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Australia's plantation log supply 2010–2054

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About this report

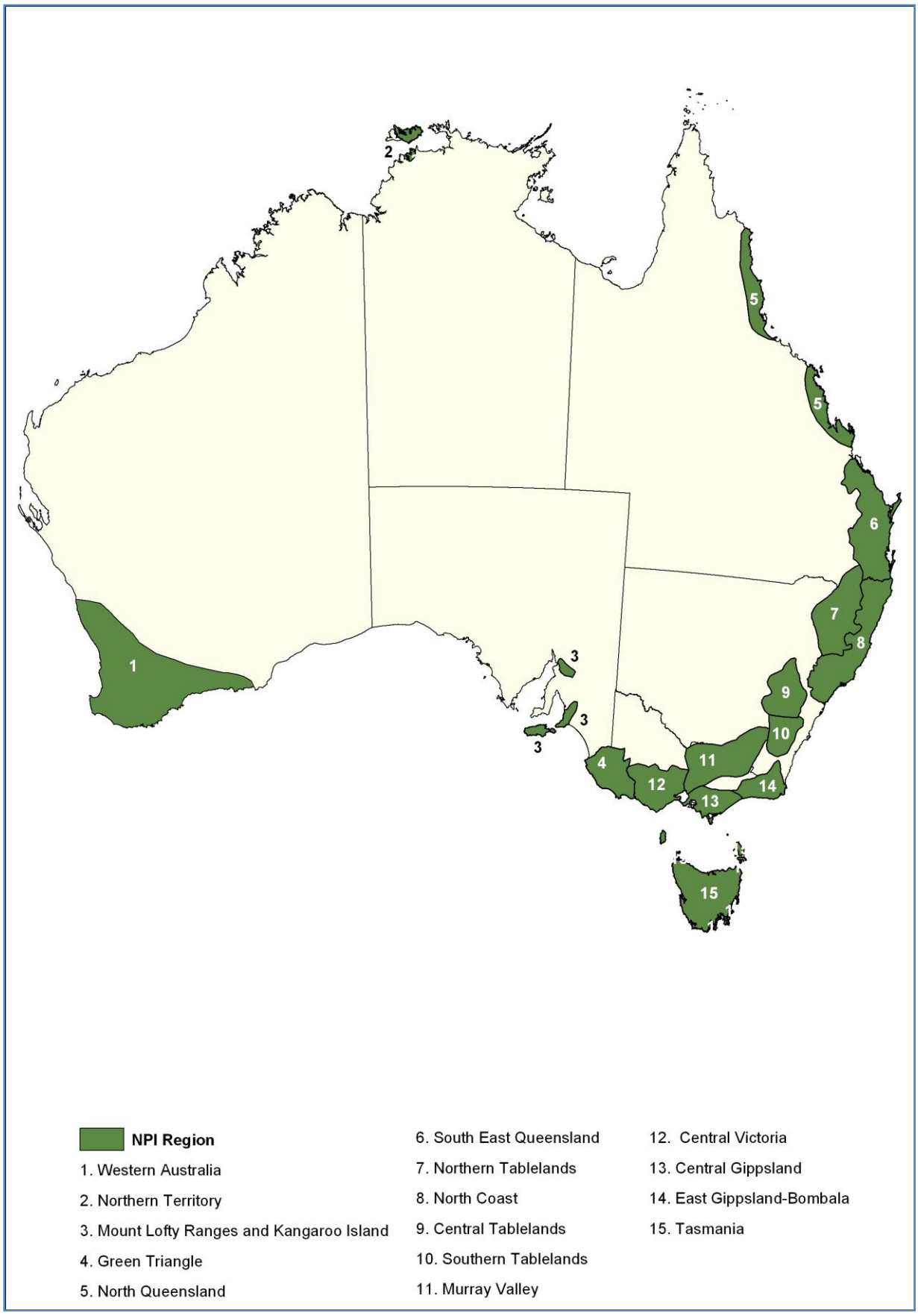
Changes in log supply have important implications for Australia's rural economies; the size, type and geographical location of wood and paper product manufacturing industries; the national supply of forest products; Australia's trade balance; and Australia's export income. Forecasts of the future supply of logs from plantations nationally and by region are provided in this report to help understand likely future changes.

This report has been prepared by ABARES under the auspices of the National Plantation Inventory—a program that has collected data and reported on plantations established primarily for timber production in Australia since 1993. Comprehensive plantation log supply forecast reports are published every five years and *Australia's plantation log supply 2010–2054* is the fourth log supply report. The report includes updated data from plantation owners and managers, and plantations statistics from the ABARES report *Australian plantation statistics 2011*.

In this report, forecasts are presented for coniferous and broadleaved sawlog and pulpwood volumes by National Plantation Inventory region (Figure 1), based on the combination of forecasts supplied by plantation owners and managers through a survey and ABARES modelled forecasts. For the modelled forecasts, ABARES did not account for any future changes in social, economic or environmental parameters. ABARES has separately published analyses of the potential effects of climate change on forests and forestry in Australia.

This report complements two other information products produced by the National Plantation Inventory: annual plantation area statements and five-yearly comprehensive spatial stock take of Australia's industrial plantation estate. Data collated by the National Plantation Inventory are subsequently reported in other national reporting mechanisms including ABARES Australian Forest and Wood Product Statistics, Australia's State of the Forests Report and Australian Bureau of Statistics Year Book Australia, 2009–10.

Figure 1 National Plantation Inventory regions



Source: ABARES

Summary

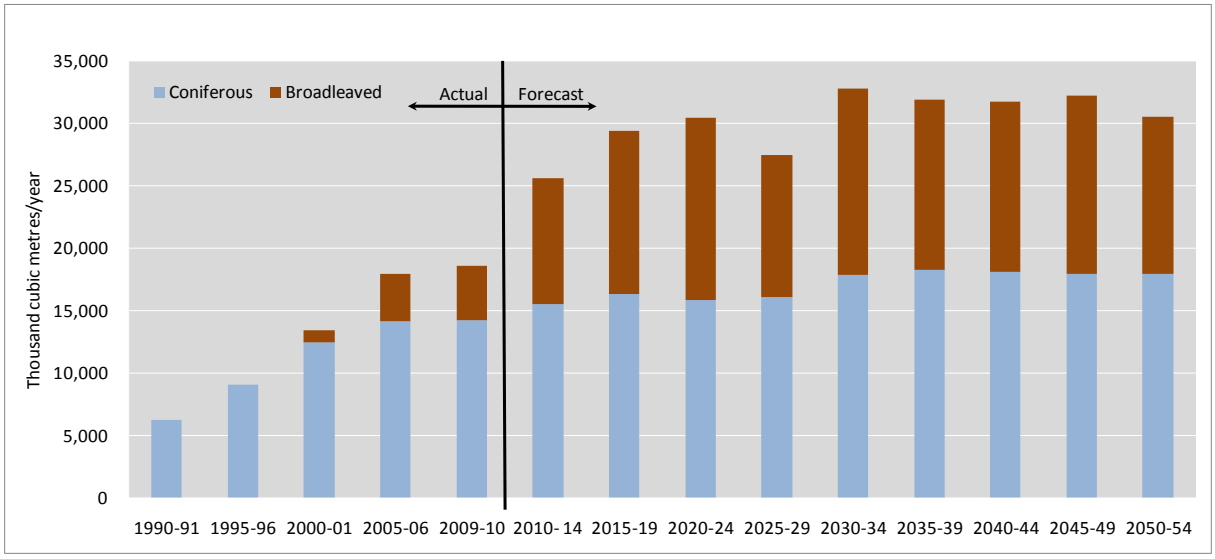
The national plantation log harvest in 2009–10 was over 18.6 million cubic metres, which was around 4 per cent higher compared with the harvest in 2005–06. This represented 74 per cent of the total plantation and native forest logs harvested in Australia in 2009–10.

Figure 2 presents actual data on national log harvests for the financial years 1990–91 to 2009–10 with forecast log supply, which starts with the five-year period 2010–14. The forecast log supply from 2010–14 to 2050–54 is the annual average merchantable volume that is potentially available from Australia's plantation estate for each five year period.

Variations in the area planted from year to year lead to peaks and troughs in the forecast log supply. Market demand and supply for forestry products will influence the actual volumes that are harvested at a particular time, and plantation managers will adjust silviculture, scheduling and operational management accordingly.

The potential supply of logs from Australian plantations is forecast to increase to an annual average of 26 million cubic metres in the 2010–14 period, then to increase further to an annual average over 29 million cubic metres a year in the 2015–19 period. Wood availability is forecast to reach a annual average peak of 33 million cubic metres in the 2030–34 period (Figure 2).

Figure 2 Actual and forecast annual average plantation log supply



Forecast supply in the 2015–19 period comprises broadleaved pulpwood (43 per cent), coniferous sawlogs (36 per cent), coniferous pulpwood (19 per cent) and broadleaved sawlogs (2 per cent).

Key points

Eighty per cent of the forecast volumes in this report were derived directly from data provided by the owners and managers of plantation estates. The remainder are ABARES yield estimates based on yield tables, age classes and expert knowledge.

The current survey data suggest that the previous (2007 report) total plantation area estimate of 2.3 to 2.4 million hectares by 2019–20 will not be realised in this timeframe. Proposed new

plantations may stabilise Australia's plantation estate at the current level of around 2 million hectares to 2019–20.

Broadleaved forecasts

Broadleaved plantation wood supply in the 2015–19 period is forecast to be almost 13 million cubic metres a year on average, more than 3 times the actual volume harvested in 2009–10.

Since the 2007 log supply report, broadleaved pulpwood plantation managers have revised their projected yields downward for some regions where annual plantation inventories show yields from plantations have not met expectations.

Broadleaved plantation pulpwood production is projected to continue to increase over the forecast period, but at a slower rate than in previous years.

Broadleaved pulpwood production was 4 421 000 cubic metres in 2009–10, and is forecast to increase to about 13.5 million cubic metres a year in the 2020–24 period, peaking at around 13.8 million cubic metres a year in the 2030–34 period. By comparison, total broadleaved pulpwood production from native forests in 2009–10 was around 4 million cubic metres.

By the 2015–19 period, three regions—Western Australia, the Green Triangle and Tasmania—will each produce around 2.5–3.5 million cubic metres a year of broadleaved pulpwood. This will be sufficient to supply additional pulp and paper capacity in the Western Australia, Green Triangle and Tasmanian regions.

The total national supply of broadleaved plantation sawlogs is a small proportion (9 per cent) of the forecast total broadleaved plantation log supply, and will increase slightly in coming years. This reflects the relatively low level of investment in broadleaved plantations aimed at sawlog production compared with pulpwood.

Broadleaved sawlog production was 136 000 cubic metres in 2009–10, and is forecast to increase to about 1.3 million cubic metres a year in the 2025–29 period, peaking at around 1.4 million cubic metres a year in the 2040–44 period. By comparison, total broadleaved sawlog production from native forests in 2009–10 was around 2.5 million cubic metres. Most sawlogs from broadleaved plantations will be of lower quality unless they are thinned and pruned.

Over the 2010 to 2045 forecast period, the annual average broadleaved sawlog supply forecast is around 17 per cent lower than the 2007 log supply report as broadleaved plantation managers have revised their projected yields downward.

Coniferous forecasts

The supply of coniferous pulpwood was 4.6 million cubic metres a year in 2009-10, is forecast to increase to 5.6 million cubic metres per year in the 2015–19 period. The potential supply is forecast to remain around that level until the end of the 2050–54 period, with a slight decline over the 2035–2039 period.

Most plantation coniferous pulpwood is forecast to be produced in the Green Triangle, Murray Valley and Central Gippsland regions. In the 2015–19 period, the Green Triangle and the Murray Valley will contribute 22 per cent each of the total national coniferous pulpwood supply and Central Gippsland will contribute 12 per cent.

The supply of coniferous sawlogs, currently over 9.5 million cubic metres a year in 2009–10, is forecast to be steady at around 10.5 million cubic metres a year for the next 15 to 20 years, and increase to about 12.1 million cubic metres a year in the 2030–34 period.

The major coniferous sawlog-producing regions are, and will remain, the Green Triangle, the Murray Valley and South East Queensland. In the 2015–19 period, the Green Triangle will produce an estimated 21 per cent of the national coniferous sawlog volume, the Murray Valley 20 per cent and South East Queensland 17 per cent.

The 2010 to 2045 annual average coniferous log supply forecast is 1.3 per cent higher in this report, compared with the 2007 report. The slight increase is a result of the total coniferous area increasing by 34 000 hectares.

Most of the sawn timber used for housing and general construction in Australia is derived from coniferous plantation sawlogs.

Plantation log supply

Sources and assumptions

Around 80 per cent of the forecasts in this report were derived directly from data provided by the owners and managers of large plantation estates. Where plantation owners and managers did not provide log supply forecasts, the estimates are based on yield models developed by the NPI (Ferguson et al. 2002; Parsons et al. 2007) using data on plantation areas by species and region, as reported in *Australian plantation statistics 2011* (Gavran & Parsons 2011).

Plantation log supply forecasts were compiled and summarised from a series of surveys completed by plantation owners and managers, which were provided to ABARES under confidentiality agreements. The survey comprised two sections: one for owners or managers to complete if they could provide log supply forecasts for each species over the forecast period, and the other for owners or managers who could not provide log supply forecasts but were able to provide management objectives, planting year, species, mean annual increment, site index and National Plantation Inventory region. This information was used by ABARES to model log supply forecasts.

Discrepancies and anomalies were clarified with the owner or manager. Where data provided by plantation owners or managers were incomplete for later periods, either the NPI yield model was used to extrapolate for the remaining yield based on the supplied age class distribution, or a three-year moving average was used to estimate future log supply.

Yield tables for the NPI model were obtained from plantation owners and managers (Ferguson et al. 2002), or developed by the NPI. 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 species. 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 and supply will influence the actual volumes that are harvested at a particular time, and plantation managers will adjust silviculture, scheduling and operational management accordingly.

Some plantation owners and managers provided smoothed forecasts. For the modelled forecasts, ABARES did not undertake smoothing. In most cases the forecasts developed by the NPI reflect current plantation age and the associated growth rates.

Coniferous 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 provide more space for the remaining trees. Broadleaved plantations are managed primarily for pulpwood production, with a small proportion managed for sawlog and veneer log production.

Broadleaved plantations must be thinned and pruned, and grown for longer periods if they are to produce substantial volumes of sawlogs (Nolan et al. 2005). The forecasts in this report assume that such thinning and pruning will be undertaken at an optimal level. If this does not happen, future sawlog yields will be substantially lower than forecast. Broadleaved plantations

managed for sawlog production may also produce some pulpwood from thinnings, defective stems and unpruned upper 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 produced by the NPI. Productivity will be increased by ongoing tree breeding and the introduction of improved silvicultural techniques, and it may be reduced by factors such as increased pest damage and reduced water availability.

The following are limitations that apply to all forecasts in this report.

- Volumes given for sawlogs include logs suitable for veneer and plywood manufacture. It was not feasible to provide forecasts for individual sawlog quality classes because sawlog quality varies widely.
- 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.
- The volumes shown are gross harvestable volumes and do not take into account any losses during harvesting.

Plantation estate

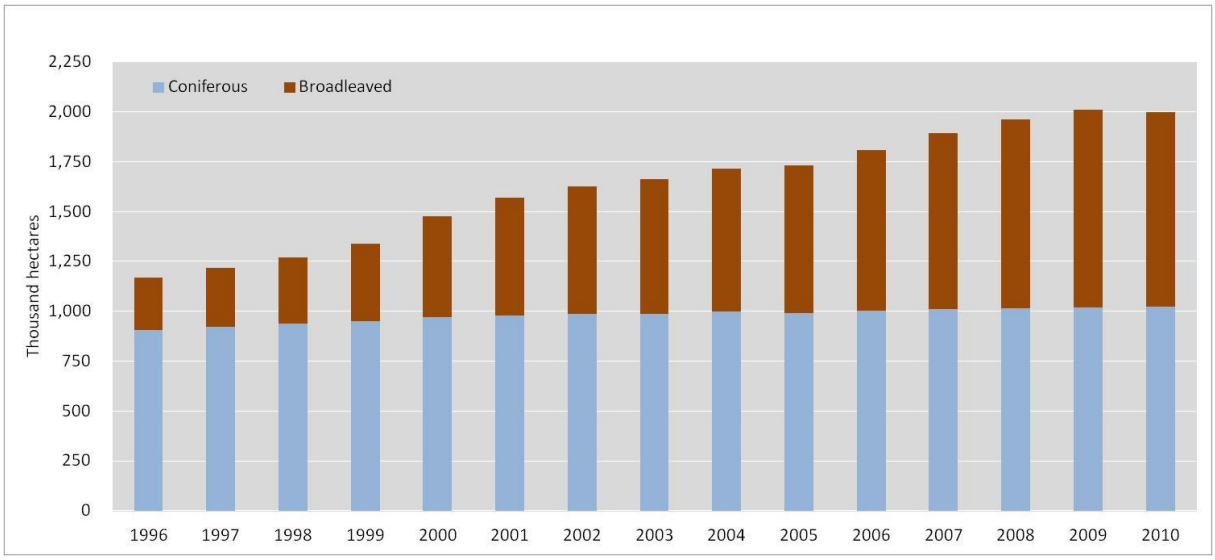
Log availability will remain at the current levels unless the current plantation estate is increased. Improved genetics and silviculture are other factors that can increase growth rates. The current plantation estate and expansion are discussed below.

