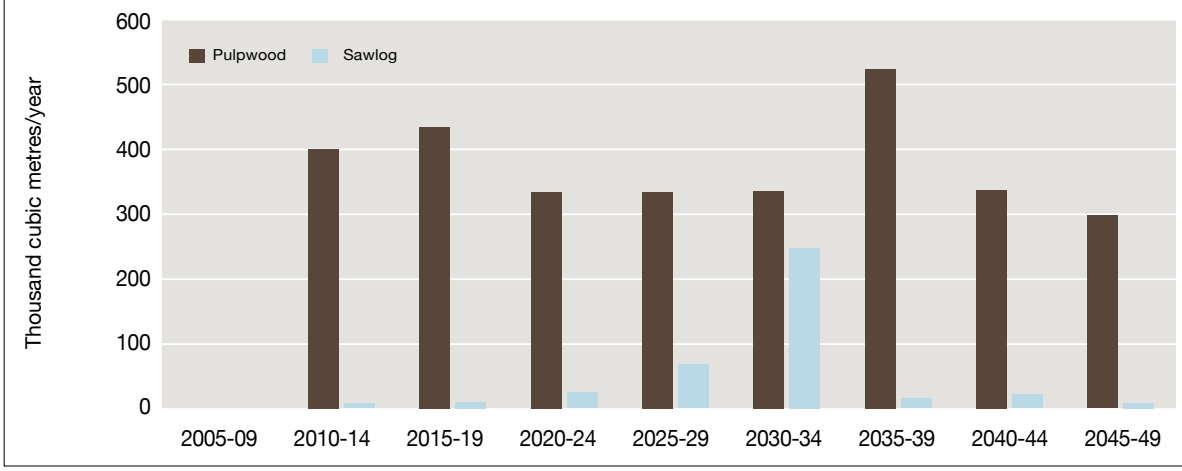
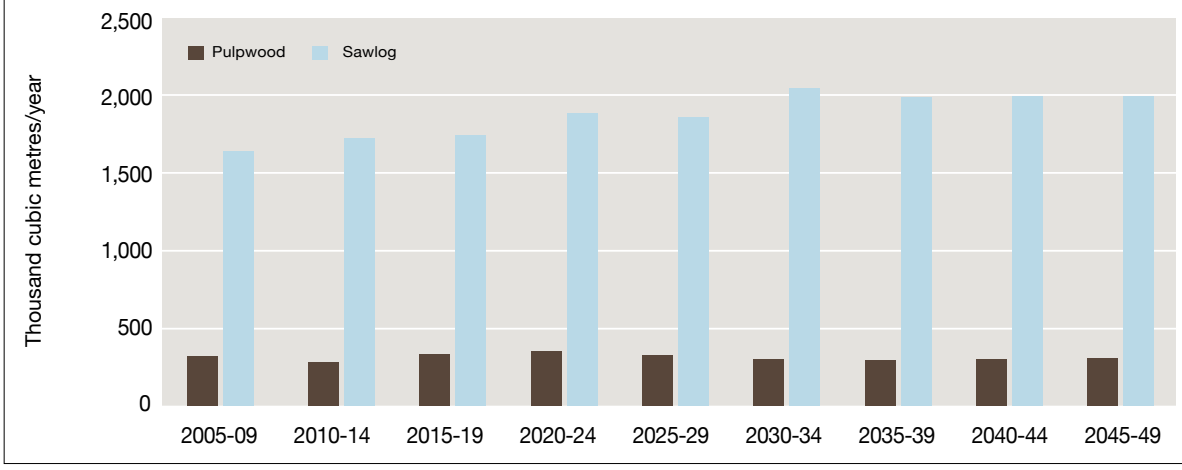
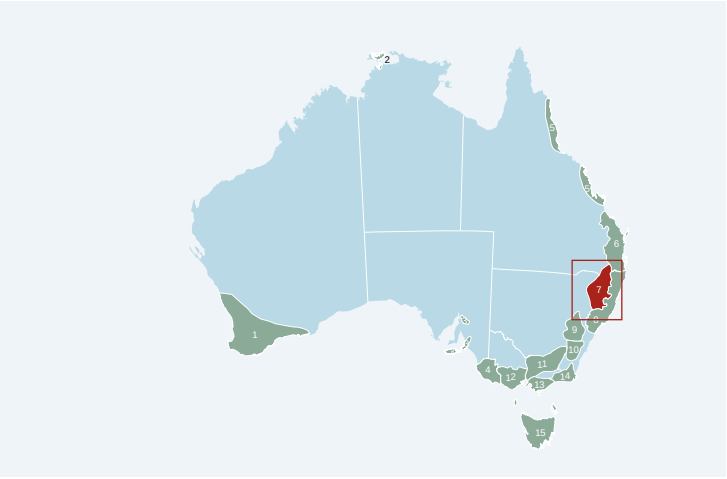


FIGURE 26: FORECAST PLANTATION LOG SUPPLY, SOUTH EAST QUEENSLAND (SOFTWOOD)



NORTHERN TABLELANDS



The Northern Tablelands encompass an elevated area, generally 1,000 metres or higher in altitude, inland of Wauchope in northern New South Wales and northwards towards Warwick in south-east Queensland.

The region's softwood plantations supply sawmills at Glen Innes and Nundle. A sawmill is under construction at Quirindi.

The undulations in the forecast softwood sawlog supply shown in the figures and tables below reflect the timing of plantation establishment, which increased from the 1970s to the 1980s but declined substantially in the 1990s. All the hardwood plantations in the Northern Tablelands are managed for sawlog production. The forecast hardwood pulpwood supply shown below is from thinnings and unpruned higher stem sections.

Plantation owners and managers provided about 80% of the data on forecast softwood plantation log supply and around 20% of the data on forecast hardwood plantation log supply.

FIGURE 27: AREA PLANTED IN EACH FIVE-YEAR PERIOD, NORTHERN TABLELANDS

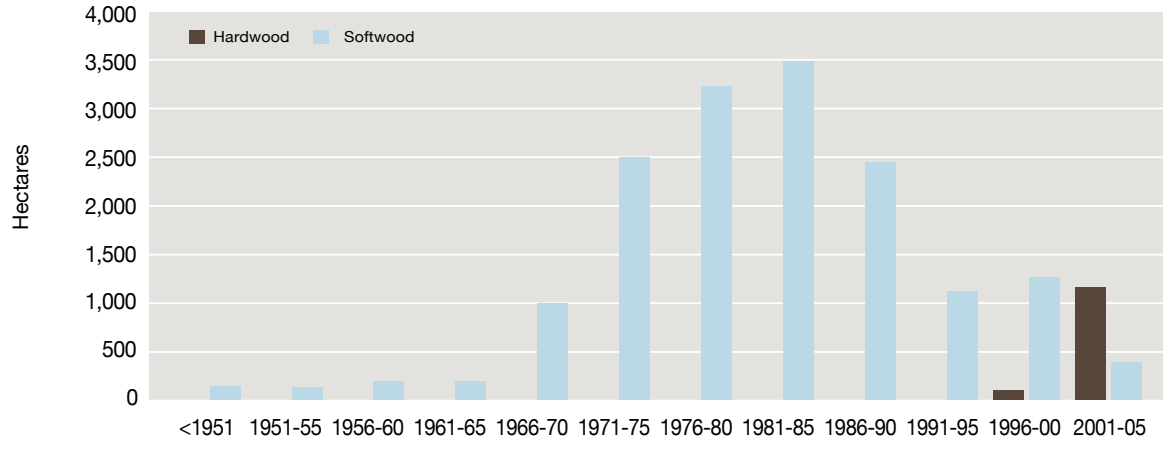


TABLE 8: FORECAST PLANTATION LOG SUPPLY, NORTHERN TABLELANDS (Thousand cubic metres per year average for each five-year period)									
Period	**2005-09**	**2010-14**	**2015-19**	**2020-24**	**2025-29**	**2030-34**	**2035-39**	**2040-44**	**2045-49**
Hardwood									
– pulpwood	0	7	5	24	6	10	6	26	9
– sawlog	1	6	5	14	4	16	10	21	10
Softwood									
– pulpwood	71	93	53	50	88	75	66	83	59
– sawlog	208	310	211	217	248	210	263	321	222

FIGURE 28: FORECAST PLANTATION LOG SUPPLY, NORTHERN TABLELANDS (HARDWOOD)

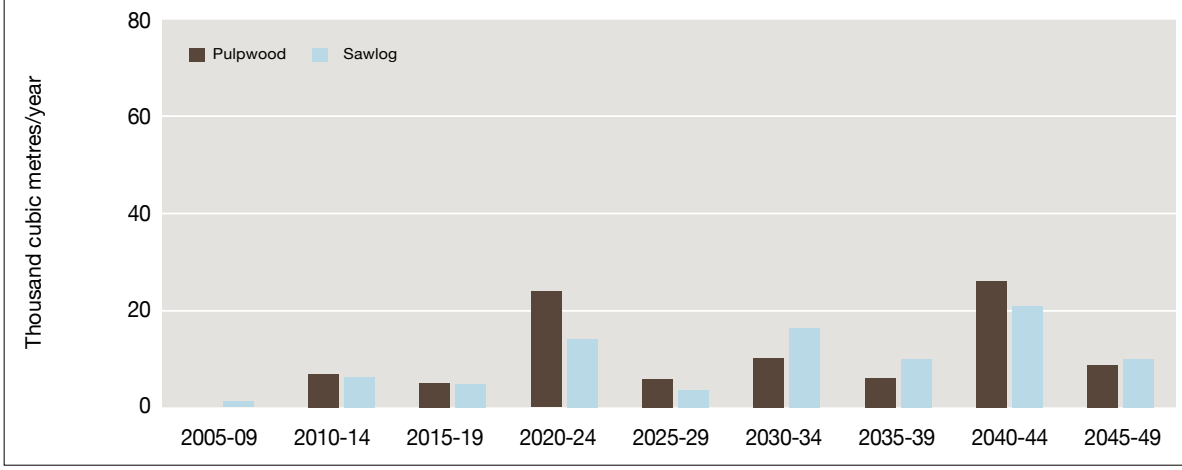
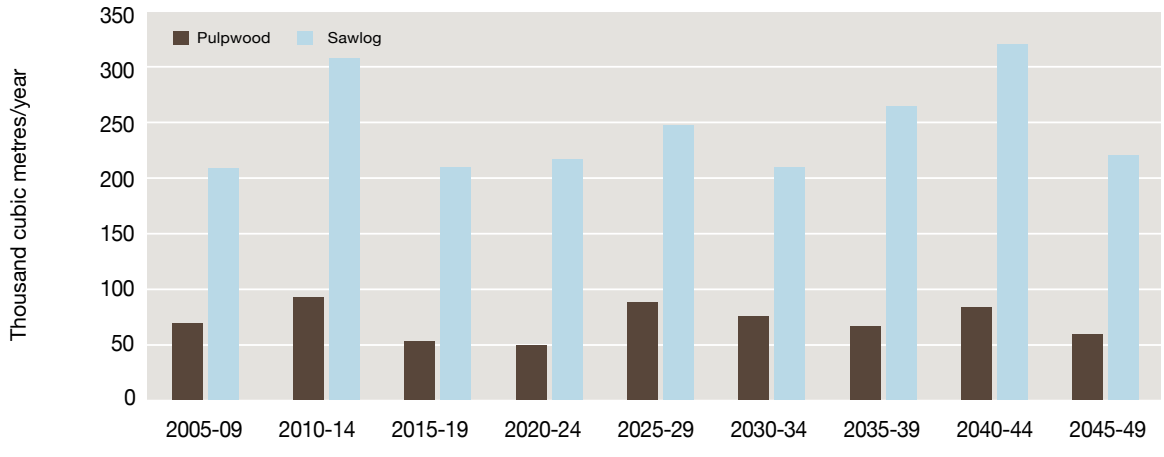
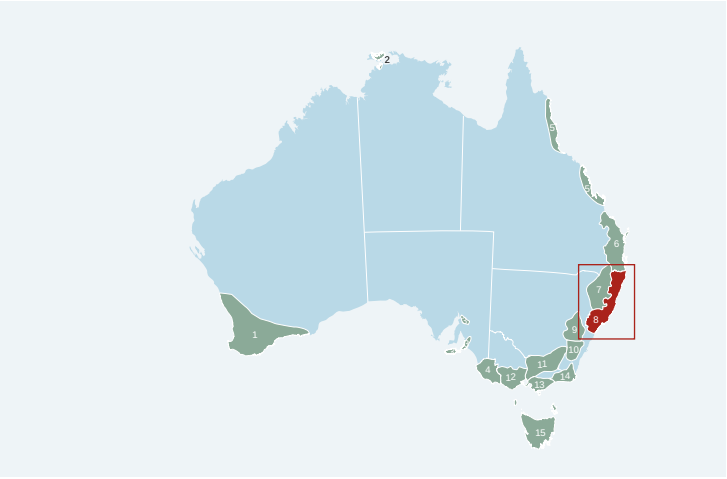


FIGURE 29: FORECAST PLANTATION LOG SUPPLY, NORTHERN TABLELANDS (SOFTWOOD)



NORTH COAST NSW



This region extends westwards from the northern New South Wales coast to the escarpment of the Northern Tablelands and northwards from about Newcastle to the Queensland/New South Wales border. Hardwood plantations are dispersed throughout the region, while softwood plantations tend to be concentrated in larger blocks, mostly north of Grafton.

Softwood and hardwood sawlogs and veneer logs are supplied to sawmills and plymills at Grafton, Casino, Lismore, Urbenville and Wyan. Smaller-diameter timber is used for posts and sold to pole and girder markets. Woodchips from sawmilling residues are exported from ports at Newcastle and Brisbane. Some are also used for hardboard manufacture within Australia.

While most of the softwood plantations on the North Coast are several decades old, some new areas were established in the late 1990s. The softwood pulpwood supply is forecast to increase after about 2015, when these newer plantations start to be thinned. The sawlog supply will increase significantly from around 2030.

There are two age-group peaks in the North Coast hardwood plantations. The first reflects planting from the mid 1960s to around 1980 and the second, much larger peak is due to a rapid acceleration in planting from 1995. Around 90% of the hardwood plantations on the North Coast are managed for sawlog production. Due to the relatively long rotation required for sawlog production, hardwood sawlog supply is forecast to increase substantially only towards the end of the forecast period. Plantation managers will inevitably adjust silviculture, scheduling and operational management to smooth the supply and match markets.

Plantation owners and managers provided over 90% of the data on forecast softwood plantation log supply and around 60% of the data on forecast hardwood plantation log supply.

FIGURE 30: AREA PLANTED IN EACH FIVE-YEAR PERIOD, NORTH COAST NEW SOUTH WALES

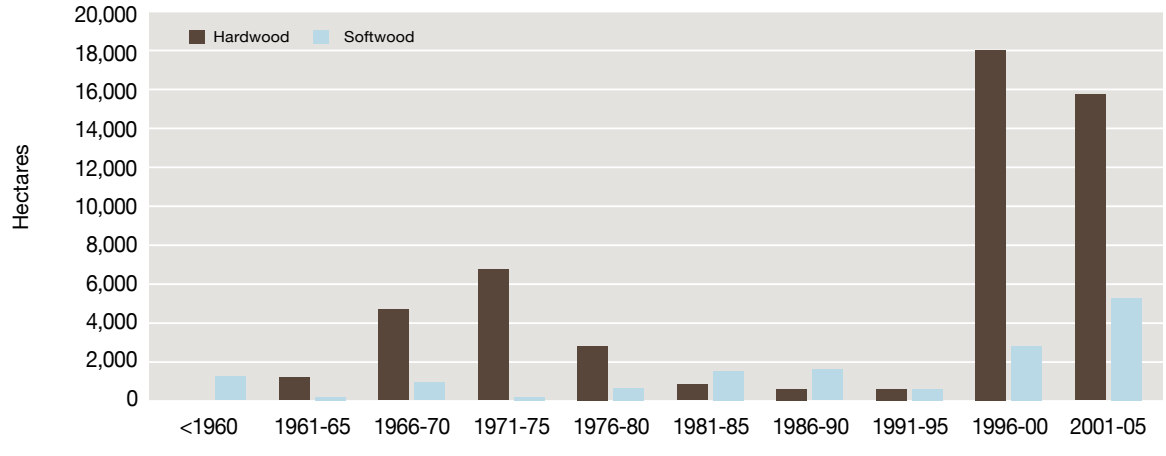


TABLE 9: FORECAST PLANTATION LOG SUPPLY, NORTH COAST NEW SOUTH WALES
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	36	121	129	174	126	239	330	261	168
– sawlog	72	72	85	130	100	493	771	519	212
Softwood									
– pulpwood	33	29	38	54	59	63	53	59	63
– sawlog	143	125	132	138	145	181	188	180	189

FIGURE 31: FORECAST PLANTATION LOG SUPPLY, NORTH COAST NEW SOUTH WALES (HARDWOOD)

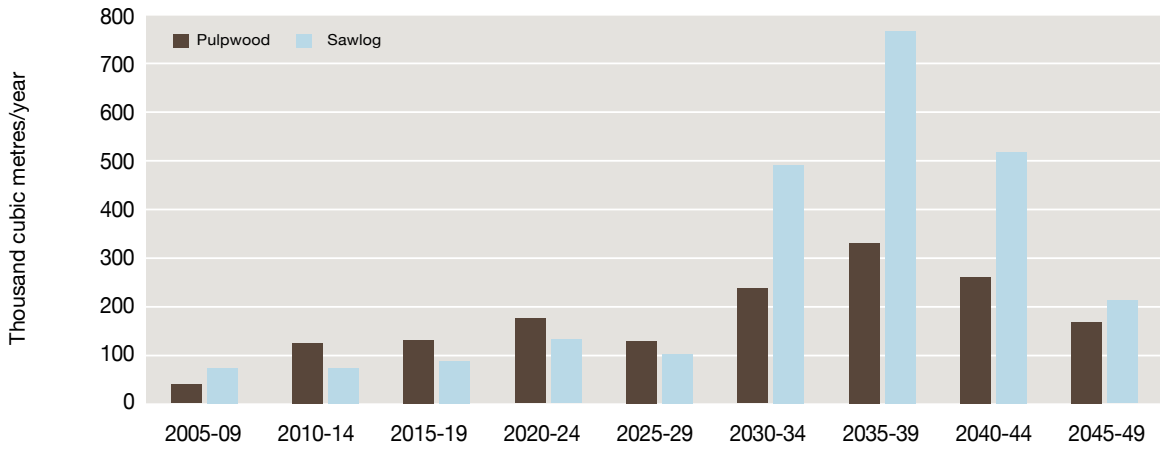
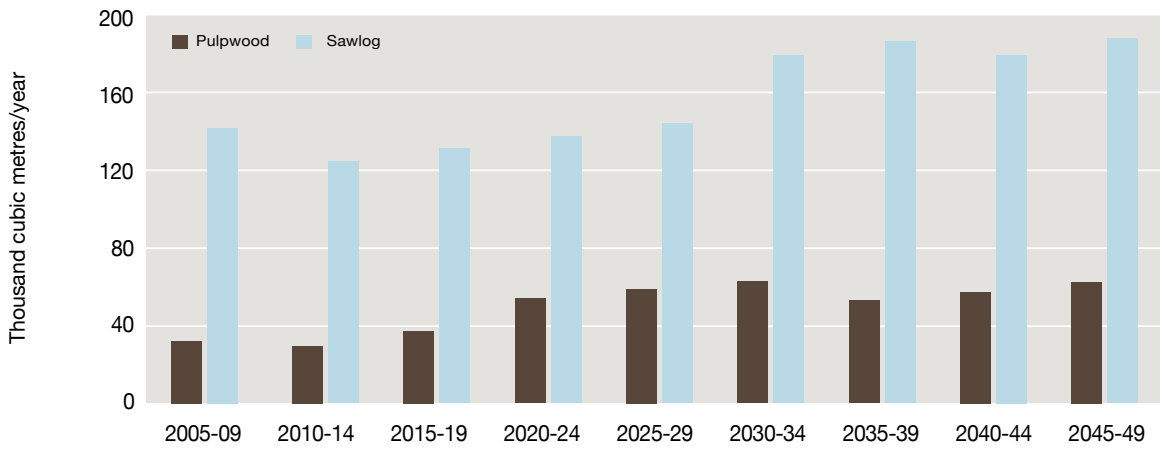
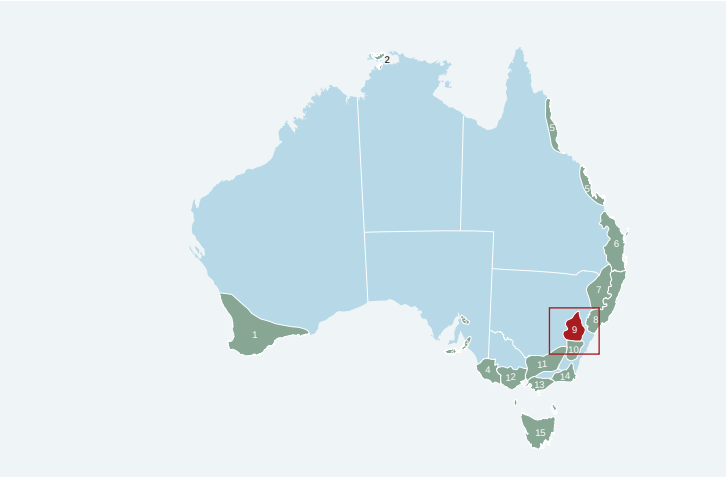


FIGURE 32: FORECAST PLANTATION LOG SUPPLY, NORTH COAST NEW SOUTH WALES (SOFTWOOD)



CENTRAL TABLELANDS NSW



This region is west of the Blue Mountains and stretches southwards from Wellington, Dunedoo and Mudgee to Boorowa, where it adjoins the Southern Tablelands. Its softwood plantations are concentrated around Oberon and in the Mt Canobolas State Forest (south of Orange), the Mullions Range State Forest (north of Orange) and the Sunny Corner State Forest (between Bathurst and Lithgow). The region's hardwood plantations comprise small, dispersed research and demonstration sites, mainly near Wellington, and an investment scheme near Forbes.