Total land area dedicated to timber plantations in Australia has increased steadily since 1994, reaching a peak of over 2 million hectares in 2008–09 (Figure 3).

In 2009–10, timber plantations decreased in area by less than 1 per cent compared with 2008–09 and the total plantation area remained around 2 million hectares. In 2009–10, 24 000 hectares of new plantation were established, which is 48 per cent less than the new plantings in 2008–09 (Figure 4).

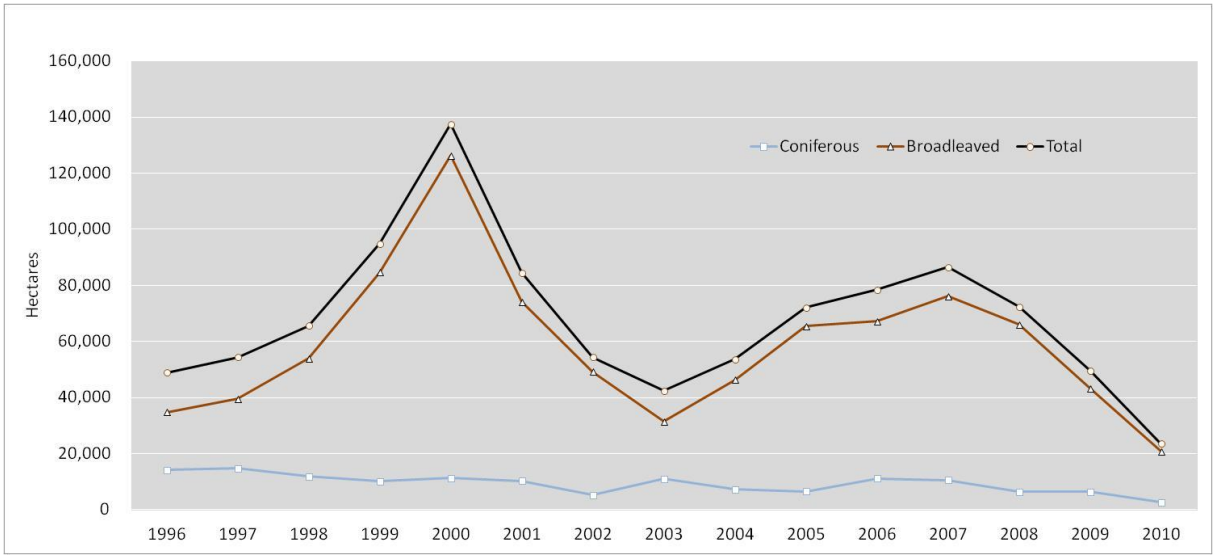
The National Plantation Inventory (NPI) surveyed the main plantation owners and managers in 2007 to estimate potential expansion of their plantation estates. They reported that plantations could reach 2.3–2.4 million hectares by 2019–20. Since the 2007 report (Gavran & Parsons 2011), some of the main respondents to that survey have either exited the industry (with subsequent purchase of the land and/or trees by other private companies) or are in receivership. The current survey results show that plantation owners and managers expect only marginal expansion of their net planted estates from 2010–11. The current survey data suggest that the previous total plantation area estimate of 2.3–2.4 million hectares by 2019–20 will not be realised in this timeframe. Proposed new plantations may stabilise Australia's plantation estate at the current level of around 2 million hectares. Figure 4 shows that new plantings have declined since 2006–07, reaching their lowest level since 1996 in 2009–10. In 2008–09, the total plantation area decreased for the first time since 1993, when the NPI started reporting on plantation area. The decline is a result of low productivity sites not being replanted, growers leaving the industry and changes to land use.

Figure 3 Area of timber plantations



Note: 1996 to 2005 are calendar years and 2006 to 2010 are financial years (2005–06 to 2009–10).

Figure 4 New plantations, 1996 to 2010



Note: 1996 to 2005 are calendar years and 2006 to 2010 are financial years (2005–06 to 2009–10).

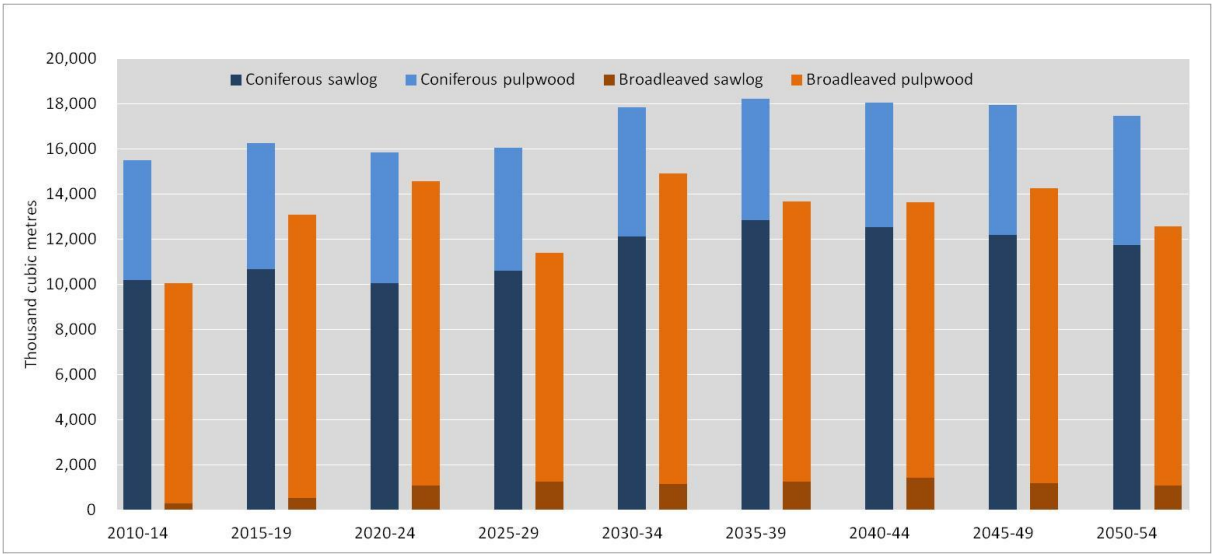
Forecasts

Log supply from plantations is forecast to increase to an annual average of 29 million cubic metres a year in the 2015–19 period (Table 1, Figure 5). Forecast supply in the 2015–19 period comprises broadleaved pulpwood (43 per cent), coniferous sawlogs (36 per cent), coniferous pulpwood (19 per cent) and broadleaved sawlogs (2 per cent). Trends and issues for broadleaved and coniferous plantations are discussed below.

Table 1 Forecast plantation log supply, Australia

	(thousands cubic metres a year average for each five-year period)								
Period	2010–14	2015–19	2020–24	2025–29	2030–34	2035–39	2040–44	2045–49	2050–54
Broadleaved									
- pulpwood	9 763	12 571	13 499	10 145	13 776	12 448	12 236	13 099	11 495
- sawlog	290	530	1 079	1 271	1 159	1 244	1 417	1 178	1 091
- total	10 053	13 101	14 578	11 416	14 935	13 692	13 654	14 277	12 586
Coniferous									
- pulpwood	5 309	5 593	5 797	5 474	5 734	5 381	5 540	5 743	5 720
- sawlog	10 205	10 686	10 054	10 592	12 114	12 863	12 537	12 200	11 759
- total	15 514	16 279	15 851	16 066	17 848	18 244	18 076	17 943	17 479
Overall total	25 566	29 380	30 429	27 482	32 783	31 936	31 730	32 220	30 065

Figure 5 Forecast plantation log supply, Australia



Broadleaved plantation forecast

Broadleaved plantation log supply in the 2015–19 period is forecast to be around 13 million cubic metres a year, more than 3 times the volume harvested in 2009–10. Average log supply is forecast to fluctuate between 11.4 and 14.9 million cubic metres a year from the 2015–19 period to the 2050–54 period (Table 1, Figure 5).

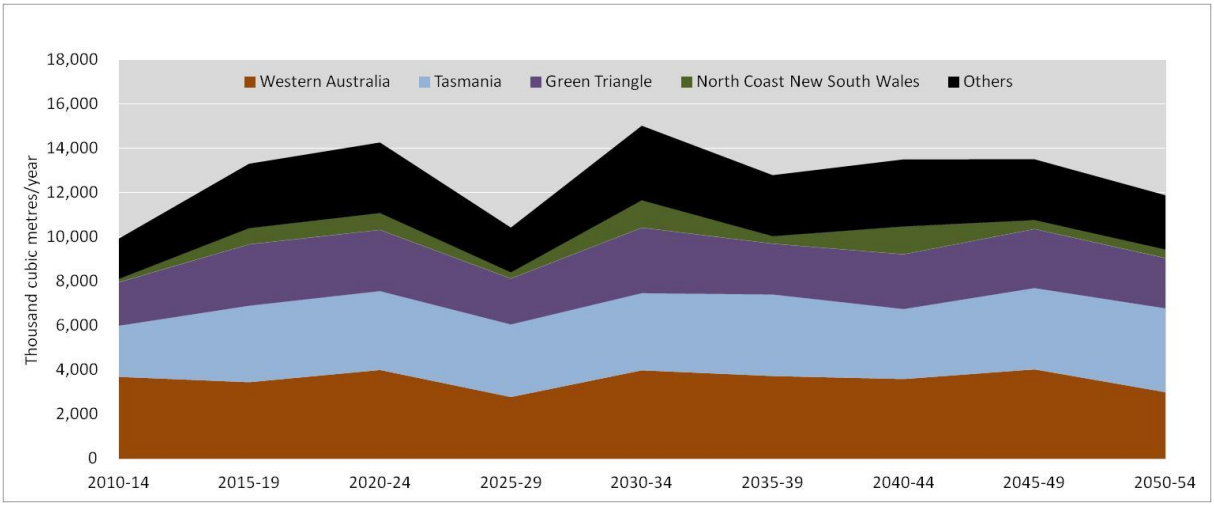
Broadleaved pulpwood production was 4 421 000 cubic metres in 2009–10, and is forecast to increase to about 13.5 million cubic metres a year in the 2020–24 period, peaking at around 13.8 million cubic metres a year in the 2030–34 period. By comparison, total broadleaved pulpwood production from native forests in 2009–10 was around 4 million cubic metres.

By the 2015–19 period, three regions—Western Australia, the Green Triangle and Tasmania—will each produce around 2.5–3.5 million cubic metres a year of broadleaved pulpwood. This will be sufficient to supply additional pulp and paper capacity in the Western Australia, Green Triangle and Tasmanian regions.

Most plantation broadleaved pulpwood is produced in three NPI regions: Western Australia, the Green Triangle and Tasmania. The NPI regions will be discussed in detail later in the report. By 2015–19, the major broadleaved pulpwood-producing regions will be Western Australia and Tasmania, each accounting for 27 per cent of the national total pulpwood, and the Green

Triangle, accounting for another 22 per cent. North Coast NSW and Central Victoria are forecast to produce 6 per cent each.

Figure 6 Forecast plantation broadleaved pulpwood supply, by region



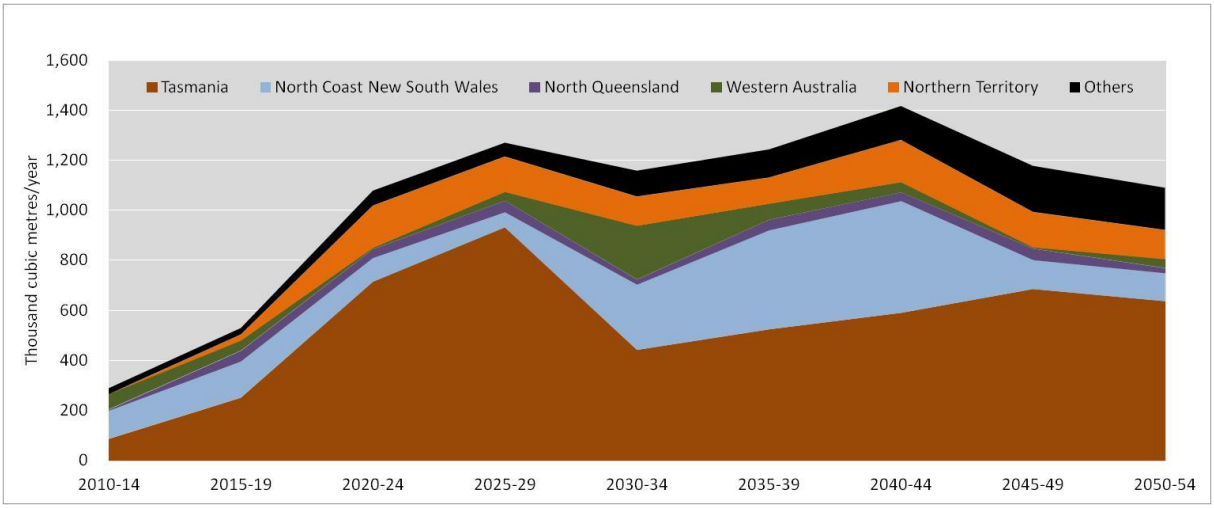
The total national supply of broadleaved plantation sawlogs is a small proportion (9 per cent) of the forecast total broadleaved plantation log supply, and will increase slightly in coming years. This reflects the relatively low level of investment in broadleaved plantations aimed at sawlog production compared with pulpwood.

Broadleaved sawlog production was 136 000 cubic metres in 2009–10, and is forecast to increase to about 1.3 million cubic metres a year in the 2025–29 period, peaking at around 1.4 million cubic metres a year in the 2040–44 period. By comparison, total broadleaved sawlog production from native forests in 2009–10 was around 2.5 million cubic metres. Most sawlogs from broadleaved plantations will be of lower quality unless they are thinned and pruned (Nolan et al. 2005).

Most of the broadleaved sawlog plantations are in Tasmania and North Coast NSW (Figure 7), and were predominantly established by state governments. The majority of the increase in broadleaved plantations for sawlog production are being promoted by state governments to ensure continued broadleaved sawlog supply.

In the 2015–19 period, Tasmania and North Coast NSW will be the main sources of broadleaved plantation sawlogs, producing an annual average of about 251 000 and 145 000 cubic metres, respectively (Figure 7). By the 2025–29 period, the total national supply of broadleaved plantation sawlogs is forecast to increase to 1.3 million cubic metres a year. Tasmania will produce over 73 per cent of the total, the Northern Territory 11 per cent, North Coast NSW nearly 5 per cent, North Queensland 3.6 per cent and Western Australia 2.9 per cent.

Figure 7 Forecast plantation broadleaved sawlog supply, by region



Coniferous plantation forecast

The supply of coniferous pulpwood was 4.6 million cubic metres a year in 2009-10, is forecast to increase to 5.6 million cubic metres per year in the 2015–19 period. The potential supply is forecast to remain around that level until the end of the 2050–54 period, with a slight decline over the 2035–2039 period (Figure 9).

Most plantation coniferous pulpwood is forecast to be produced in the Green Triangle, Murray Valley and Central Gippsland regions. In the 2015–19 period, the Green Triangle and the Murray Valley will contribute 22 per cent each of the total national coniferous pulpwood supply and Central Gippsland will contribute 12 per cent.