Softwood timber is processed at a large sawmill and particleboard and medium density fibreboard mills in Oberon, and at sawmills in Bathurst and Burraga. The plantation and timber industry is the mainstay of the Oberon economy, accounting in 2003 for 59% of the gross regional product and 33% of employment in the local government area.

The small areas of hardwood plantations in the Central Tablelands were established only recently and no log production is expected for many years. Few data are available on which to base a forecast of potential supply from these plantations but at most it would amount to only a few thousand cubic metres. Given the uncertainty and small volumes, no estimates are given below.

The plantation forecast log supply data shown below were provided by plantation managers and the Central Tablelands Private Forestry Development Committee.

FIGURE 33: AREA PLANTED IN EACH FIVE-YEAR PERIOD, CENTRAL TABLELANDS NEW SOUTH WALES

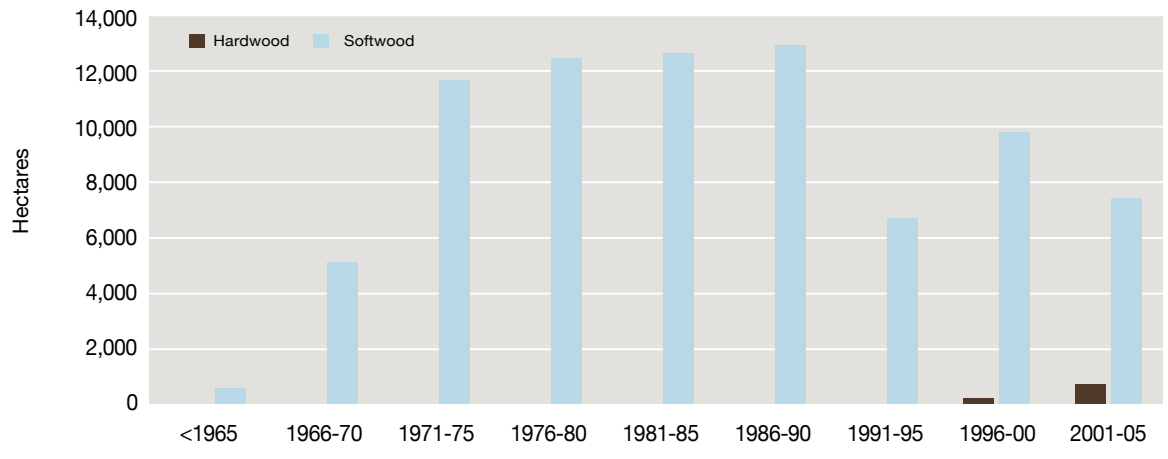
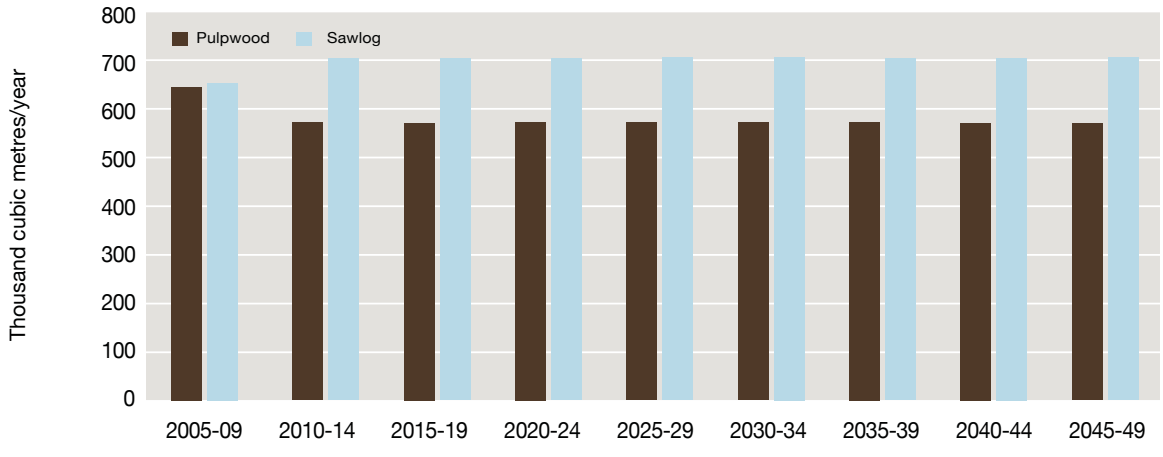


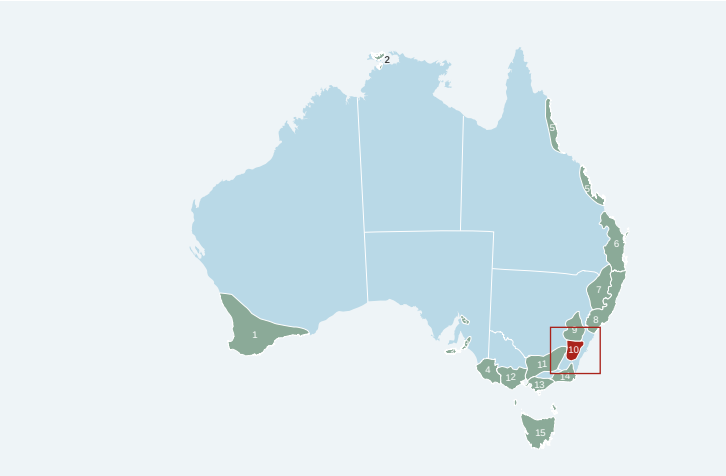
TABLE 10: FORECAST PLANTATION LOG SUPPLY, CENTRAL TABLELANDS NEW SOUTH WALES
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Softwood									
– pulpwood	647	576	576	576	576	576	576	576	576
– sawlog	657	708	708	708	708	708	708	708	708

FIGURE 34: FORECAST PLANTATION LOG SUPPLY, CENTRAL TABLELANDS NEW SOUTH WALES (SOFTWOOD)



SOUTHERN TABLELANDS NSW



This region extends from Boorowa to the Moss Vale/ Braidwood escarpment and southwards to encompass the Australian Capital Territory.

The softwood plantations of the Southern Tablelands supply sawmills located within the Australian Capital Territory and at Moss Vale. Some pulpwood is carted to Tumut for processing at the pulp and paper mill there. Supply was substantially reduced by bushfires in 2003 that destroyed about two-thirds of the softwood plantations in the Australian Capital Territory. A significant area of mature private plantations to the east of the Australian Capital Territory is available for harvest to partially offset that loss in the short term.

The small areas of hardwood plantations in the Southern Tablelands have been established only recently and no log production is expected for many years. Few data are available on which to base a forecast of potential supply from these plantations but at most it would amount to only a few thousand cubic metres. Given the uncertainty and small volumes, no estimates are made here.

The plantation forecast log supply data shown below were provided by plantation managers and the Southern Tablelands Private Forestry Development Committee.

FIGURE 35: AREA PLANTED IN EACH FIVE-YEAR PERIOD, SOUTHERN TABLELANDS NEW SOUTH WALES

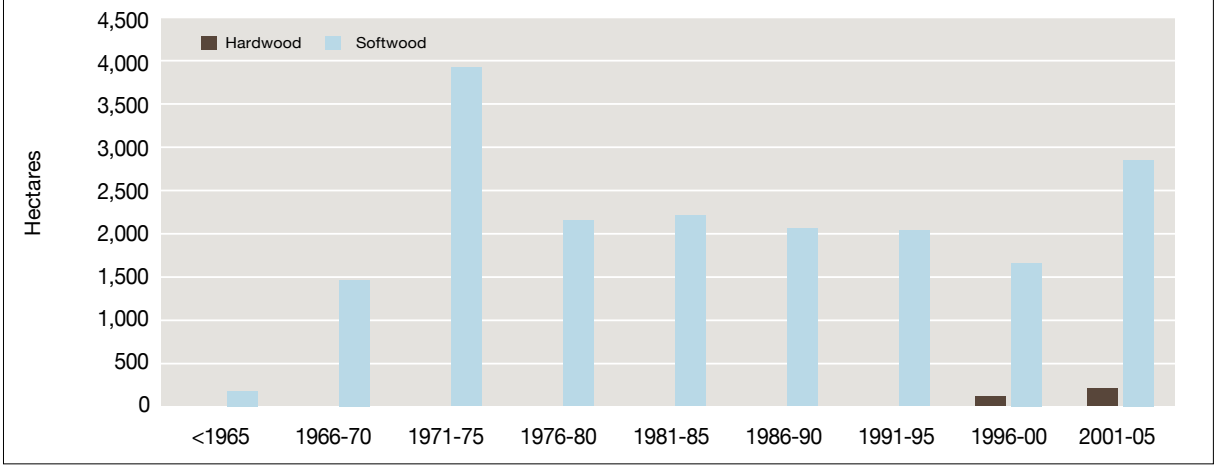
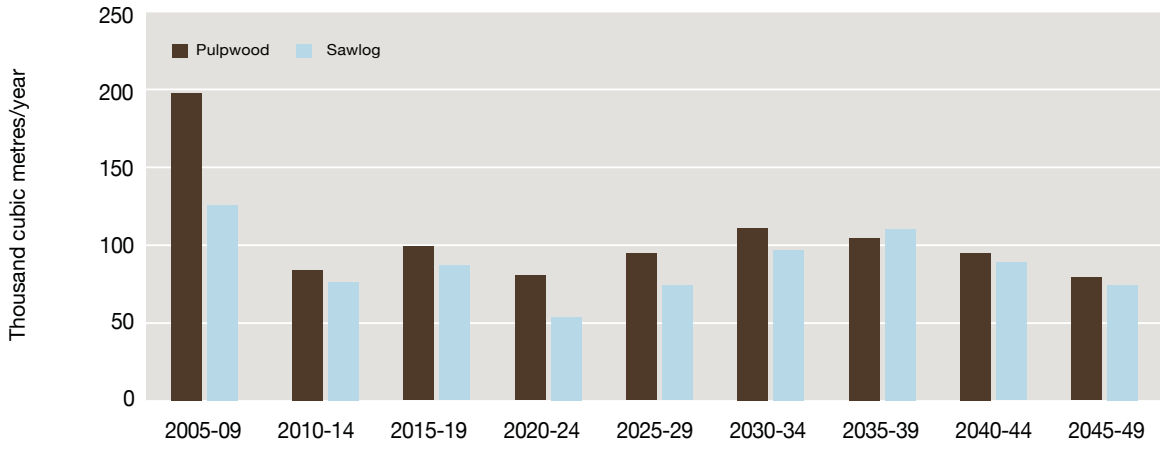


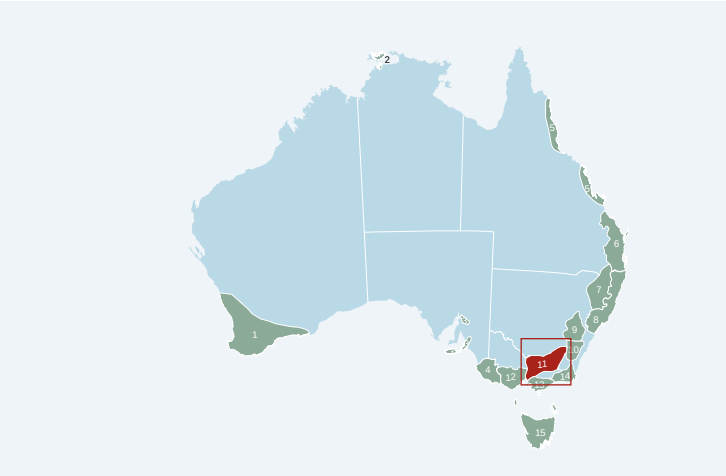
TABLE 11: FORECAST PLANTATION LOG SUPPLY, SOUTHERN TABLELANDS NEW SOUTH WALES (Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Softwood									
– pulpwood	198	83	98	79	95	111	104	95	79
– sawlog	125	76	87	53	73	96	110	88	73

FIGURE 36: FORECAST PLANTATION LOG SUPPLY, SOUTHERN TABLELANDS NEW SOUTH WALES (SOFTWOOD)



MURRAY VALLEY



The Murray Valley region stretches from Gundagai to Melbourne. Most of its plantations are in the foothills of the Great Dividing Range, but there are also some farm forests in the agricultural regions of north-east Victoria and central-western New South Wales.

The Murray Valley softwood plantations supply sawlogs, veneer and pulpwood to industries dispersed throughout the region; major processing facilities are located at Tumut, Tumbarumba, Wagga Wagga, Albury, Wangaratta, Myrtleford and Benalla. The plantation forestry and forest product industries employed about 5,880 people in the region in 2003.

The current softwood plantation sawlog supply is around 2.0 million cubic metres per year. Supply is forecast to increase into the next decade but to decline from 2020, reflecting a reduction in the area planted in the early 1990s. Supply will increase in the long-term as plantations established since 2000 mature.

The forecast accounts for areas of privately owned plantations established in the 1970s and 1980s that were not thinned and which will therefore produce more pulpwood than sawlogs. The softwood pulpwood supply therefore reaches a peak in the short term before declining in the medium-term and then increasing again towards the end of the forecast period.

About 10,000 hectares of softwood plantations in the Murray Valley region were destroyed by wildfire in 2006–07. These are expected to be replanted. The forecast given here is based on areas established as of 2005 and therefore does not allow for the impact of this event. Depending on the ages of the burned plantations, the losses could have significant implications for medium-term sawlog supply.

About 70% of the hardwood plantations in the Murray Valley region, including those developed by the Farm Forestry North East project, are managed for sawlog production and many have been thinned and pruned. The other 30% are managed solely for pulpwood production; some of these will reach harvest age in the next few years.

Plantation owners and managers provided over 60% of the data on forecast softwood and hardwood log supply.

FIGURE 37: AREA PLANTED IN EACH FIVE-YEAR PERIOD, MURRAY VALLEY

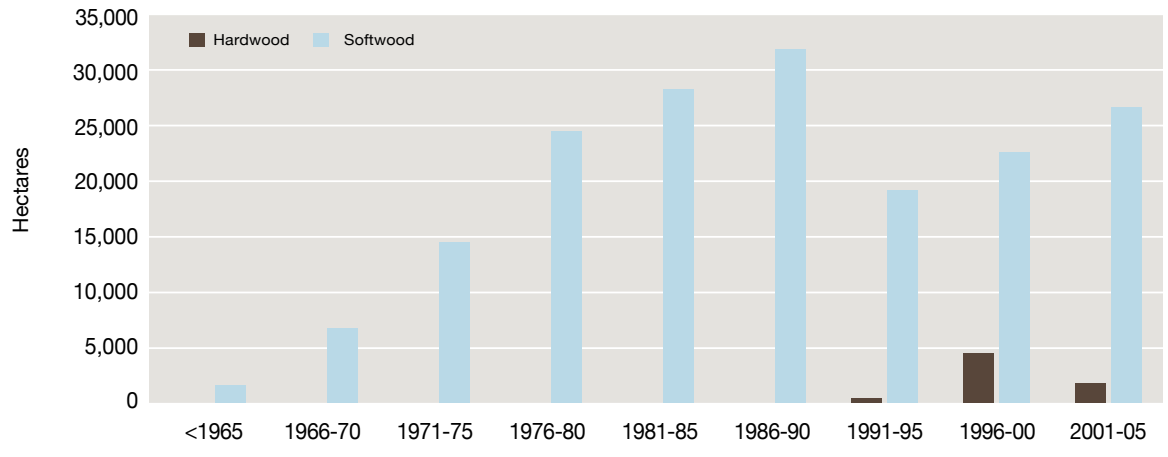


TABLE 12: FORECAST PLANTATION LOG SUPPLY, MURRAY VALLEY
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	20	62	28	75	50	52	25	66	47
– sawlog	2	1	7	102	58	4	1	7	102
Softwood									
– pulpwood	1,022	1,161	1,377	956	838	918	941	1,116	1,332
– sawlog	1,981	2,057	2,315	1,844	2,161	2,827	2,318	2,152	2,530

FIGURE 38: FORECAST PLANTATION LOG SUPPLY, MURRAY VALLEY (HARDWOOD)

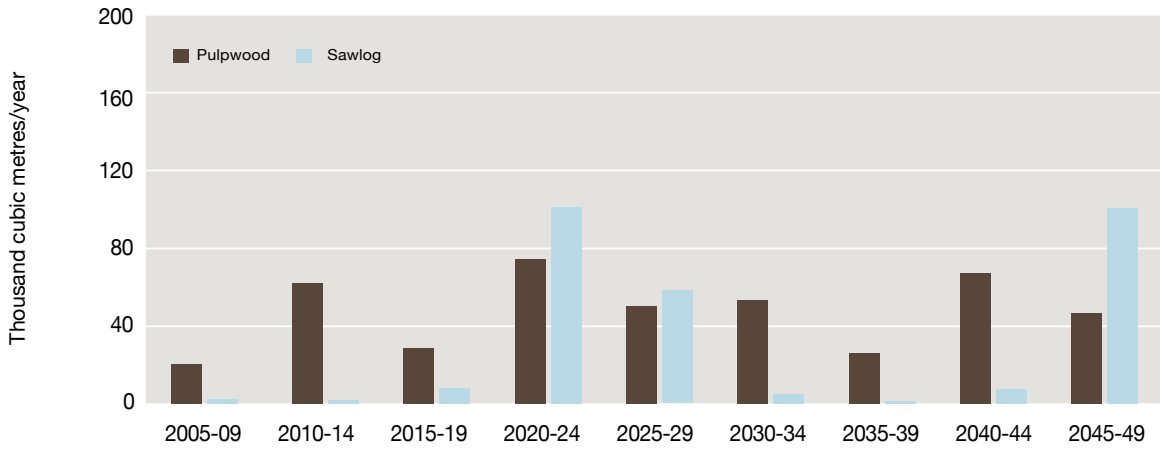
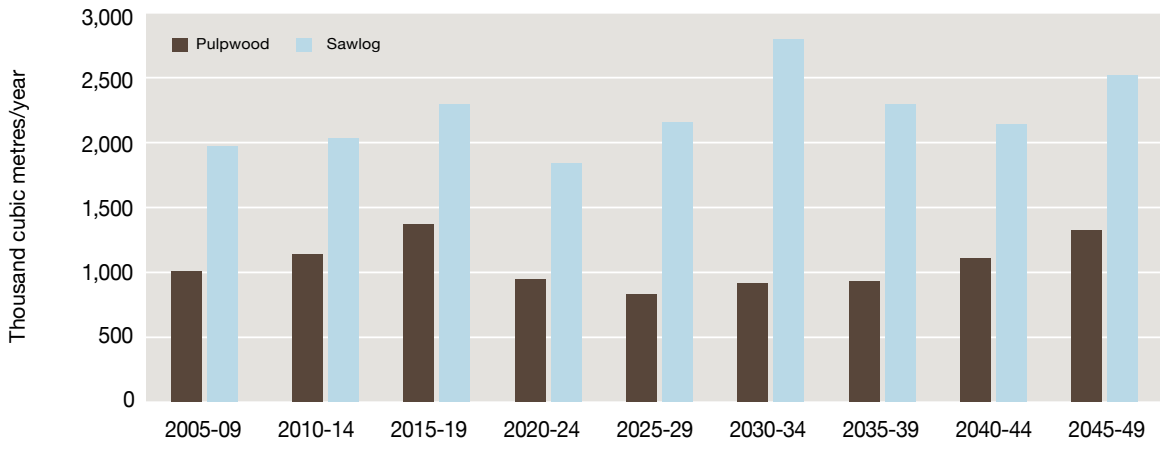
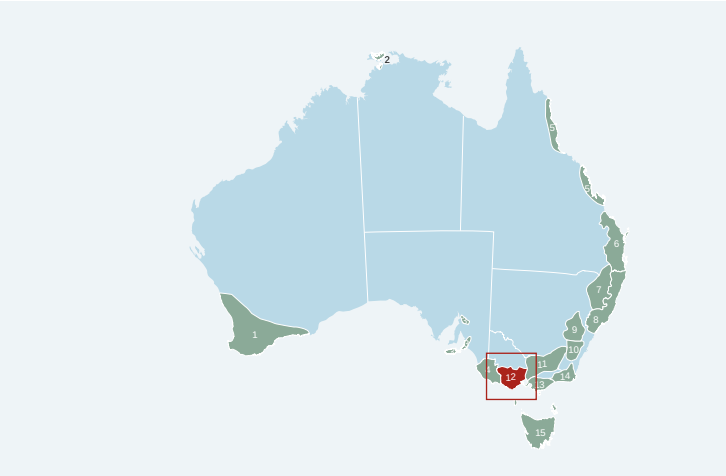


FIGURE 39: FORECAST PLANTATION LOG SUPPLY, MURRAY VALLEY (SOFTWOOD)



CENTRAL VICTORIA



The Central Victoria region is located immediately west of Melbourne, stretching north from the Otway Ranges to Castlemaine and to just west of the Grampians. Ballarat is located centrally in a large area of softwood plantations. Softwood sawlogs and small-diameter logs supply timber-processing industries at Ballarat, Beaufort, Colac and around Geelong. Softwood sawlogs and softwood and hardwood woodchips are exported from the port at Geelong.