The supply of coniferous sawlogs, currently over 9.5 million cubic metres a year in 2009–10, is forecast to be steady at around 10.5 million cubic metres a year for the next 15 to 20 years, and to increase to about 12.1 million cubic metres a year in the 2030–34 period (Table 1, Figure 8).

Most sawn timber used for housing and general construction in Australia is derived from coniferous plantation sawlogs. The increased supply in the longer term is a result of some replanting of broadleaved plantation sites with coniferous species, better silviculture, and an expansion of the coniferous plantation estate in a few regions.

The major coniferous sawlog-producing regions are, and will remain, the Green Triangle, the Murray Valley and South East Queensland (Figure 8). In the 2015–19 period, the Green Triangle will produce an estimated 21 per cent of the national coniferous sawlog volume, the Murray Valley 20 per cent and South East Queensland 17 per cent.

The proportion of coniferous plantation that is privately owned has increased to around 56 per cent of the total planted area. In 2010, the government-owned plantations in Queensland were sold to superannuation funds, and recently the government-owned coniferous plantations in Tasmania were sold to a forestry investment fund.

Figure 8 Forecast plantation coniferous sawlog supply, by region

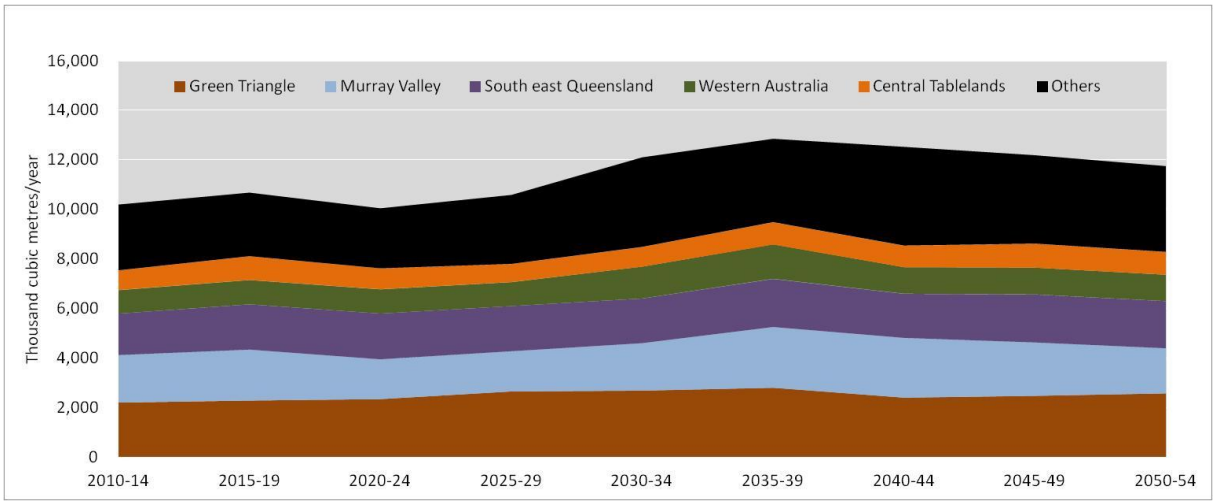
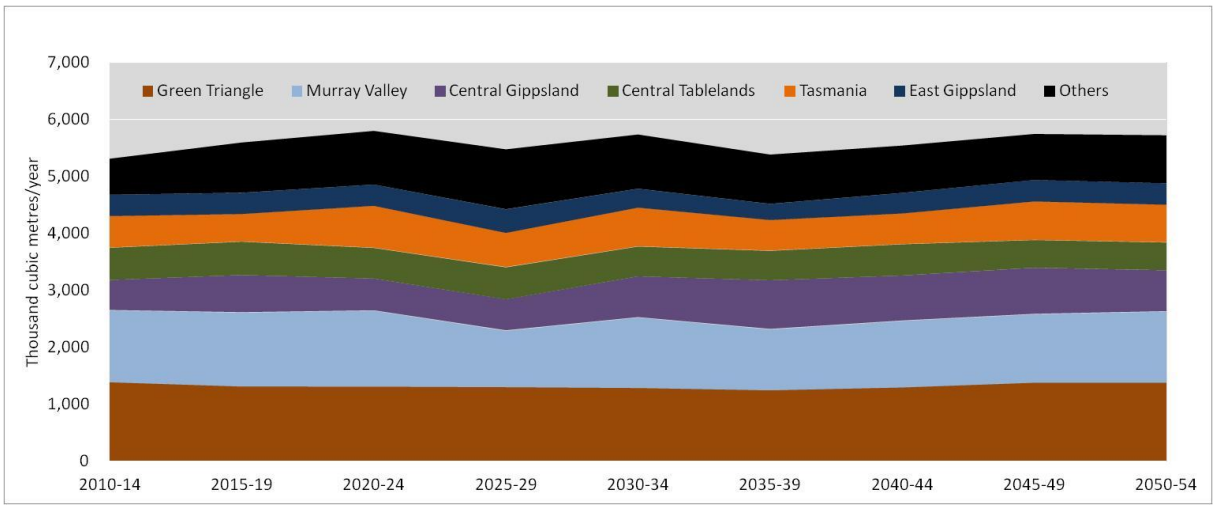


Figure 9 Forecast plantation coniferous pulpwood supply, by region



How does the 2012 forecast compare with the 2007 forecast?

The previous Australian plantation log supply forecast (Parsons et al. 2007) was based on plantation areas recorded by the NPI as at 2004–05. The present forecast is based mainly on areas as at 2009–10.

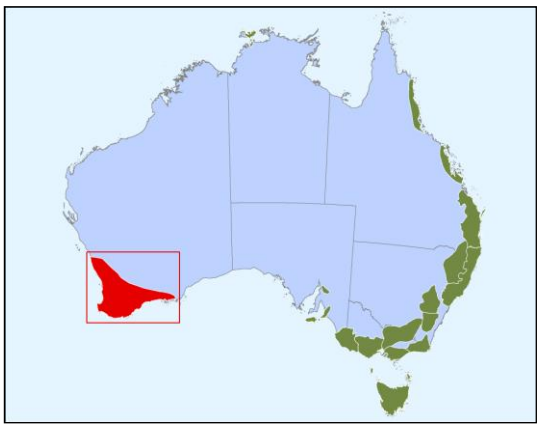
Although the broadleaved plantation area has increased by 31.4 per cent since 2004–05, the 2012 forecasts indicate a 2.3 per cent decrease in national broadleaved plantation log supply in the 2015–19 period compared with the 2007 report estimates (Gavran & Parsons 2011). Over the 2010 to 2045 forecast period, the annual average broadleaved sawlog supply forecast is around 17 per cent lower in this report, compared with the 2007 report (Gavran & Parsons 2011). This is a result of the broadleaved plantation managers revising their projected yields downward for regions where annual plantation inventories show yields from plantations have not met expectations since the 2007 log supply report.

The 2010 to 2045 annual average coniferous log supply forecast is 1.3 per cent higher in this report, compared with the 2007 report (Gavran & Parsons 2011). The slight increase is a result

of the total coniferous area increasing by 34 000 hectares.. In addition, a larger proportion of plantation growers and managers provided wood flow data for the 2012 forecasts, improving the reliability of the forecasts (Gavran & Parsons 2011).

Regional forecasts

Western Australia



Source: ABARES

Plantations in Western Australia are located across an arc from the north of Perth to the east of Esperance, and in some small areas of the Ord River irrigation area in the far north of the state (Gavran & Parsons 2011). These smaller areas are not visible at the scale of the map above. Major plantation timber processing industries are located at Neerabup, Dardanup, Manjimup, Collie and Albany. Woodchips are exported from ports at Bunbury and Albany.

Plantation area for the 2007 log supply report (Gavran & Parsons 2011) was based on statistics collected in 2004–05. Since then, the actual broadleaved plantation area in Western Australia has increased by 12 per cent to 307 200 hectares in 2009–10. Most of the increase has been for the production of pulpwood. Around 6 per cent of the broadleaved estate is planted for environmental benefits such as salinity and erosion management and sawlog production, and comprises a range of broadleaved species with varying growth rates. The main species used for environmental plantings and sawlog production are sugar gum (*Eucalyptus cladocalyx*), Sydney blue gum (*E. saligna*), spotted gum (*Corymbia maculata*) and flooded gum (*E. grandis*).

The major broadleaved plantation species in Western Australia is blue gum (*E. globulus*), which is grown mainly for pulpwood production. Around 92 per cent of the area under blue gum plantation is on private land. Since the 2007 log supply report (Parsons et al. 2007), around 25 000 hectares of first rotation blue gums have been planted, with the majority of broadleaved plantations established from 1995–96 onward (Figure 10).

Production from broadleaved plantations has been stable at around 2.5 million cubic metres of logs since 2006–07. The broadleaved pulpwood volume is forecast to be around 3.5 million cubic metres a year in the 2015–19 period, with around 4 million cubic metres a year in the 2020–24 and 2045–49 periods and decline to around 3 million cubic metres a year in the 2050–54 period (Table 2, Figure 11). The reported volumes have not been smoothed by ABARES and reflect the expectations of major growers. Although there has been an increase in new blue gum plantations, the broadleaved pulpwood production for Western Australia has declined since the last log supply report. This largely reflects updated information received from most major growers.

In this report, 70 per cent of the data on forecast broadleaved plantation were provided by growers, compared with 40 per cent provided for the 2007 log supply report (Gavran & Parsons 2011).

Radiata pine (*Pinus radiata*) and maritime pine (*P. pinaster*) are the main coniferous species planted in Western Australia, and have been producing sawlogs and pulpwood for many years. The total coniferous area in Western Australia in 2009–10 was 100 200 hectares, reflecting a 4 per cent decline in area since 2006–07. Groundwater recharge areas were not replanted, mainly accounting for this decline in coniferous area. Around 7000 hectares of new coniferous plantations have been established since 2006–07, partially offsetting the area removed to increase groundwater recharge (Yesertener 2005).

The coniferous sawlog volume is forecast to be 976 000 cubic metres a year until the 2015–19 period, then to increase to 1 382 000 cubic metres a year in the 2035–39 forecast period (Table 2, Figure 12). There has been a slight increase in available coniferous volume since the 2007 log supply report (Gavran & Parsons 2011). Plantation owners and managers provided 97 per cent of the forecasts of coniferous log supply.

Figure 10 Area planted by five-year period, Western Australia

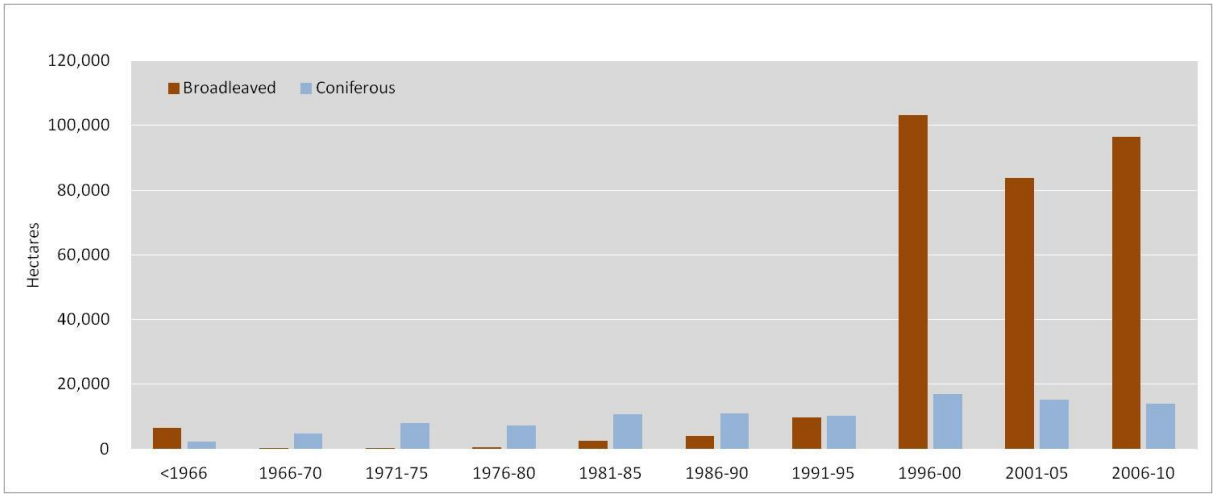


Table 2 Forecast plantation log supply, Western Australia

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	3 705	3 460	4 013	2 793	3 997	3 741	3 604	4 041	3 012
- sawlog	62	41	6	36	215	65	41	6	36
Coniferous									
- pulpwood	83	114	86	96	76	76	95	107	90
- sawlog	942	976	973	959	1 278	1 382	1 066	1 072	1 060
Overall total	4 792	4 591	5 079	3 884	5 565	5 264	4 806	5 226	4 199

Figure 11 Forecast broadleaved plantation log supply, Western Australia

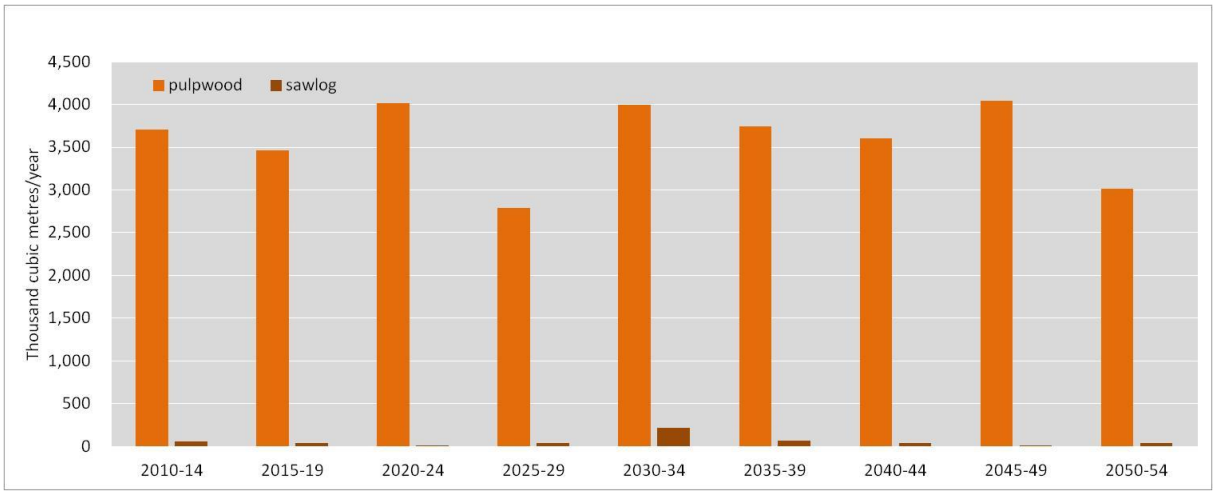
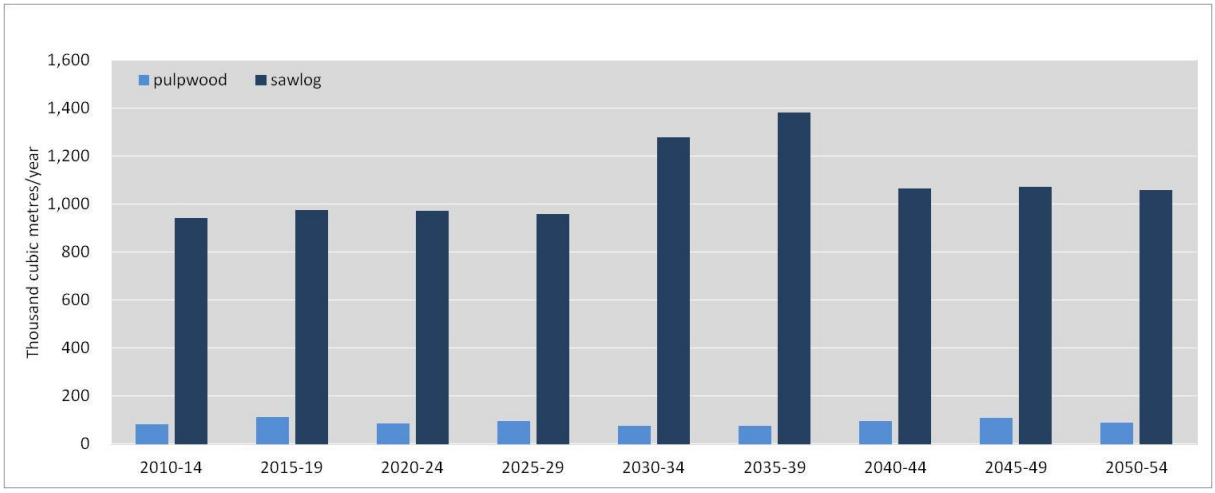
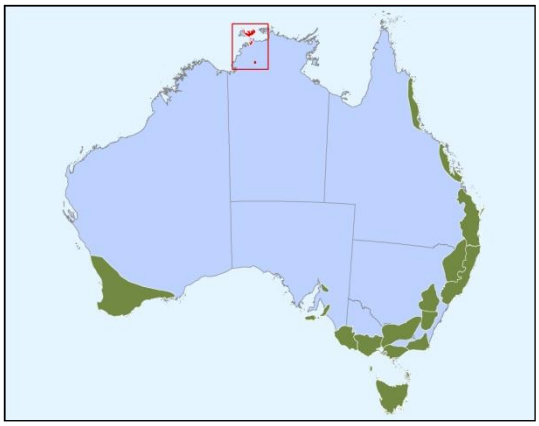


Figure 12 Forecast coniferous plantation log supply, Western Australia



Northern Territory



Source: ABARES

Plantations in the Northern Territory are located on Melville Island and some northern parts of the mainland. The broadleaved plantation area in the Northern Territory region, grown for pulpwood and sawlog production, more than doubled in the past five years since 2004–05 to a total of 35 700 hectares in 2009–10. In comparison, the coniferous plantation area was static at 2400 hectares. The coniferous plantations were established before 1995–96 and most of the broadleaved plantations were established from 2000–01 onward (Figure 13).