The forecast decline in softwood supply in Central Victoria is due to a reduction in the area planted in the early 1990s. To some extent, this fluctuating supply will be smoothed by silvicultural management and harvest scheduling.

An estimated 98% of the hardwood plantations in Central Victoria are managed solely for pulpwood production. The remaining 2% are farm forests comprising a wide range of species; given their small current area, the diversity of species used and the likely large variability in growth rates, the forecast hardwood sawlog supply from these plantations should be considered indicative.

Plantation owners and managers provided about 70% of the data on forecast softwood plantation log supply and less than 10% of the data on forecast hardwood plantation log supply.

FIGURE 40: AREA PLANTED IN EACH FIVE-YEAR PERIOD, CENTRAL VICTORIA

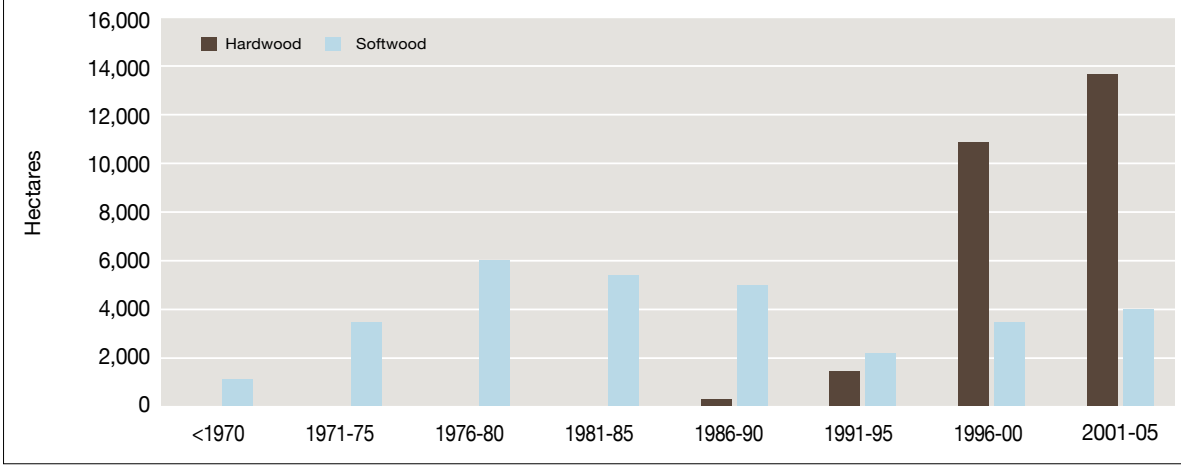


TABLE 13: FORECAST PLANTATION LOG SUPPLY, CENTRAL VICTORIA
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	220	627	356	458	481	320	590	394	508
– sawlog	0	2	2	4	4	3	3	2	3
Softwood									
– pulpwood	212	179	170	184	187	189	181	163	157
– sawlog	361	402	362	232	283	282	403	394	385

FIGURE 41: FORECAST PLANTATION LOG SUPPLY, CENTRAL VICTORIA (HARDWOOD)

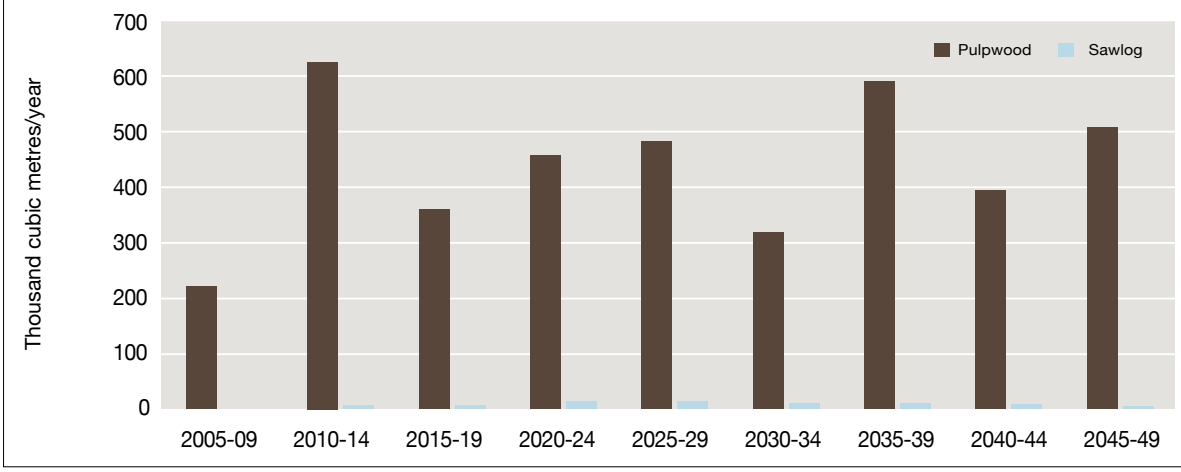
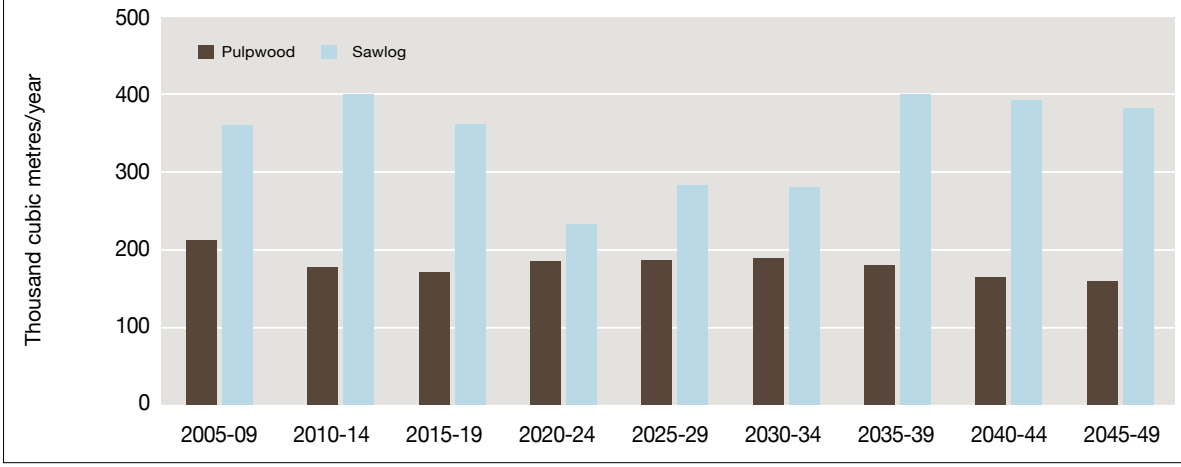
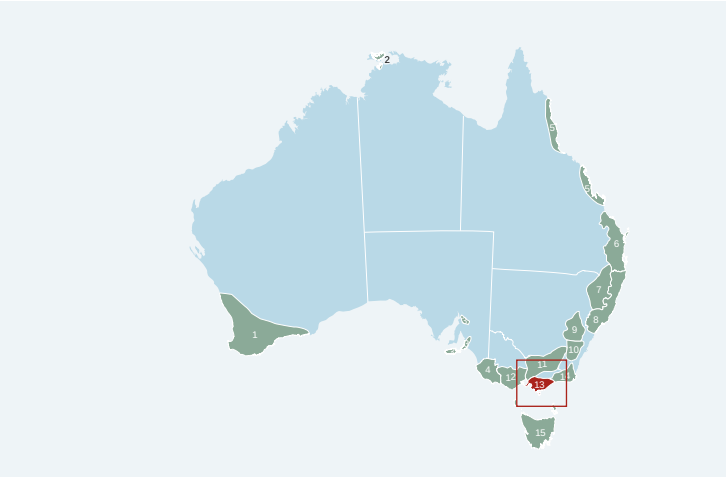


FIGURE 42: FORECAST PLANTATION LOG SUPPLY, CENTRAL VICTORIA (SOFTWOOD)



CENTRAL GIPPSLAND



The Central Gippsland region extends eastwards from Melbourne to Bairnsdale and northwards to the Great Dividing Range. It includes extensive mature softwood plantations and some of Australia's oldest eucalypt plantations. The softwood plantations supply several sawmills, the largest of which are at Morwell and Yarram, the PaperlinX pulp and paper mill at Maryvale, and post and pole treatment plants. Gippsland is one of the few current sources of hardwood plantation sawlogs in Australia. These are milled at Morwell and a number of other locations within and outside the region.

The softwood sawlog supply is forecast to increase substantially from about 2025; this is because some hardwood plantations with inadequate productivity are being replanted with pines. The forecast decline in hardwood sawlog production up to 2025 reflects the age distribution of the plantations.

The plantation log supply forecasts shown below are based on data provided by plantation owners and Gippsland Private Forestry.

FIGURE 43: AREA PLANTED IN EACH FIVE-YEAR PERIOD, CENTRAL GIPPSLAND

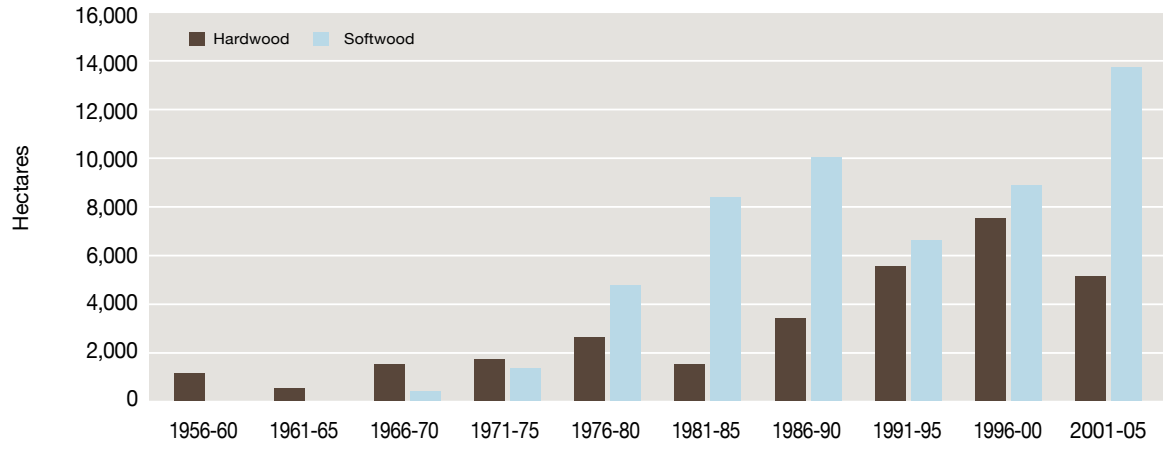


TABLE 14: FORECAST PLANTATION LOG SUPPLY, CENTRAL GIPPSLAND
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	211	369	321	324	304	303	272	283	351
– sawlog	120	70	20	30	81	81	96	101	131
Softwood									
– pulpwood	458	474	445	450	475	480	493	524	520
– sawlog	644	722	739	693	865	904	1,210	1,272	1,264

FIGURE 44: FORECAST PLANTATION LOG SUPPLY, CENTRAL GIPPSLAND (HARDWOOD)

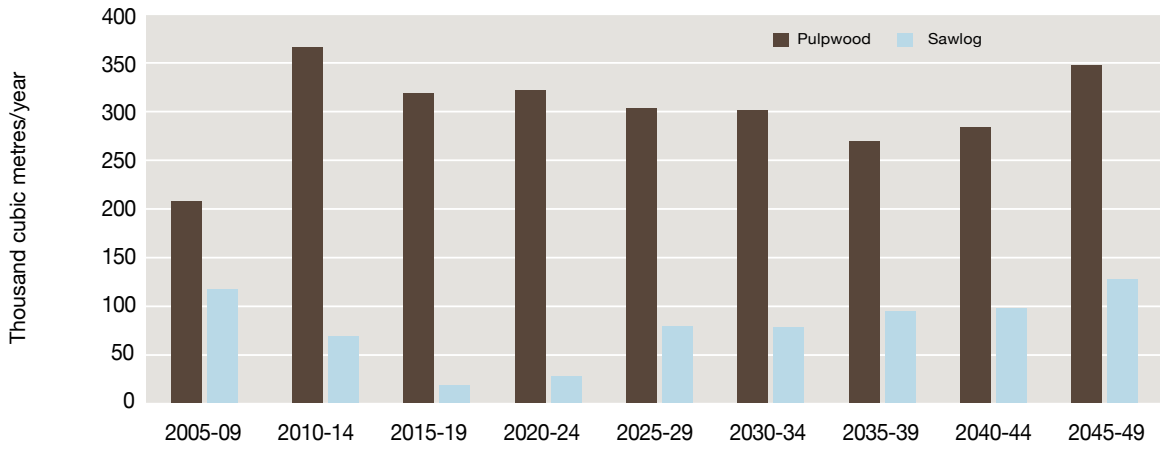
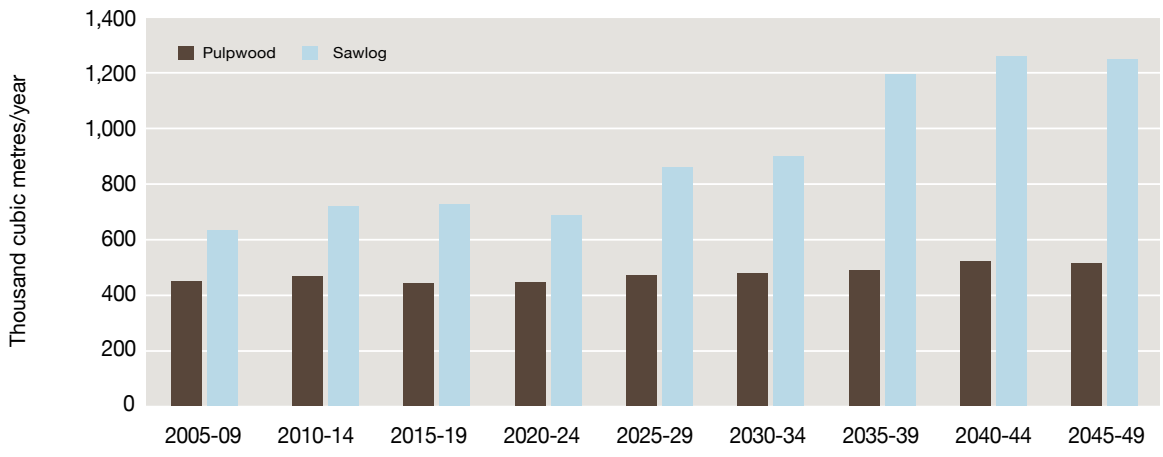
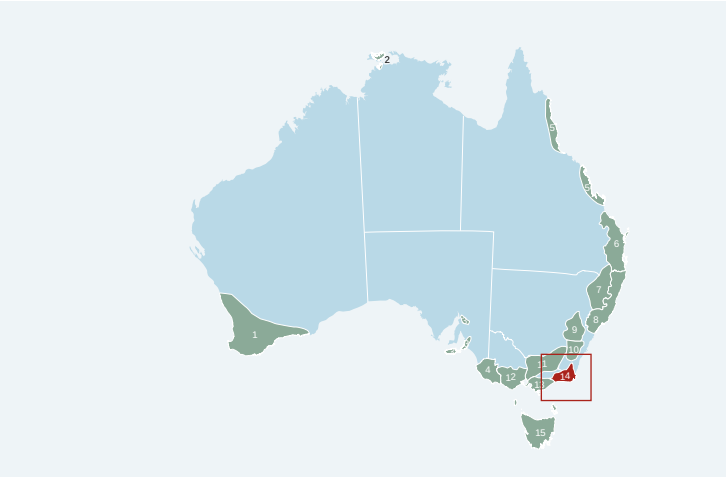


FIGURE 45: FORECAST PLANTATION LOG SUPPLY, CENTRAL GIPPSLAND (SOFTWOOD)



EAST GIPPSLAND-BOMBALA



The East Gippsland-Bombala plantation region is centred around Bombala, near the southern border of New South Wales, and extends to adjacent areas of Victoria's East Gippsland. It includes Eden, on the far south coast of New South Wales, from which logs, timber products and woodchips are exported. Timber-processing industries are concentrated at Bombala (using softwood sawlogs) and Eden (using pulpwood for woodchips).

The region's softwood plantations consist almost entirely of radiata pine and supply an increasing volume of sawlogs. Pulpwood supply is higher now than it will be in the longer term because the area that currently requires thinning is higher than the long-term average. A large proportion of the plantation area was destroyed by a wildfire in the early 1980s and was replanted within a few years of the event, resulting in a tight cluster of plantation ages.

The hardwood plantations comprise shining gum (*Eucalyptus nitens*) and blue gum managed for woodchip production and a few farm forests totalling around 800 hectares. This farm forestry resource is composed mostly of eucalypts established quite recently and no sawlog production is expected for many years. Few data are available on which to base a forecast of potential supply but at most it would amount to only a few thousand cubic metres. Given the uncertainty and small volumes, no estimates are made here.

Plantation owners and managers provided about 40% of the data on forecast softwood plantation log supply. The hardwood plantation log supply forecast is based on modelled growth data.

FIGURE 46: AREA PLANTED IN EACH FIVE-YEAR PERIOD, EAST GIPPSLAND-BOMBALA

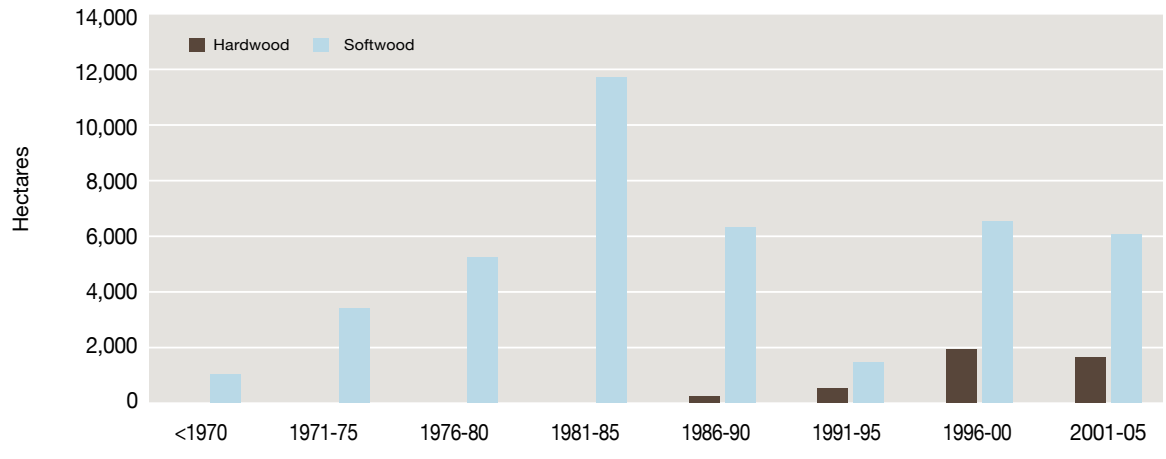


TABLE 15: FORECAST PLANTATION LOG SUPPLY, EAST GIPPSLAND-BOMBALA
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	39	102	37	87	75	55	107	41	90
Softwood									
– pulpwood	411	483	286	237	155	240	313	277	318
– sawlog	244	343	309	380	337	470	340	336	332

FIGURE 47: FORECAST PLANTATION LOG SUPPLY, EAST GIPPSLAND-BOMBALA (HARDWOOD)