For much of the past decade, broadleaved plantations increased mainly because of managed investment scheme planting of mangium (*Acacia mangium*) on Melville Island. That expansion has ceased and the plantations on Melville Island are now managed by the Tiwi Land Council. In the late 2000s, significant African mahogany (*Khaya senegalensis*) plantings began in mainland Northern Territory to produce sawlogs. The total area is now around 8 400 hectares, with African mahogany plantation managers aiming for a total planted area of around 15 000 to 20 000 hectares.

Broadleaved pulpwood production is forecast to be around 188 000 cubic metres a year in the 2015–19 period and to peak at around 883 000 cubic metres a year in the 2020–24 period (Table 3, Figure 14). This doubles the forecast log supply compared with the figure from the 2007 log supply report (Gavran & Parsons 2011).

It is forecast that 169 000 cubic metres of broadleaved sawlog will be available for extraction in the 2020–24 period (Table 3, Figure 14). The large drop in the yield of broadleaved pulpwood in the 2015–19 period reflects the proposed silvicultural regime for the plantation's age class distribution.

From the mid-1970s to the early 1990s, Caribbean pine was the main coniferous species planted in Melville Island. Following its harvest, the sites were replanted with mangium. The coniferous sawlog production is forecast to reach 41 000 cubic metres a year in the 2015–19 period, then to decline to 6000 cubic metres a year in the 2025–29 period (Table 3, Figure 15).

Plantation owners and managers provided 70 per cent of the forecasts of African mahogany sawlog supply. The broadleaved pulpwood plantation area was modelled using information provided by plantation managers. The volumes reported in Figure 14 and Figure 15 have not been smoothed by ABARES.

Figure 13 Area planted by five-year period, Northern Territory

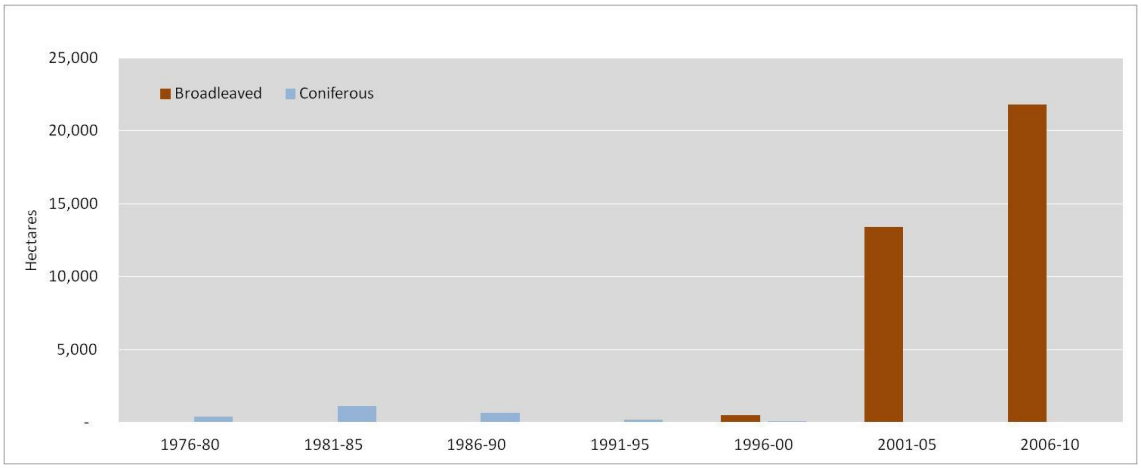


Table 3 Forecast plantation log supply, Northern Territory

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	682	188	883	502	517	782	393	759	782
- sawlog	0	25	169	141	117	105	169	141	117
Coniferous									
- pulpwood	3	5	2	2	7	4	3	5	2
- sawlog	27	41	18	6	7	11	27	41	18
Overall total	712	259	1 071	651	647	902	592	946	919

Figure 14 Forecast broadleaved plantation log supply, Northern Territory

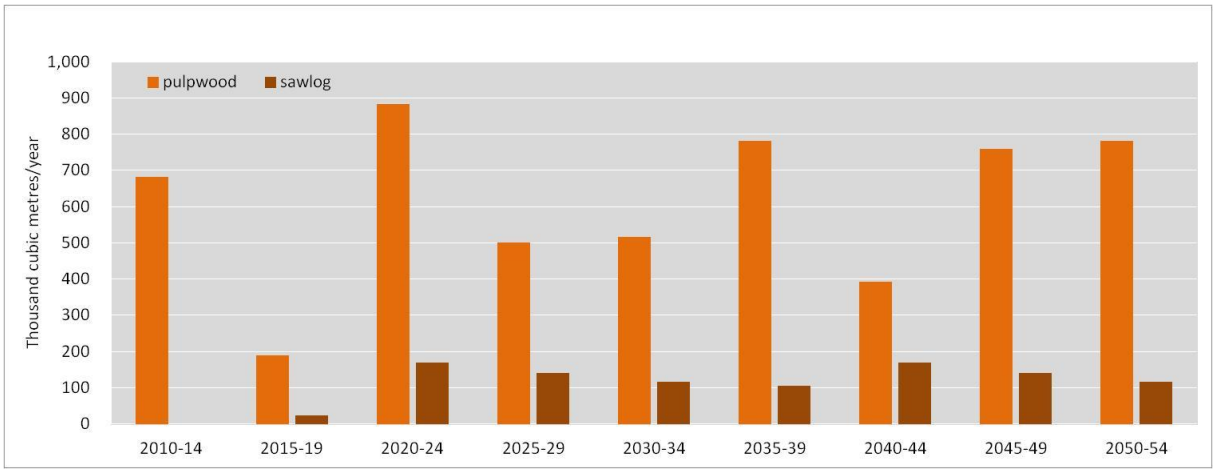
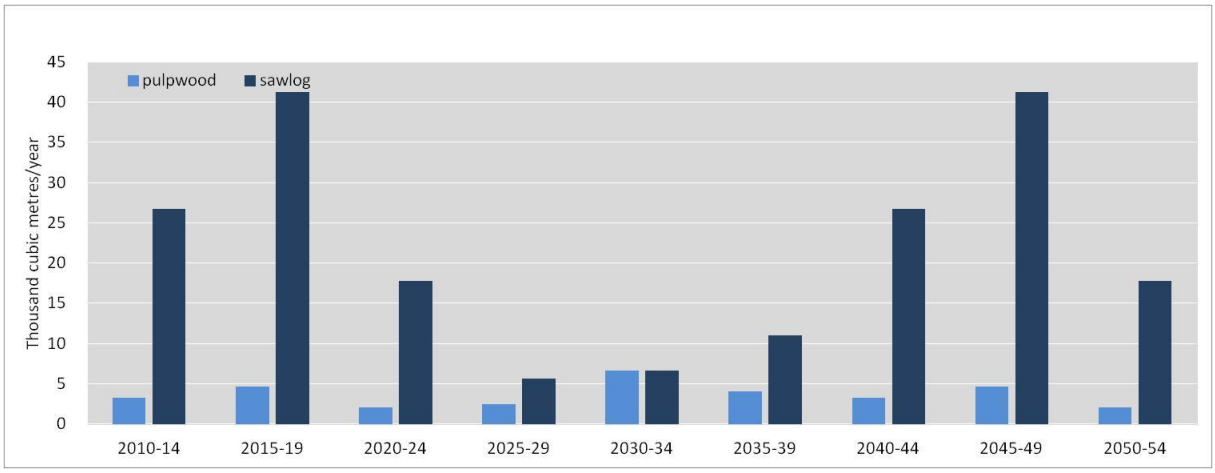
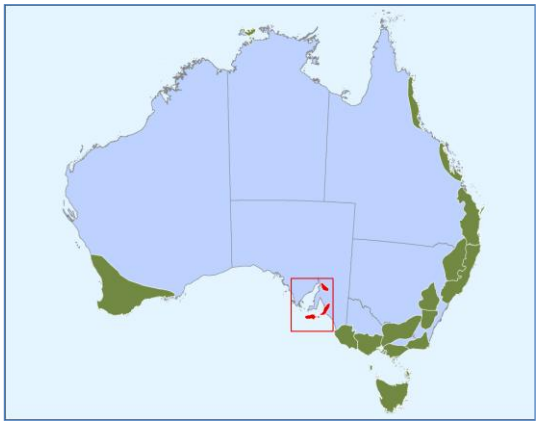


Figure 15 Forecast coniferous plantation log supply, Northern Territory



Mount Lofty Ranges and Kangaroo Island



Source: ABARES

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

The coniferous plantations in this region supply sawlogs and pulpwood to processing industries near Adelaide at Kuitpo, Wingfield, Nuriootpa and Jamestown. Logs can be exported from Port of Adelaide. Establishment of the coniferous plantations started before 1965–66, and most of the broadleaved plantations were established from 2000–01 onward (Figure 16).

The plantation area in the Mount Lofty Ranges and Kangaroo Island increased substantially to 37 000 hectares between 1999–00 and 2008–09, mainly because of blue gum (*E. globulus*) planting on Kangaroo Island, but decreased by 8 per cent in 2009–10. The decline reflects plantations being written off, harvested plantations not being replanted following a change of ownership. Around 88 per cent of the broadleaved estate is blue gum managed for pulpwood production. The remaining 12 per cent are farm forestry plantations managed for sawlog production and comprise a range of broadleaved species with varying growth rates.

Broadleaved pulpwood production is forecast to be 256 000 cubic metres a year in the 2015–19 period, then to decline to 16 000 cubic metres a year in the 2040–44 period (Table 4, Figure 17).

The total area of coniferous plantations, comprising mainly radiata pine (*P. radiata*), has increased by around 3 per cent since 2004–05 to around 20 000 hectares in 2009–10. The coniferous sawlog volume is forecast to be 208 000 cubic metres a year in the 2015–19 period and peak in the 2050–54 period at 218 000 cubic metres a year (Table 4, Figure 18).

Plantation owners and managers provided 90 per cent of the forecasts of broadleaved plantation log supply and 75 per cent of the forecasts of coniferous plantation log supply. These forecasts assume that established plantation areas will be replanted once harvested.

Figure 16 Area planted by five-year period, Mount Lofty Ranges and Kangaroo Island

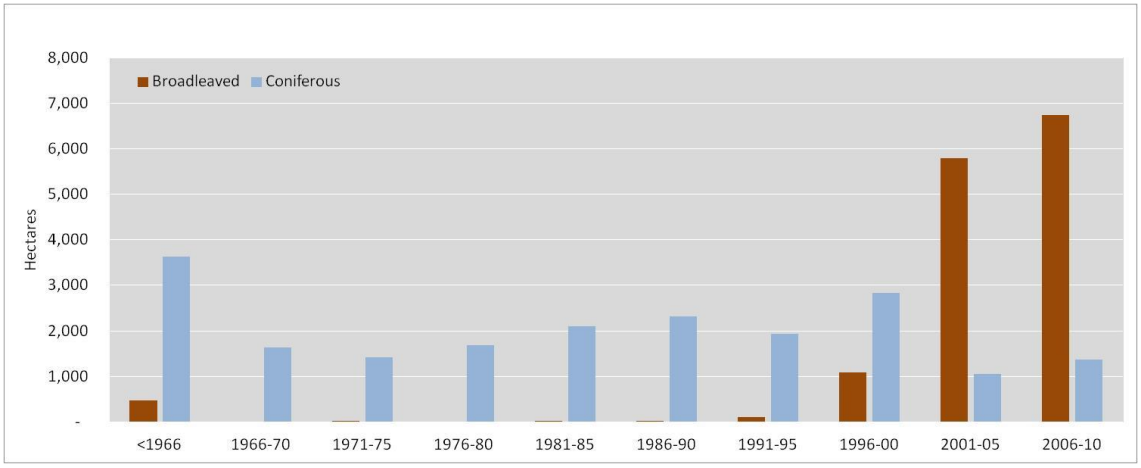


Table 4 Forecast Plantation log supply, Mount Lofty Ranges and Kangaroo Island

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	28	256	120	32	204	218	16	211	32
- sawlog	0	2	23	12	1	0	2	23	12
Coniferous									
- pulpwood	99	57	59	77	70	67	87	64	58
- sawlog	241	208	205	208	219	128	189	186	218
Overall total	369	522	407	330	493	413	294	485	321

Figure 17 Forecast broadleaved plantation log supply, Mount Lofty Ranges and Kangaroo Island

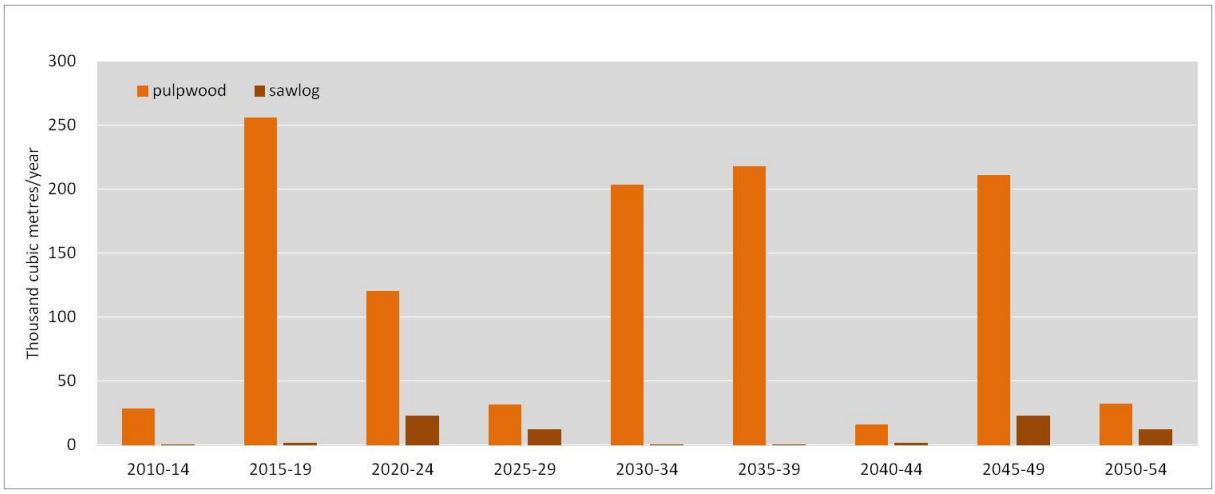
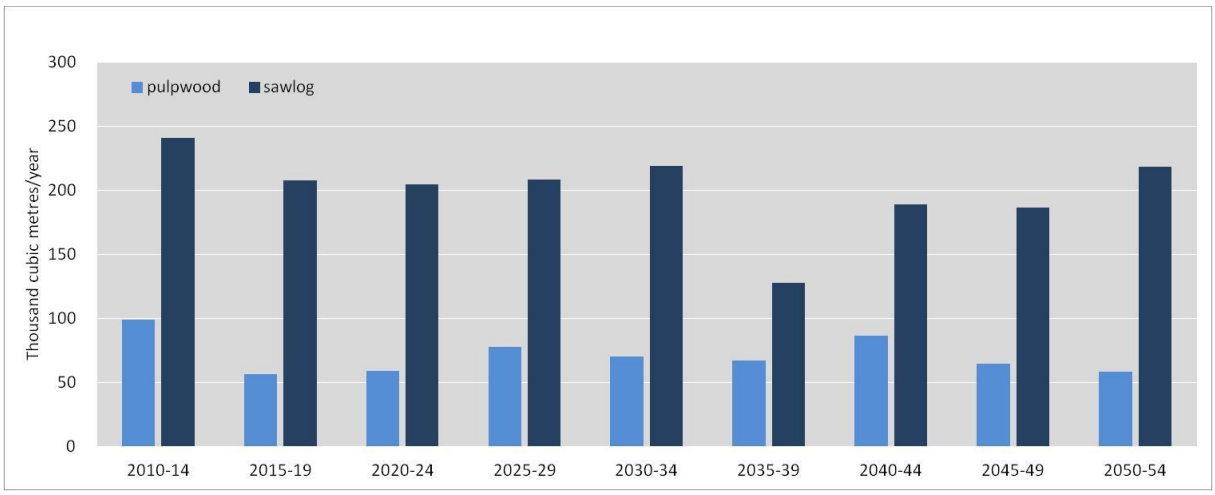
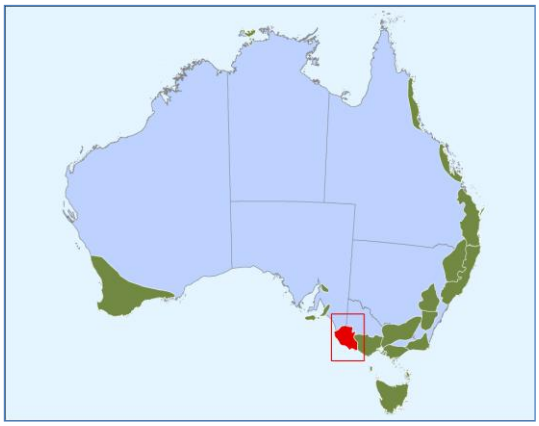