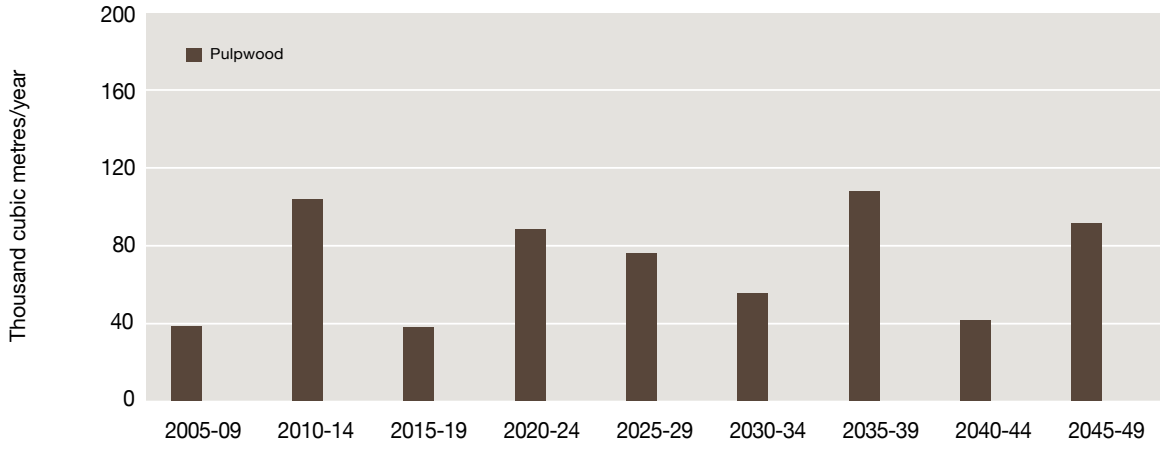
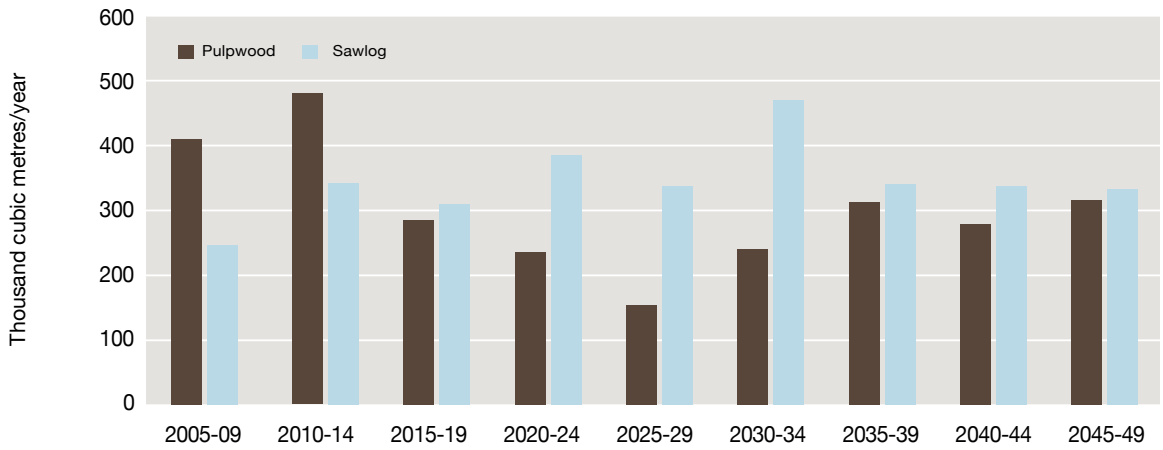
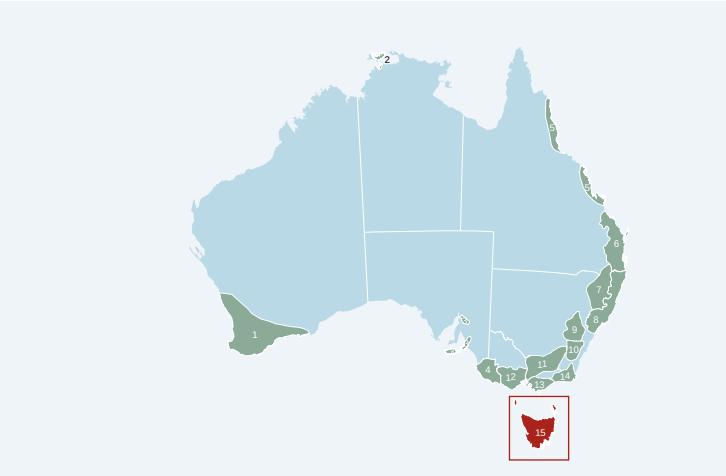


FIGURE 48: FORECAST PLANTATION LOG SUPPLY, EAST GIPPSLAND-BOMBALA (SOFTWOOD)



TASMANIA



The entire State of Tasmania is considered to be one region for the purposes of the National Plantation Inventory. Tasmania's plantations are concentrated in the north of the State and in its south-east corner inland from Hobart.

The State's softwood plantations supply a pulpmill at Boyer and several sawmills, the larger of which are located at Scottsdale in the north-east. Another softwood sawmill is being developed at Bell Bay. Most of the hardwood plantations were established to supply the export woodchip market via ports at Burnie, Bell Bay and Triabunna. Some hardwood logs are sawn at Bell Bay. Gunns Limited has proposed a plan to develop a pulpmill that would use a large proportion of the available hardwood pulpwood.

Most of the eucalypt plantations established on private land are designed to supply pulpwood; only a small minority is aimed at sawlog production. The emphasis on public land is sawlog production, which requires that the plantations are thinned to accelerate diameter growth and pruned to reduce the number of knots. The eucalypt plantations on public land constitute one of the country's largest hardwood plantation estates managed for sawlog production.

The forecast log supply given here was collated from data reported by Forestry Tasmania (for public land) and Private Forests Tasmania (for private land). Together, these data cover all Tasmanian plantations. The supplied data were extrapolated where necessary to cover the period to 2049. The forecasts allow for further increases in plantation area, such as new plantations funded by the Tasmanian Community Forest Agreement, and for some smoothing of production to provide a more even supply. The actual hardwood sawlog supply will be substantially affected by the extent to which thinning and pruning are carried out and the development of technology and markets for small-diameter and knotty logs.

FIGURE 49: AREA PLANTED IN EACH FIVE-YEAR PERIOD, TASMANIA

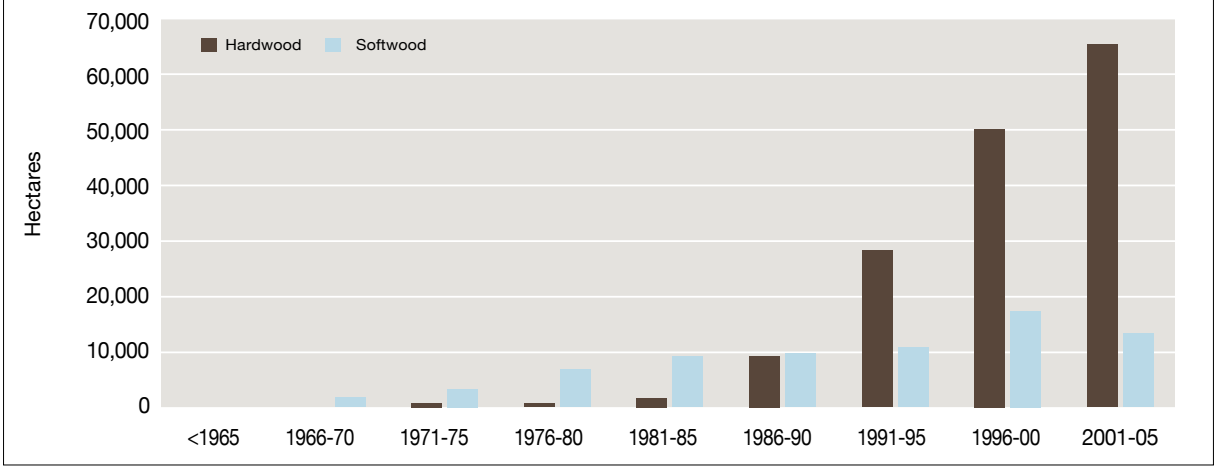


TABLE 16: FORECAST PLANTATION LOG SUPPLY, TASMANIA
(Thousand cubic metres per year average for each five-year period)

Period	2005-09	2010-14	2015-19	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Hardwood									
– pulpwood	1,227	2,657	3,577	4,095	4,161	4,195	4,316	4,406	4,273
– sawlog	21	193	446	746	904	909	906	904	895
Softwood									
– pulpwood	632	547	587	464	476	480	484	478	484
– sawlog	697	619	769	862	751	901	838	857	863

FIGURE 50: FORECAST PLANTATION LOG SUPPLY, TASMANIA (HARDWOOD)

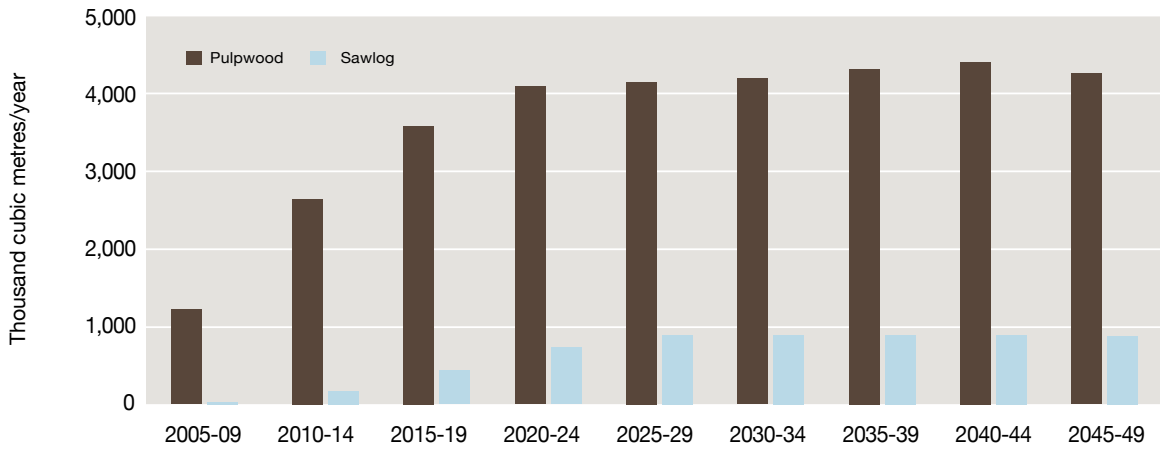
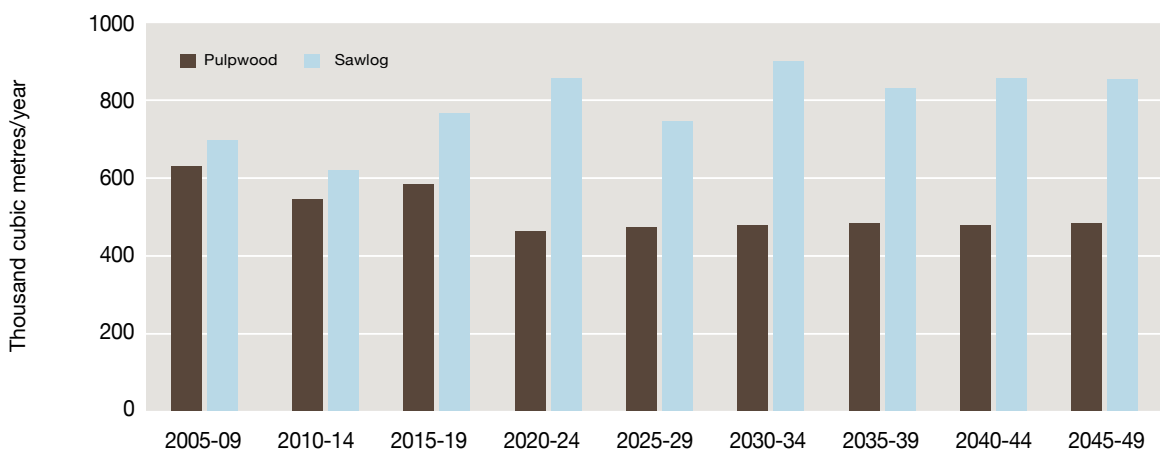