Figure 18 Forecast coniferous plantation log supply, Mount Lofty Ranges and Kangaroo Island



Green Triangle



Source: ABARES

The Green Triangle straddles the border between south-east South Australia and south-west Victoria. It has been a major coniferous plantation region since the early 20th century and includes some of Australia's most productive radiata pine plantations. Most of the coniferous plantations were established from 1980–81 onward, and the broadleaved plantations were established from 1995–96 onward (Figure 19).

Most of the coniferous plantations in the Green Triangle region are radiata pine (*P. radiata*) and 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 plantation area in the Green Triangle region has increased substantially over the past five to ten years, although the rate of increase fell to low levels by the end of the decade. Of the total increase in area since 2004–05, about 38 000 hectares are blue gum (*E. globulus*) plantations established to produce pulpwood for the paper industry. The balance of 10 000 hectares are radiata pine established to supply sawn wood and other products for the building and construction industry.

The broadleaved pulpwood volume is forecast to be 2 763 000 cubic metres a year in the 2015–19 period and to increase to 2 948 000 cubic metres a year in the 2030–34 period (Table 5, Figure 20). The forecast broadleaved wood flow volumes have decreased since the 2007 log supply estimate, despite the broadleaved plantation area having expanded by around 38 000 hectares. This mainly reflects revised growth rates supplied by plantation owners and managers.

The broadleaved sawlog plantations in the Green Triangle have not been modelled because the total planted area is less than 1000 hectares and comprises a range of broadleaved species with varying growth rates.

The coniferous sawlog volume is forecast to be 2 280 000 cubic metres a year in the 2015–19 period and to peak in the 2035–39 period at 2 798 000 cubic metres a year (Table 5, Figure 21). The forecast sawlog coniferous wood flow volumes have increased from the 2007 estimates, reflecting the expansion of the coniferous estate by 10 000 hectares since 2004–05.

Plantation owners and managers provided 85 per cent of the forecasts of broadleaved plantation log supply and 80 per cent of the forecasts of coniferous plantation log supply.

Figure 19 Area planted by five-year period, Green Triangle

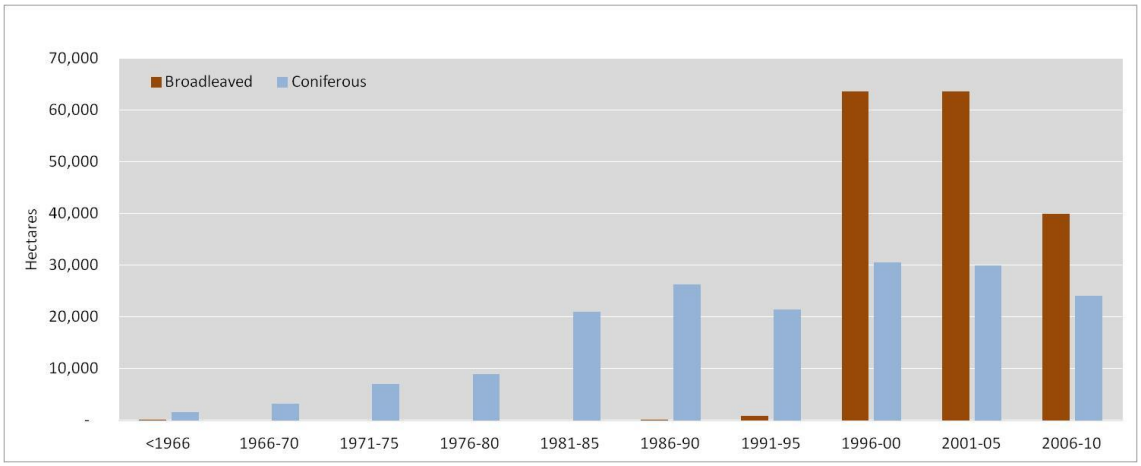


Table 5 Forecast plantation log supply, Green Triangle

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	1 954	2 763	2 754	2 066	2 948	2 289	2 462	2 659	2 264
- sawlog	2	0	2	4	1	2	0	2	4
Coniferous									
- pulpwood	1 387	1 312	1 310	1 301	1 286	1 244	1 295	1 378	1 378
- sawlog	2 195	2 280	2 338	2 648	2 681	2 798	2 397	2 471	2 571
Overall total	5 538	6 356	6 404	6 019	6 915	6 333	6 155	6 510	6 216

Figure 20 Forecast broadleaved plantation log supply, Green Triangle

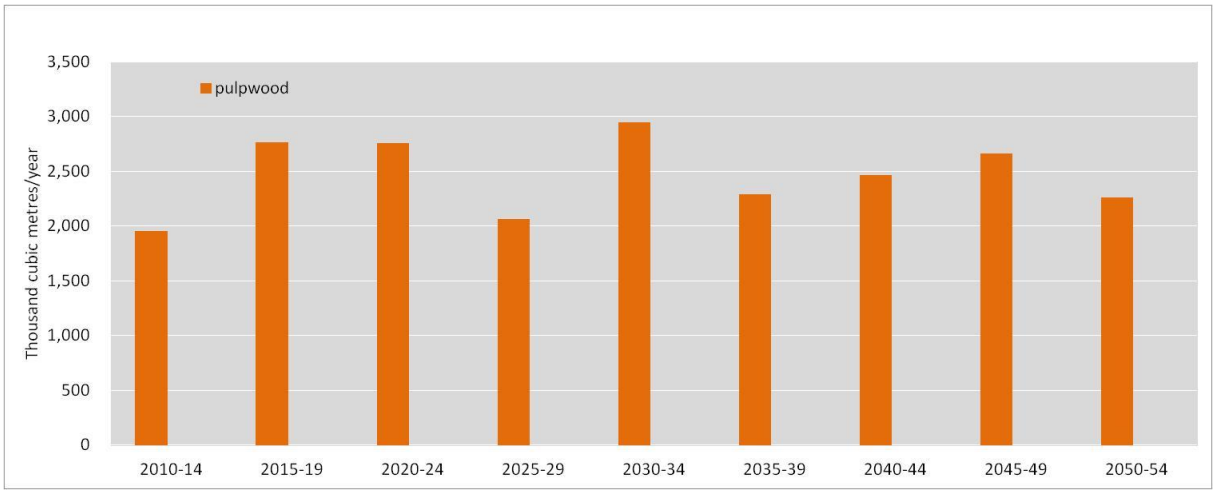
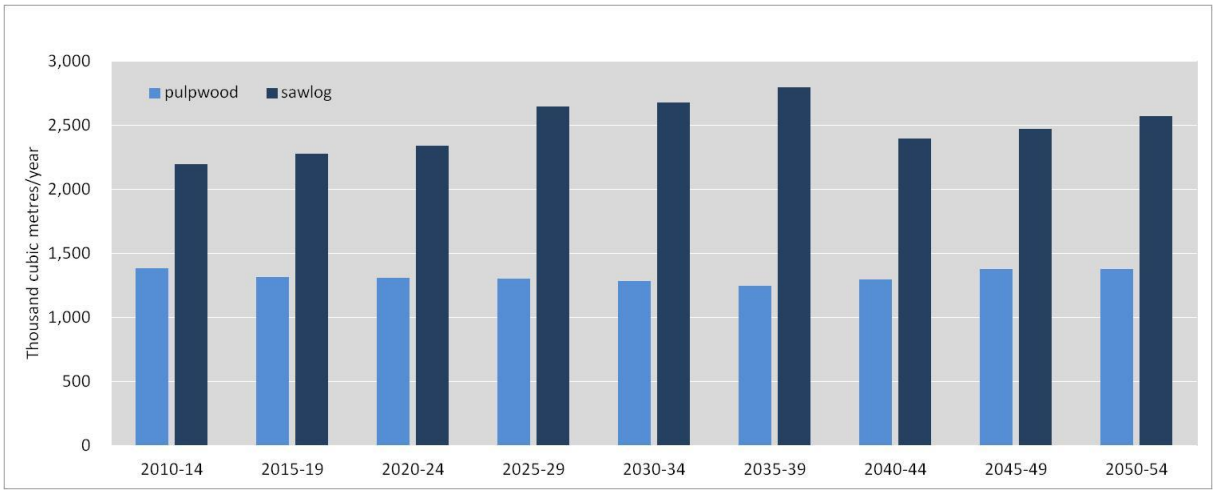
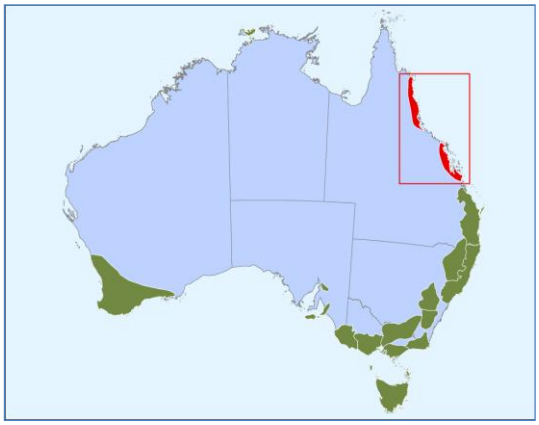


Figure 21 Forecast coniferous plantation log supply, Green Triangle



North Queensland



Source: ABARES

The North Queensland plantation region lies north of Gladstone in a strip along the coast as far north as Cooktown. The coniferous plantations are concentrated between Ingham and Tully, near Yeppoon, and on the Atherton Tableland. They comprise exotic Caribbean pine (*Pinus caribaea*) and native hoop pine (*Araucaria cunninghamii*) and have been established for many years. The broadleaved plantations are concentrated between Townsville and Cooktown and supply sawmills at Ravenshoe and Bondoola. Coniferous sawlogs (mainly Caribbean pine) are exported from Townsville. The main broadleaved species planted are Dunn's white gum (*Eucalyptus dunnii*) and teak (*Tectona grandis*). The coniferous plantations area has been steadily growing since 1985–86, with a peak in planting in the 1986–90 period, and most of the broadleaved plantations were established from the 2006–10 period onward (Figure 22).

The North Queensland plantation area doubled between 1999–00 and 2008–09 as new broadleaved plantations were established. However, recurring disease and cyclone damage led to substantial areas of broadleaved and coniferous plantations being written off in 2009–10. The effects of cyclone damage in early 2010–11 have resulted in over 6000 hectares of broadleaved plantations being removed from the plantation estate. The plantations removed were eucalypts for pulpwood production and eucalypts and African mahogany (*Khaya senegalensis*) for sawlog production.

Around 65 per cent of the broadleaved plantations are teak and mahogany for sawlog production. The remaining 35 per cent are managed for pulpwood. The broadleaved sawlog volume is forecast to be 42 000 cubic metres a year in the 2015–2019 period and to increase to 46 000 cubic metres a year in the 2025–29 period (Table 6, Figure 23). The pulpwood production has decreased substantially since the 2007 wood supply report (Gavran & Parsons 2011), as a large proportion of the pulpwood estate was affected by disease and cyclone damage.

The total area of coniferous plantations has increased by around 11 per cent between 2004–05 and 2009–10. The coniferous sawlog volume is forecast to be 239 000 cubic metres a year in the 2015–19 period and to peak at 552 000 cubic metres a year in the 2040–44 period (Table 6, Figure 24).

Plantation owners and managers provided 70 per cent of the forecasts of broadleaved plantation log supply and 100 per cent of the forecasts of coniferous plantation log supply.

Figure 22 Area planted by five-year period, North Queensland

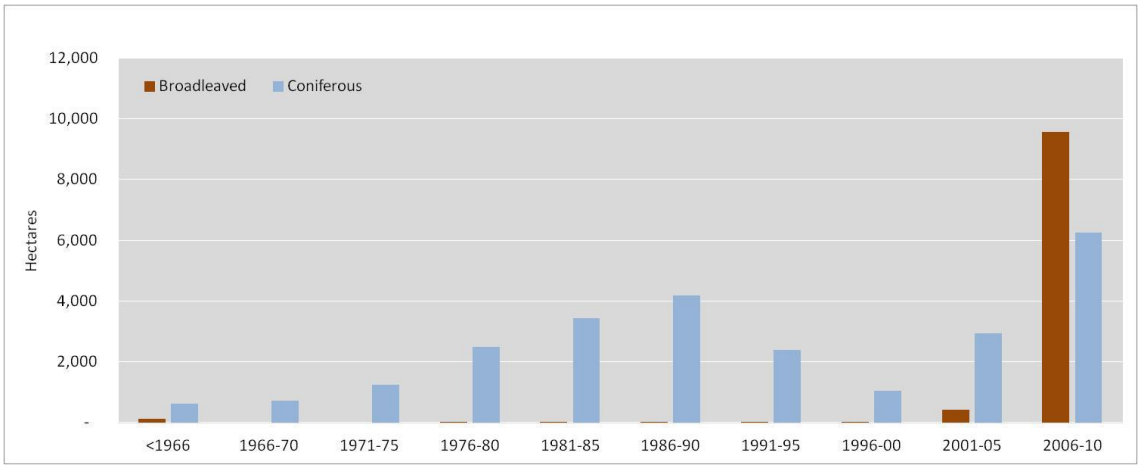


Table 6 Forecast plantation log supply, North Queensland

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	0	0	51	0	51	0	51	0	0
- sawlog	4	42	35	46	21	42	35	46	21
Coniferous									
- pulpwood	13	17	10	17	36	26	30	22	23
- sawlog	240	239	253	262	417	504	552	429	463
Overall total	257	298	348	324	524	572	667	497	507