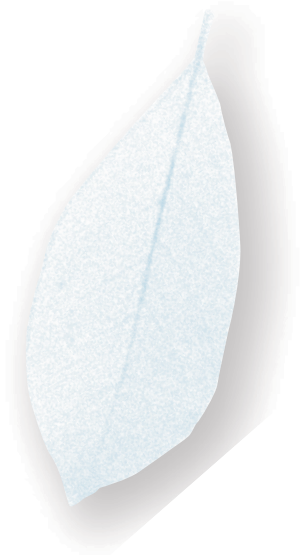
FIGURE 51: FORECAST PLANTATION LOG SUPPLY, TASMANIA (SOFTWOOD)



GLOSSARY

Acacia mangium	See 'mangium'
African mahogany (*Khaya senegalensis*)	A tall hardwood tree from Africa that has shown promise for sawn timber production in northern Australia
Araucaria	A genus of large softwood trees, two species of which – *Araucaria cunninghamii* (hoop pine) and *A. bidwillii* (bunya pine) – are native to Australia. *A. cunninghamii* is the only native softwood used extensively in plantations
Blue cypress pine (*Callitris intratropica*)	A softwood tree native to tropical northern Australia
Blue gum (*Eucalyptus globulus* subspecies *globulus*)	A species of eucalypt native to Tasmania and parts of southern Victoria. One of the hardwood species preferred for the production of wood fibre for paper manufacture in regions with a temperate climate. Also known as Tasmanian blue gum
Caribbean pine (*Pinus caribaea*)	See 'southern pines'
Flooded gum (*Eucalyptus grandis*)	A species of eucalypt native to coastal New South Wales and Queensland and widely planted in sub-tropical regions for pulpwood and sawlog production. Also known as rose gum
Green Triangle	The name given in the plantation timber industry to the region straddling the border between the south-eastern corner of South Australia and the south-western corner of Victoria
Hardwood	Timber from flowering trees, such as eucalypts, irrespective of the physical hardness of the timber; also used to refer to the trees that have such timber
Hybrid southern pines	See 'southern pines'
Mangium (*Acacia mangium*)	A medium-sized hardwood tree native to Queensland and Papua New Guinea grown in tropical regions for pulpwood. Also known as brown salwood
Maritime pine (*Pinus pinaster*)	A softwood tree species introduced to Australia from southern Europe and planted for sawlog production in lower-rainfall, temperate climates not suitable for radiata pine
Mean annual increment	Total log volume growth (in cubic metres) of a unit area (hectare) of plantation or forest averaged over the planned rotation (years), expressed in cubic metres per hectare per year
Pruning	Removing the branches from the lower part of the tree trunk so that subsequent bole growth is free of knots
Plantation	An intensively managed stand of trees of native or exotic (that is, introduced) species established by the regular placement of seedlings or seeds, usually to produce timber. The National Plantation Inventory currently does not collect data on plantations established primarily to produce eucalyptus oil, sandalwood oil, bioenergy, carbon or other non-timber products or services
Pulpwood	Logs used to manufacture fibreboard, particleboard, paper products, and small-diameter logs used for posts and poles
Radiata pine (*Pinus radiata*)	A softwood tree species introduced to Australia from California. Widely held to be the most productive plantation species in medium to higher rainfall temperate climatic regions in southern Australia
Red mahogany (*Eucalyptus pellita)*	An Australian native hardwood that has shown promise for sawn timber production in northern Australia

Rotation	In silviculture, the planned growing period of a tree crop. Short rotations, typically of 10–15 years, are used for pulpwood production. Rotations of 20–30 years or more are typically required to produce sawlogs. A second (or subsequent) rotation is the second (or subsequent) generation of planted trees on a site
Sawlogs	Logs used in the manufacture of veneer, plywood and sawn timber
Shining gum (*Eucalyptus nitens*)	A eucalypt species native to eastern Victoria and New South Wales. One of the hardwood species preferred for the production of wood fibre for paper manufacture
Silviculture	The science and technology of managing forest establishment, composition and growth
Slash pine (*Pinus elliottii*)	See 'southern pines'
Softwood	Timber from cone-bearing trees, such as pines, irrespective of the physical softness of the timber; also used to refer to the trees that have such timber
Southern pines	Softwood species introduced from southern North America and the Caribbean. Species include Caribbean pine (*Pinus caribaea*) and slash pine (*P. elliottii*) and several varieties of those. A hybrid between southern pine varieties is now the preferred plantation softwood in sub-tropical and tropical regions of Australia
Teak (*Tectona grandis*)	A hardwood originating in tropical areas of Asia and planted widely in Indonesia, India and other countries to produce cabinet and furniture timber
Thinning	Removing a proportion of the trees in a stand so that remaining trees have more growing space and are therefore likely to grow in diameter more quickly
Yield	The volume of logs harvested, often expressed in cubic metres per hectare



APPENDIX 1:
REGIONAL YIELD TABLES

	CLEARFALL AGE	SAWLOG YIELD	PULPWOOD YIELD	THIRD THINNING AGE	SAWLOG YIELD	PULPWOOD YIELD	SECOND THINNING AGE	SAWLOG YIELD	PULPWOOD YIELD	FIRST THINNING AGE	SAWLOG YIELD	PULPWOOD YIELD	MEAN ANNUAL INCREMENT
	Years	cubic metres per hectare		Years	cubic metres per hectare		Years	cubic metres per hectare		Years	cubic metres per hectare		
Western Australia													
Eucalypt pulpwood	12	0	204	-	-	-	-	-	-	-	-	-	17
Eucalypt sawlog	20	130	150	-	-	-	-	-	-	-	-	-	14
P. radiata	30	270	50	24	60	40	18	60	40	12	0	80	20
P. pinaster	40	110	60	35	90	20	25	40	20	18	0	90	11
Mt Lofty Ranges and Kangaroo Is.													
Eucalypt sawlog	25	150	170	-	-	-	15	0	100	9	0	80	20
P. radiata	30	350	20	23	55	25	18	15	50	13	0	110	21
Green Triangle													
Eucalypt pulpwood	12	0	204	-	-	-	-	-	-	-	-	-	17
North Queensland													
Hardwood sawlog	18	120	0	15	70	0	11	62	0	7	35.5	0	16
Hardwood sawlog	30	201	90	-	-	-	-	-	-	22	26	31	12
Eucalypt pulpwood	12	0	216	-	-	-	-	-	-	-	-	-	18
South East Queensland and North Coast New South Wales													
Eucalypt pulpwood	12	0	216	-	-	-	-	-	-	-	-	-	18
Eucalypt sawlog	20	80	140	-	-	-	-	-	-	13	50	50	16
Eucalypt sawlog	30	201	90	-	-	-	-	-	-	22	26	31	12
Northern Tablelands													
Eucalypt sawlog	20	80	140	-	-	-	-	-	-	13	50	50	16
P. radiata	30	300	70	-	-	-	-	-	-	18	40	70	16
Murray Valley													
Eucalypt sawlog	25	200	50	-	-	-	-	-	-	-	-	-	10
Eucalypt pulpwood	13	0	203	-	-	-	-	-	-	-	-	-	16
P. radiata	30	380	30	-	-	-	21	60	60	14	0	100	21
P. radiata - unthinned	30	180	220	-	-	-	-	-	-	-	-	-	13
Central Victoria													
Eucalypt pulpwood	12	0	210	-	-	-	-	-	-	-	-	-	18
Eucalypt sawlog	25	200	50	-	-	-	-	-	-	-	-	-	10
P. radiata	30	300	30	-	-	-	21	50	60	14	0	100	18
East Gippsland-Bombala													
Eucalypt pulpwood	12	0	204	-	-	-	-	-	-	-	-	-	17
P. radiata	30	220	30	-	-	-	24	70	40	16	0	110	16

Note: These are the yield tables used for modelling by the National Plantation Inventory. Yield tables are not shown for regions and crop types for which forecasts were supplied by plantation owners and managers.

APPENDIX 2:
INFORMATION SOURCES

The following organisations and individuals provided information used in this report. Their support and assistance are gratefully acknowledged.

Abbeygate Afforestation Pty Ltd
ACT Forests
Adelaide Blue Gum Pty Ltd
AKD Softwoods
Auspine
Australian Forest Growers
Australian Pines and Products
Australian Plantation and Paper Products Industry Council
Birnam Forests Pty Ltd
Brisbane Forest Plantation Company of Australia Pty Ltd
Calco Timbers
Cathedral Valley Softwoods
Central Highlands Water
Central Tablelands Private Forestry
Central Victorian Farm Plantations
Central Western Regional Development Board
Conservation and Land Management Western Australia
Coonawarra Blue Gum Pty Ltd
Department of Agriculture, Fisheries and Forestry
East Victoria Plantation Forest Company of Australia Pty Ltd
Enots Pty Ltd
Environinvest Ltd
Forest Enterprises Australia Ltd
Forest Products Commission Western Australia
Forestry Plantations Queensland
ForestrySA
Forestry Tasmania
Forests NSW
Fred Fairthorne and Son Pty Ltd
Gerard Corporation Pty Ltd
Gippsland Private Forestry Inc
Gittins, W. J., and Associates Pty Ltd
Great Southern Plantations Limited
Green Triangle Plantation Forest Company of Australia Pty Ltd
Green Triangle Forest Products
Greenfield Resource Options Pty Ltd
Hancock Victorian Plantations Pty Ltd
Hansol P I Pty Ltd
Hume Forests Limited
Hyne & Son Pty Ltd
Insignis Forestry Services Pty Ltd
Integrated Tree Cropping
Midway Afforestation Ltd
Midway Plantations Pty Ltd
Mitsui and Co (Australia) Pty Ltd
Mount Lofty Ranges Farm Forestry
Murray Riverina Private Forestry
N M Rothschild & Sons (Australia) Ltd
National Association of Forest Industries
Norske Skog Australasia
Northern Inland Forestry Investment Group
Northern Rivers Private Forestry
Northern Territory DPI & Fisheries
Northern Tropical Timbers Pty Ltd
Plantations North East
Premium Plantations Ltd
Private Forests Tasmania
Private Forestry North Queensland
Private Forestry Southern Queensland
Queensland Department of Primary Industries
Queensland North Private Forestry
Queensland Paulownia Forests Ltd
Rainfresh Pty Ltd
Rewards Group
RuralAus Investors Ltd
Sharus Pty Ltd
Sotico Pty Ltd
South East Fibre Exports Pty Ltd
South East Forest Foundation
South East NSW Private Forestry
South East Resource Information Centre
Southern Tablelands Farm Forestry Network Inc
Synnot, R.
Timber 2020 Inc
Timbercorp Treefarms Pty Ltd
Treefarm Investment Managers Australia
Tree Plantations Australia
Tree Owners Plantations Pty Ltd
Trees South West
URS Forestry
Veall, M.
Western Australian Plantation Resources
Weyerhaeuser Australia Pty Ltd
Willmott Forests Limited
Woakwine Forestry

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