Figure 23 Forecast broadleaved plantation log supply, North Queensland

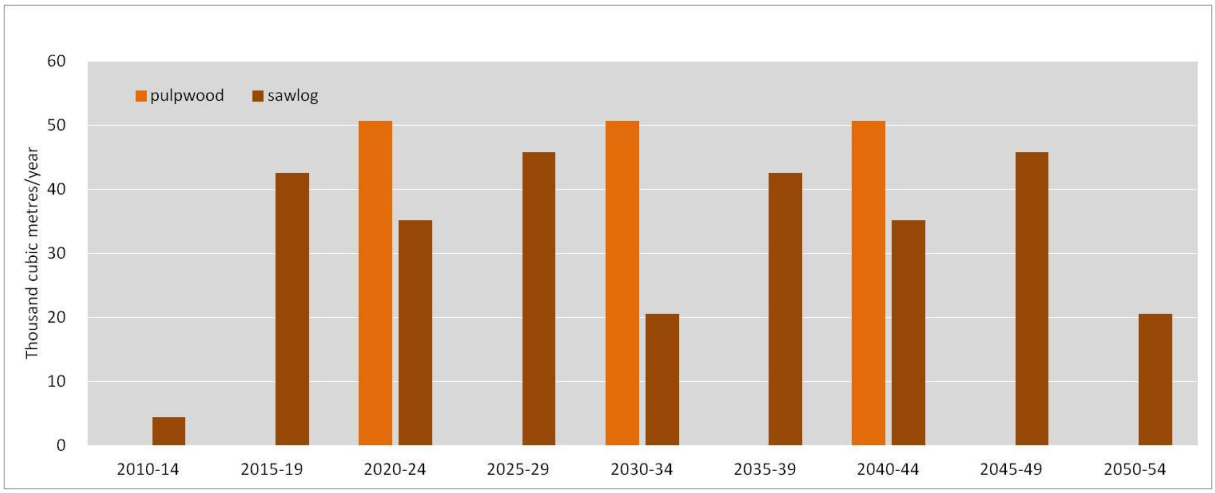
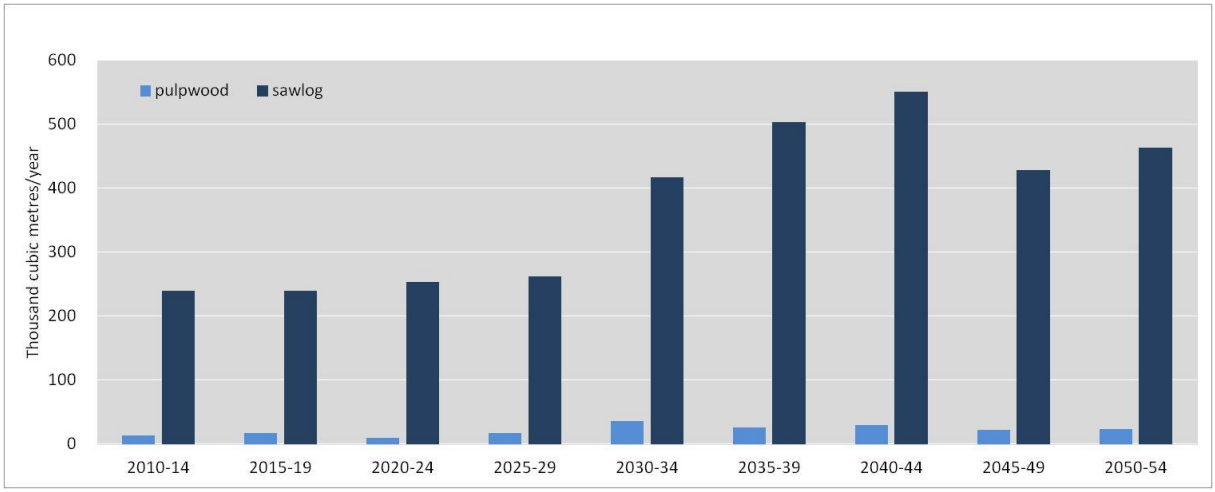
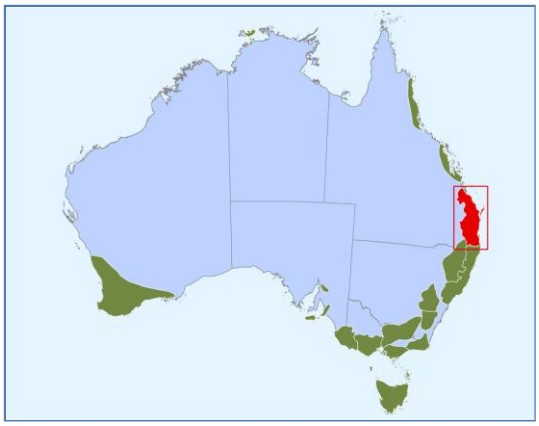


Figure 24 Forecast coniferous plantation log supply, North Queensland



South East Queensland



Source: ABARES

The South East Queensland plantation region extends north from the New South Wales border to Gladstone and west past Toowoomba and Kingaroy. There are many sawmills that process

coniferous plantation logs in this region, with the largest located at Caboolture, Tuan, Imbil and Yarraman. Woodchips are currently exported from the port of Brisbane. The coniferous plantations have been planted steadily since 1975–76, with a peak in the 2001–05 period, and most of the broadleaved plantations were established from 2000–01 onward (Figure 25). The main coniferous species planted is hoop pine (*Araucaria cunninghamii*), and the main broadleaved species are Dunn's white gum (*Eucalyptus dunnii*) and lemon-scented gum (*Corymbia citriodora*).

The plantation in the South East Queensland region increased in area by 16 per cent between 1999–00 and 2008–09. A decline in the area reported in 2009–10 is attributed to revised data on previously established coniferous plantations. Some growers have written off their eucalypt plantations following damage caused by drought or disease. Since 2004–05, the broadleaved plantation area has decreased by 8 per cent and the coniferous plantation area has decreased by around 3 per cent.

Seventy-two per cent of the South East Queensland broadleaved plantations are managed for pulpwood production, with the remainder managed for sawlog production. Most of the broadleaved plantations for sawlog production are being promoted by the Queensland Government to replace sawlogs from public native forests (Queensland Government 1999).

Broadleaved pulpwood production is forecast to be 334 000 cubic metres a year and the broadleaved sawlog volume 3000 cubic metres a year in the 2015–19 period (Table 7, Figure 26). The broadleaved sawlog production is forecast to increase to 88 000 cubic metres a year in the 2045–49 period, with significant plantation supply coming on from 2030–34.

Most coniferous plantations are now managed privately for sawlog production and consist mainly of slash pine (*Pinus elliottii*), Caribbean pine and hoop pine. The coniferous sawlog production is forecast to be 1 830 000 cubic metres a year in the 2015–19 period and to peak at 1 941 000 cubic metres a year in the 2035–39 period (Table 7, Figure 27).

Plantation owners and managers provided 68 per cent of the forecasts of broadleaved plantation log supply and 100 per cent of the data on forecast coniferous plantation log supply.

Figure 25 Area planted by five-year period, South East Queensland

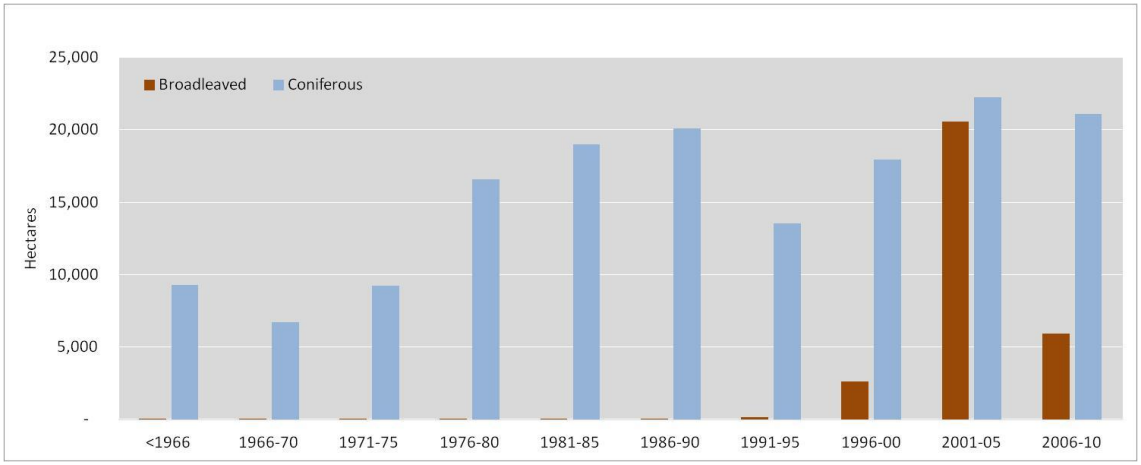


Table 7 Forecast plantation log supply, South East Queensland

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	140	334	145	225	296	160	231	263	206
- sawlog	1	3	4	1	71	74	79	88	61
Coniferous									
- pulpwood	57	275	309	349	315	301	218	240	252
- sawlog	1 678	1 830	1 851	1 826	1 806	1 941	1 782	1 941	1 905
Overall total	1 876	2 442	2 310	2 401	2 448	2 476	2 309	2 533	2 424

Figure 26 Forecast broadleaved plantation log supply, South East Queensland

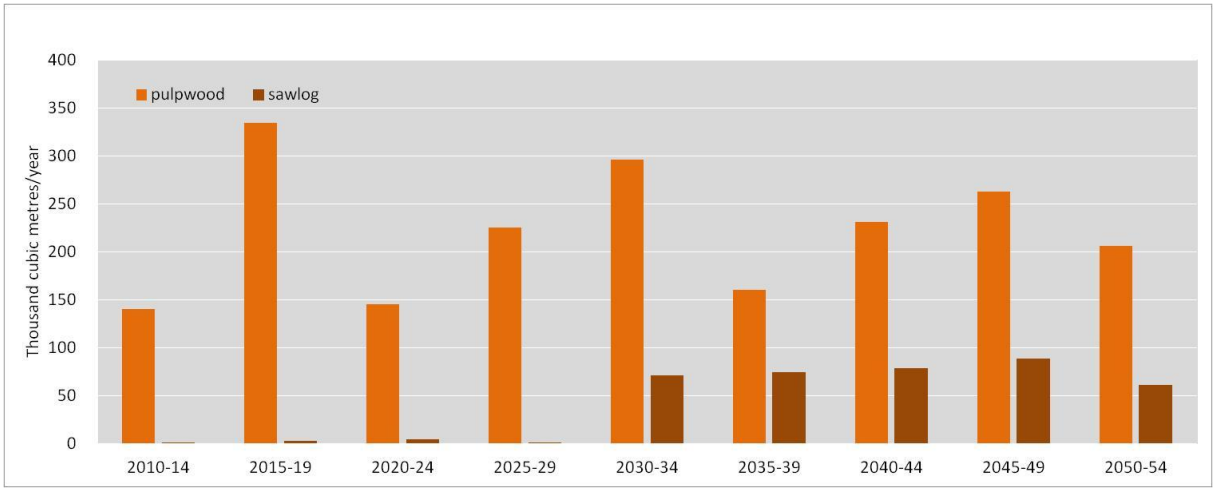
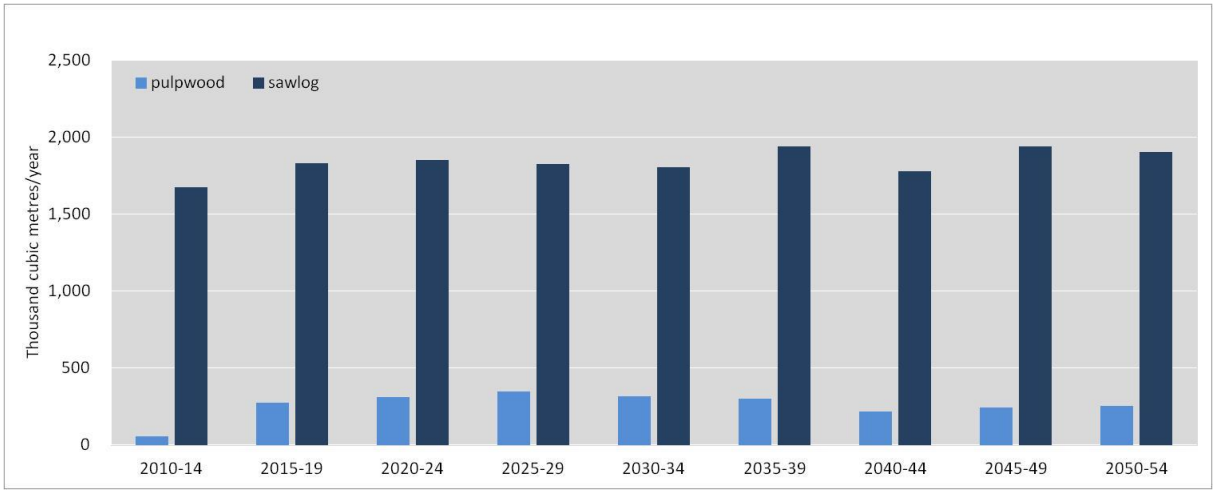
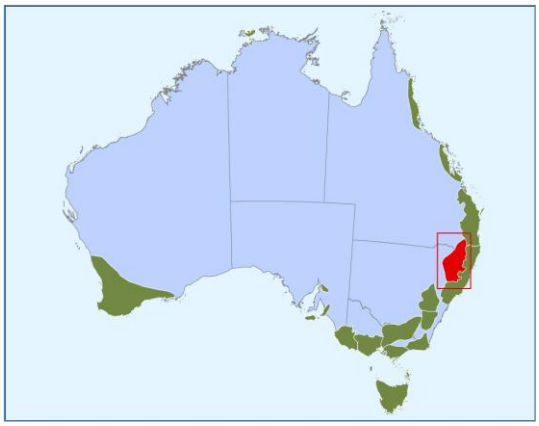


Figure 27 Forecast coniferous plantation log supply, South East Queensland



Northern Tablelands



Source: ABARES

The Northern Tablelands encompass an elevated area, generally 1000 metres or higher in altitude, inland of Wauchope in northern New South Wales and north toward Warwick in south-east Queensland. The region's coniferous plantations supply sawmills at Glen Innes, Nundle and Quirindi. The coniferous plantations area has been steadily established since the 1971–75 period, with a peak in planting in the 1976–80 period. Most of the broadleaved plantations were established in the 2006–10 period (Figure 28). The main coniferous species planted is radiata pine (*P. radiata*), and the main broadleaved species is shining gum (*E. nitens*).

The plantation area for the Northern Tablelands region was stable over the past decade but increased by 43 per cent in 2009–10. While the proportional increase seems large, it was from a small base. The apparent increase was because some plantations established in the past five years and previously assumed to be in the North Coast NSW region are actually located in the Northern Tablelands region, based on mapped data used for the 2011 plantation review. This has increased the forecast broadleaved pulpwood production in this report substantially, from around 5000 cubic metres a year in the 2015–19 period as reported in Parsons et al. 2007 to 51 000 cubic metres a year for 2015–19. The broadleaved pulpwood volumes are forecast to peak at 238 000 cubic metres a year in the 2020–24 period (Table 8, Figure 29).

The small areas of broadleaved plantations managed for sawlog production amount to only a few thousand cubic metres of log being available. As a result, no forecasts are presented in this report.

The forecast coniferous sawlog volumes have decreased by around 20 per cent from the forecasts presented in the 2007 wood flow report (Gavran & Parsons 2011), to 169 000 cubic metres a year for the 2015–19 period. The coniferous sawlog production are forecast to peak at 232 000 cubic metres a year in the 2040–44 period (Table 8, Figure 30).

Plantation owners and managers provided 20 per cent of the forecasts of broadleaved plantation log supply and 85 per cent of the forecasts of coniferous plantation log supply. A major broadleaved plantation manager was unable to supply forecast data as the company is in receivership.

Figure 28 Area planted by five-year period, Northern Tablelands

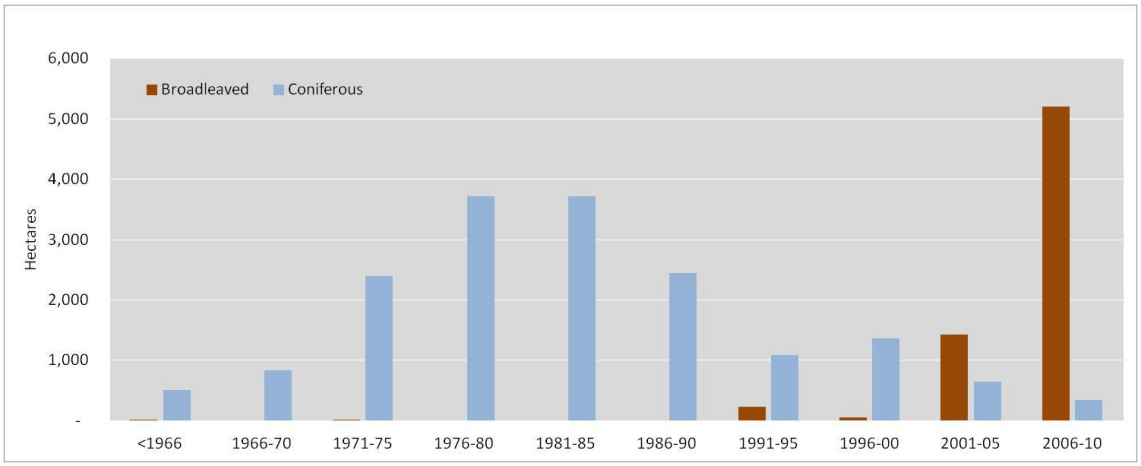


Table 8 Forecast plantation log supply, Northern Tablelands

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	2	51	238	31	58	199	30	104	153
Coniferous									
- pulpwood	78	85	79	88	74	54	54	39	42
- sawlog	218	169	174	218	177	218	232	202	195
Overall total	298	305	491	337	309	475	317	355	393

Figure 29 Forecast broadleaved plantation log supply, Northern Tablelands

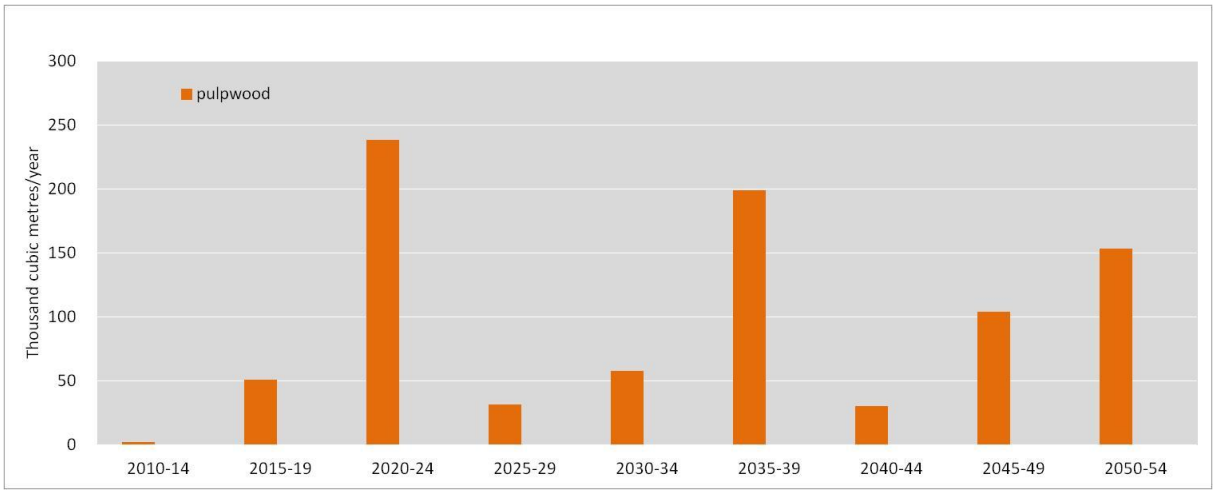
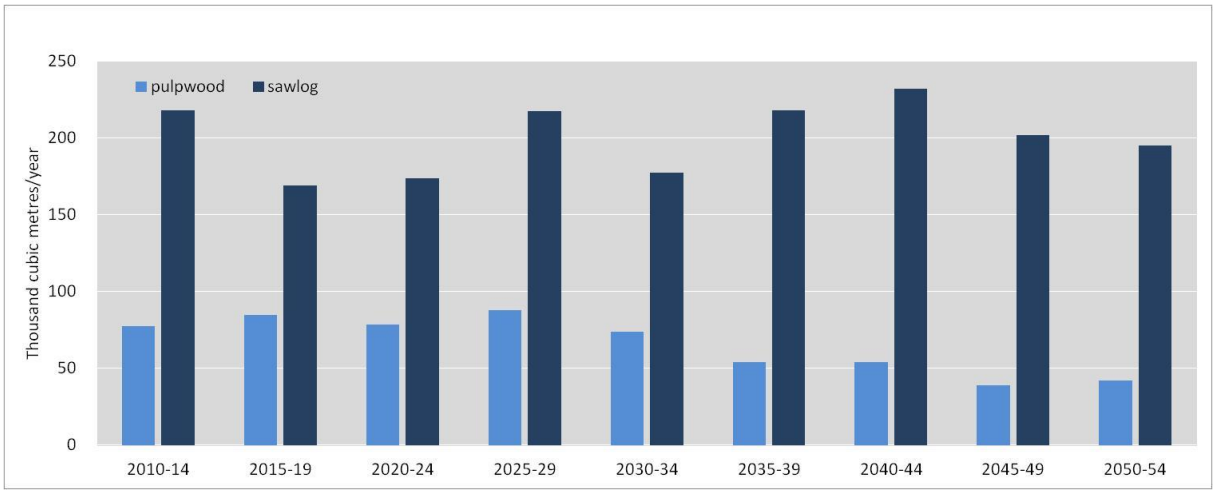
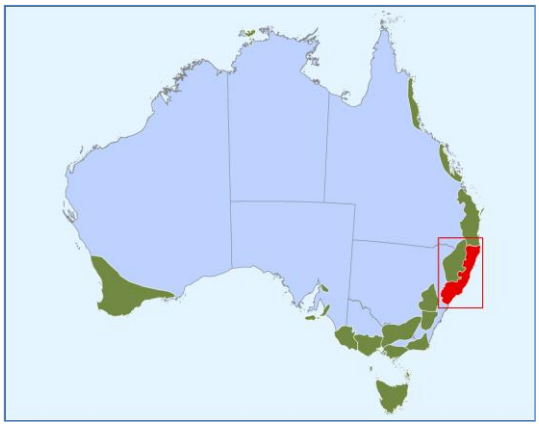


Figure 30 Forecast coniferous plantation log supply, Northern Tablelands



North Coast



Source: ABARES

The North Coast region in NSW extends west from the northern New South Wales coast to the escarpment of the Northern Tablelands and north from near Newcastle to the Queensland border. Broadleaved plantations are dispersed throughout the region and started being established in the 1960s, while coniferous plantations tend to be concentrated in larger blocks, mostly north of Grafton. Most of the broadleaved plantations were established from 1995–96 onward, and most of the coniferous plantations area has been planted since 1995–96, with a peak in planting in the 2001–05 period (Figure 31).

The main coniferous species planted are slash pine (*Pinus elliottii*), Caribbean pine (*P. caribaea*) and hybrids of the species commonly called southern pine. The main broadleaved species are Dunn's white gum (*Eucalyptus dunnii*), blackbutt (*E. pilularis*), flooded gum (*E. grandis*) and Sydney blue gum (*E. saligna*).

Coniferous and broadleaved sawlogs and veneer logs are supplied to sawmills and plymills at Grafton, Casino, Lismore, Urbenville and Wyan. Smaller-diameter timber is supplied to pole and girder markets. Woodchips from harvesting and sawmilling residues are exported from ports at Newcastle and Brisbane.

The plantation area in the North Coast region of NSW has increased by over 50 per cent since 2004–05, to a total area of 101 000 hectares. Of the total increase of about 44 000 hectares, 40 000 hectares are eucalypt plantations and the rest exotic pine plantations. Of the eucalypt plantations, 3 000 hectares are being managed for sawlogs.

The broadleaved pulpwood volume is forecast to be 738 000 cubic metres a year in the 2015–19 period and to peak at 1 267 000 cubic metres a year in the 2040–44 period. The broadleaved sawlog production is forecast to be 145 000 cubic metres a year in the 2015–19 period and to peak at 447 000 cubic metres a year in the 2040–44 period (Table 9, Figure 32).

The 2012 forecast broadleaved sawlog volumes are lower than those projected in the 2007 wood flow report (Gavran & Parsons 2011), while the pulpwood projections are higher. These changes mainly reflect the situation in which a major plantation grower is in receivership and the plantations are now assumed to be managed for pulpwood, not short-rotation sawlogs.

The coniferous plantation area has increased slightly to 15 400 hectares since 2004–05, and the main species planted is the southern pine hybrid. The forecast coniferous sawlog volumes in this report are slightly lower than the forecast figures in the 2007 wood flow report, to 118 000 cubic metres a year for the 2015–19 period. The coniferous sawlog volumes are forecast to peak in the 2030–34 period at 179 000 cubic metres a year (Table 9, Figure 33).

Plantation owners and managers provided 55 per cent of the forecasts of broadleaved plantation log supply and 90 per cent of the forecasts of coniferous plantation log supply. A major broadleaved plantation manager was unable to supply forecasts as the company is in receivership and ABARES estimated the log supply forecasts for this company.

Figure 31 Area planted by five-year period, North Coast

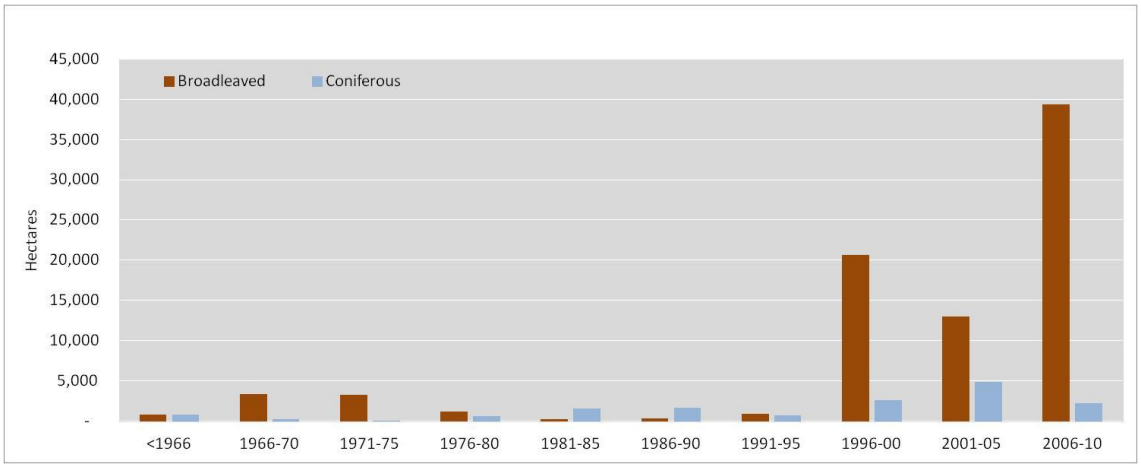


Table 9 Forecast plantation log supply, North Coast

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	163	738	766	295	1 241	347	1267	410	398
- sawlog	112	145	95	61	261	396	447	116	112
Coniferous									
- pulpwood	32	43	55	47	47	37	45	50	45
- sawlog	110	118	114	140	179	129	140	150	172
Overall total	417	1 044	1 031	542	1 728	909	1 899	726	728

Figure 32 Forecast broadleaved plantation log supply, North Coast

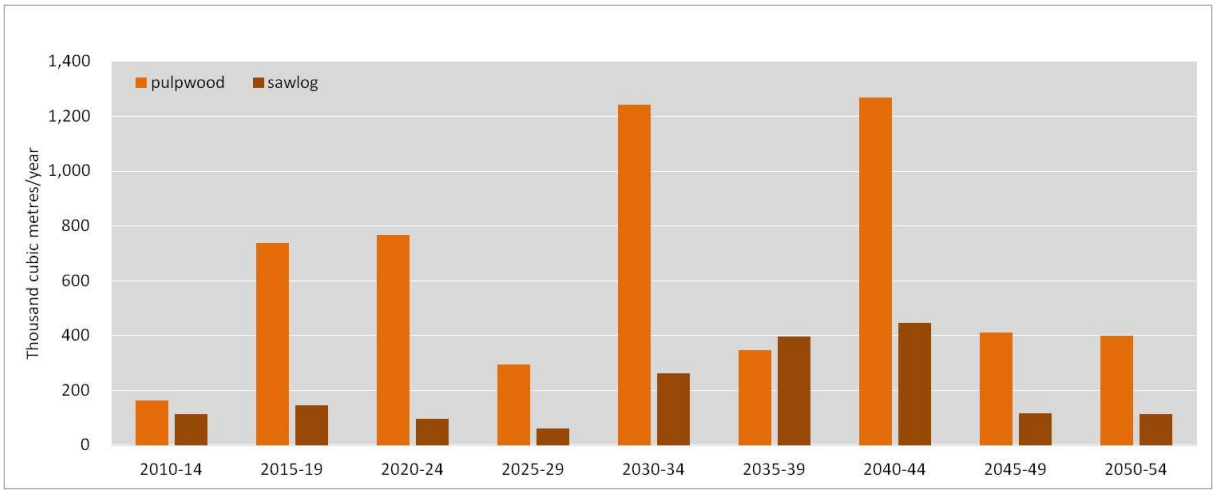
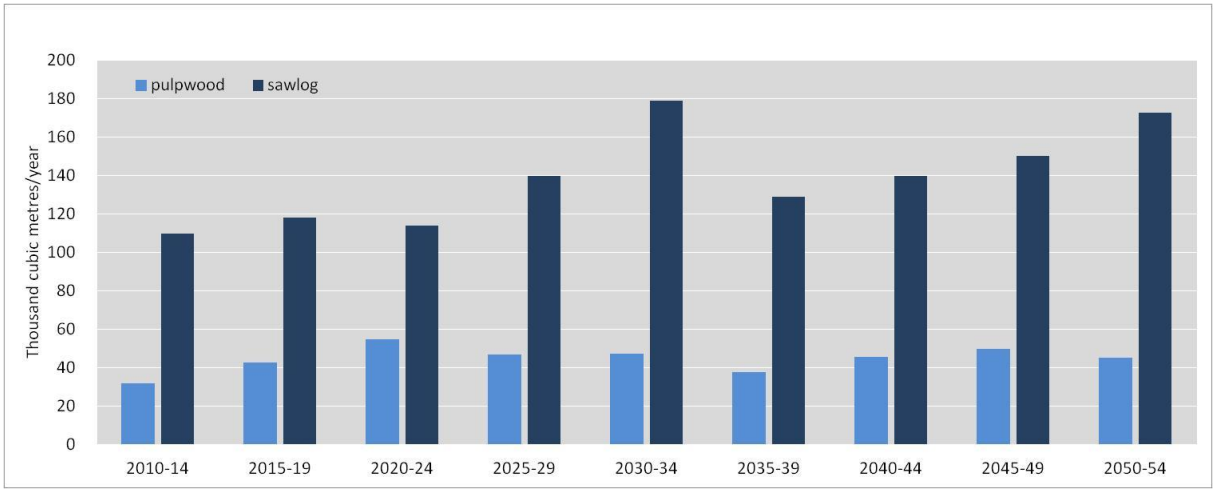
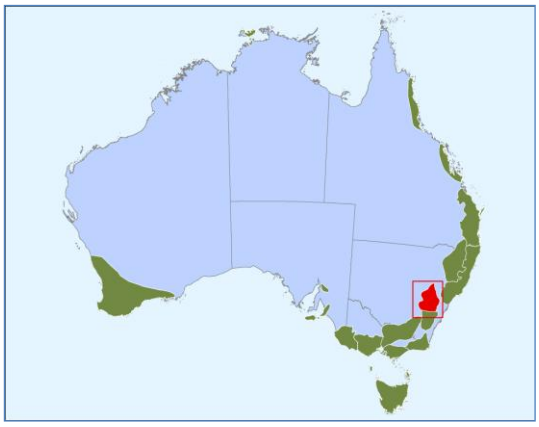


Figure 33 Forecast coniferous plantation log supply, North Coast



Central Tablelands



Source: ABARES

The Central Tablelands region of NSW is west of the Blue Mountains and stretches south from Wellington, Dunedoo and Mudgee to Boorowa, where it adjoins the Southern Tablelands. Its coniferous plantations are concentrated around Oberon, the Mount 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 broadleaved plantations comprise small dispersed research and demonstration sites, mainly near Wellington. The coniferous plantations area has been steadily planted since the 1976–80 planting period, with a peak in planting in the 1986–90 planting period, and most of the broadleaved plantations were established from 1995–96 onward (Figure 34).

Coniferous wood is processed in a large sawmill and particleboard and medium-density fibreboard mills in Oberon, as well as sawmills in Bathurst and Burraga. Coniferous sawlogs and pulp logs are exported from Port Botany.

The plantation area in the Central Tablelands region of NSW has changed little in the past decade. Substantial areas of privately owned coniferous plantations in the region have reached likely harvest age and some might not be replanted after harvesting. The planted area might therefore be revised downward in future inventory updates. Ownership changes have made it difficult to obtain up-to-date data on these plantations.

The coniferous plantation area has increased marginally since 2004–05 to 81 000 hectares, and the main species planted is radiata pine (*P. Radiata).* Forecasts supplied by plantation managers indicate an expected increase for coniferous sawlog production, with 958 000 cubic metres a year in the 2015–19 period, and peaking in the 2045–49 period at 971 000 cubic metres a year (Table 10, Figure 35).

The small areas of broadleaved plantations in the Central Tablelands were established only recently and no log production is expected for many years. Potential supply from these plantations will be only a few thousand cubic metres at most. Available data are insufficient to make forecasts of potential future supply. No forecasts are provided in this report.

Plantation owners and managers provided 87 per cent of the forecasts of coniferous plantation log supply.

Figure 34 Area planted by five-year period, Central Tablelands

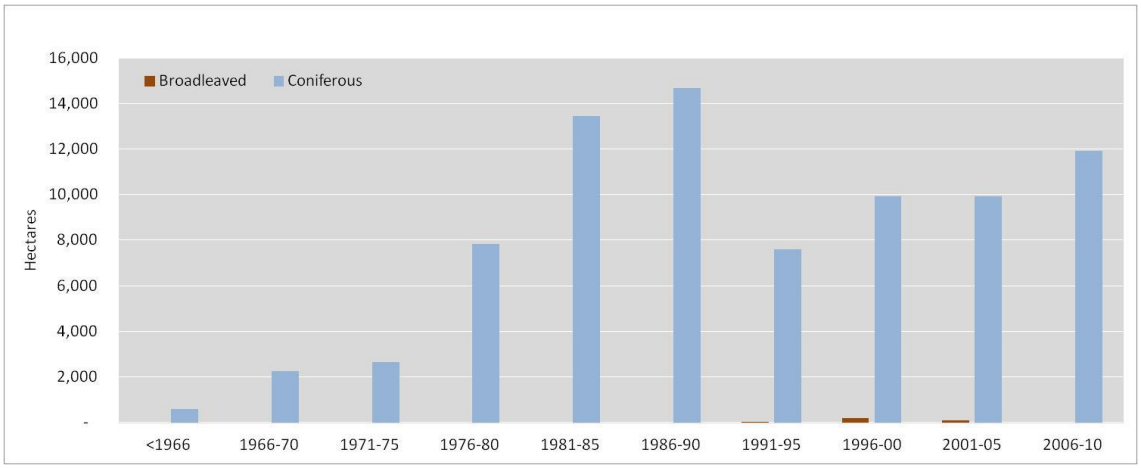
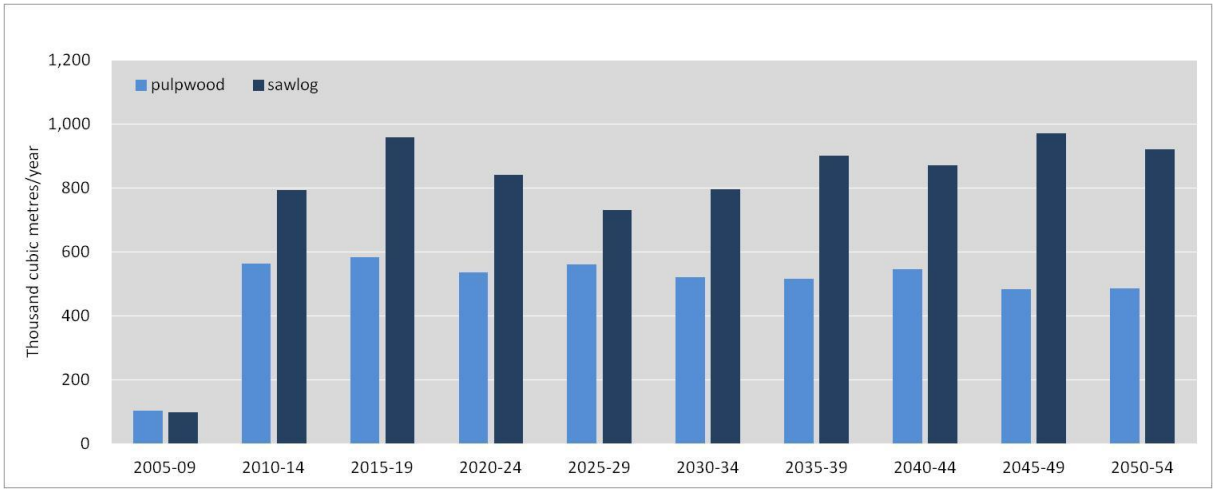


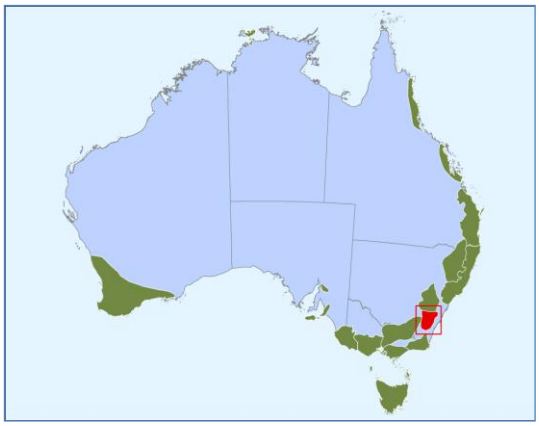
Table 10 Forecast plantation log supply, Central Tablelands

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Coniferous									
- pulpwood	564	584	536	561	521	516	546	484	486
- sawlog	793	958	841	732	796	902	871	971	921
Overall total	1 358	1 542	1 377	1 293	1 317	1 418	1 417	1 455	1 407

Figure 35 Forecast coniferous plantation log supply, Central Tablelands



Southern Tablelands



Source: ABARES

The Southern Tablelands region in NSW extends from Boorowa to the Moss Vale/Braidwood escarpment and south to include the Australian Capital Territory. Coniferous logs are processed at sawmills in Canberra, Penrose and Tumut. The coniferous plantations area has been relatively steady since the 1971–75 period, with a peak in the 2006–10 period, and the broadleaved plantations were established from 1995–96 onward (Figure 36).

The plantation area in the Southern Tablelands region of NSW declined by 17 per cent in the past decade as radiata pine (*P. radiata*) plantations in the Australian Capital Territory were not replanted following wildfire in 2003. Some privately owned pine plantations in the New South Wales part of the region have not been replanted after harvesting. The coniferous sawlog production is forecast to be around 75 000 cubic metres a year in the 2015–19 period and to peak in the 2035–39 period at 178 000 cubic metres a year (Table 11, Figure 37).

The small areas of broadleaved plantations in the Southern Tablelands region in NSW were established only recently and no log production is expected for many years. Potential supply from these plantations will be only a few thousand cubic metres at most. Available data are insufficient to make forecasts of potential future supply.

Plantation owners and managers provided 21 per cent of the forecasts of coniferous plantation log supply. No forecast data were provided for farm forestry, and a major coniferous plantation manager was unable to supply forecast data as the company is in receivership.

Figure 36 Area planted by five-year period, Southern Tablelands

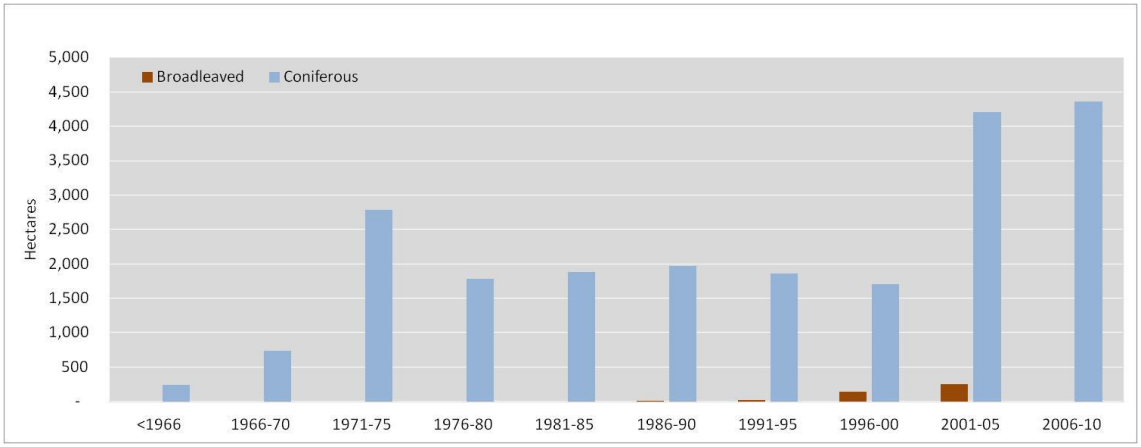
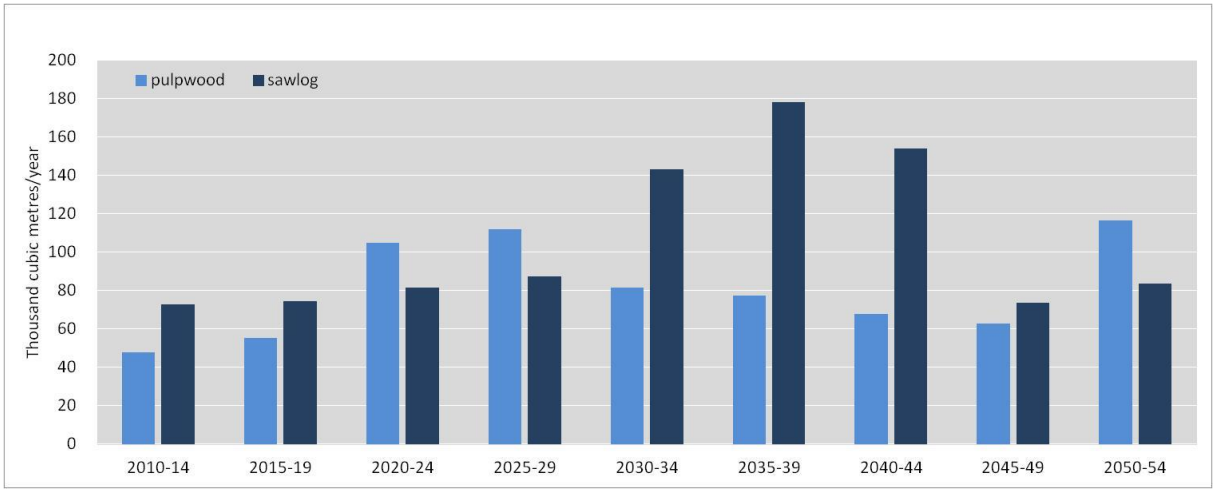


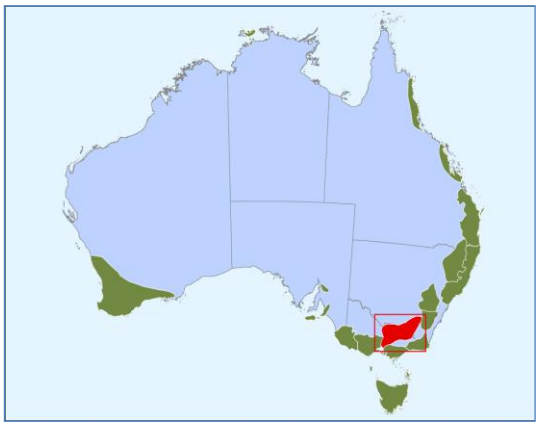
Table 11 Forecast plantation log supply, Southern Tablelands

	(thousands cubic metres a year average for each five-year period)								
Period	2010–14	2015–19	2020–24	2025–29	2030–34	2035–39	2040–44	2045–49	2050–54
Coniferous									
- pulpwood	48	55	105	112	82	77	68	63	117
- sawlog	73	75	81	87	143	178	154	74	83
Overall total	120	130	186	199	225	256	222	137	200

Figure 37 Forecast coniferous plantation log supply, Southern Tablelands



Murray Valley



Source: ABARES

The Murray Valley region stretches from Gundagai to Melbourne. Most of its plantations are in the foothills of the Great Dividing Range and there are some farm forests in the agricultural regions of north-east Victoria and central-western New South Wales. The coniferous plantations area has been steadily planted since the 1971–75 period, with a peak in planting in the 2006–10 period, and the broadleaved plantations were mostly established from 1995–96 onward (Figure 38).

The Murray Valley plantations supply sawlogs, veneer and pulpwood to industries dispersed throughout the region. Major processing facilities for the logs are located at Tumut,

Tumbarumba, Wagga Wagga, Albury, Wangaratta, Myrtleford and Benalla. The main coniferous species planted is radiata pine (*P. radiata*), and the main broadleaved species is blue gum (*E. globulus*) primarily grown for pulpwood.

The plantation area in the Murray Valley region increased by 6 per cent from 2004–05 to 195 400 hectares in 2009–10, of which 6900 hectares are broadleaved plantation and 188 400 hectares are coniferous plantation. Since 2004–05, the coniferous area has increased by 10 000 hectares and the broadleaved area has increased by over 500 hectares. Sixty-seven per cent of the coniferous plantation area is in New South Wales and 99 per cent of the broadleaved plantations are in Victoria. About 60 per cent of the broadleaved plantations are managed for pulpwood. Since the 2007 report (Gavran & Parsons 2011), new broadleaved sawlog information has become available for the region (Walsh et al. 2008; ABARES 2011) and are incorporated into the yield models.

The broadleaved pulpwood production is forecast to be 47 000 cubic metres a year in the 2015–19 period and to peak in the 2050–54 period at 100 000 cubic metres a year (Table 12, Figure 39).

The coniferous sawlog volumes are forecast to be 2 million cubic metres a year in the 2015–19 period, peaking in the 2035–39 period at 2 471 000 cubic metres a year (Table 12, Figure 40). Coniferous pulpwood volumes fluctuate between 989 000 and 1 334 000 for the forecast period (Table 12).

Plantation owners and managers provided 70 per cent of the forecasts of broadleaved plantation log supply and 90 per cent of the forecasts of coniferous plantation log supply.

Figure 38 Area planted by five-year period, Murray Valley

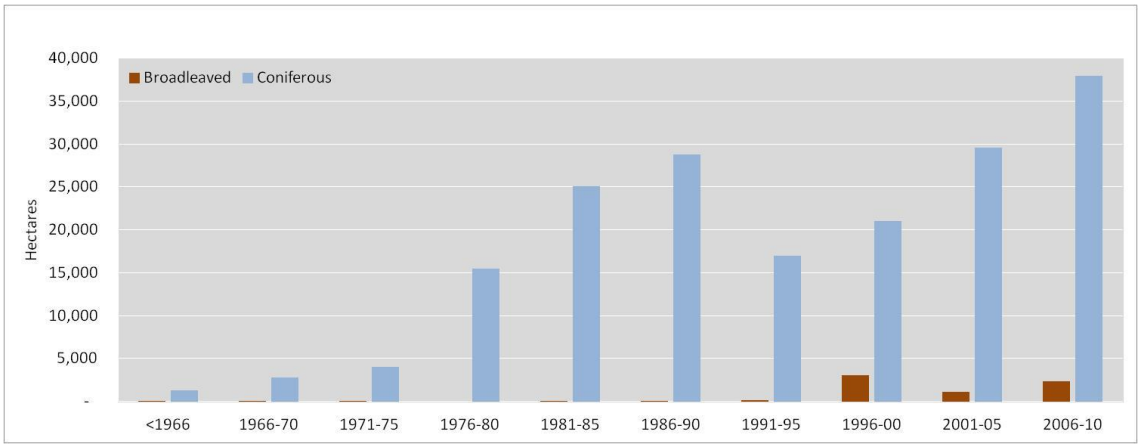


Table 12 Forecast plantation log supply, Murray Valley

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	75	47	84	85	72	75	81	33	100
- sawlog	0	0	28	24	4	2	7	2	45
Coniferous									
- pulpwood	1 262	1 298	1 334	989	1 237	1 070	1 168	1 204	1 251
- sawlog	1 937	2 073	1 623	1 641	1 933	2 471	2 432	2 172	1 837
Overall total	3 275	3 419	3 069	2 739	3 246	3 619	3 688	3 410	3 233

Figure 39 Forecast broadleaved plantation log supply, Murray Valley

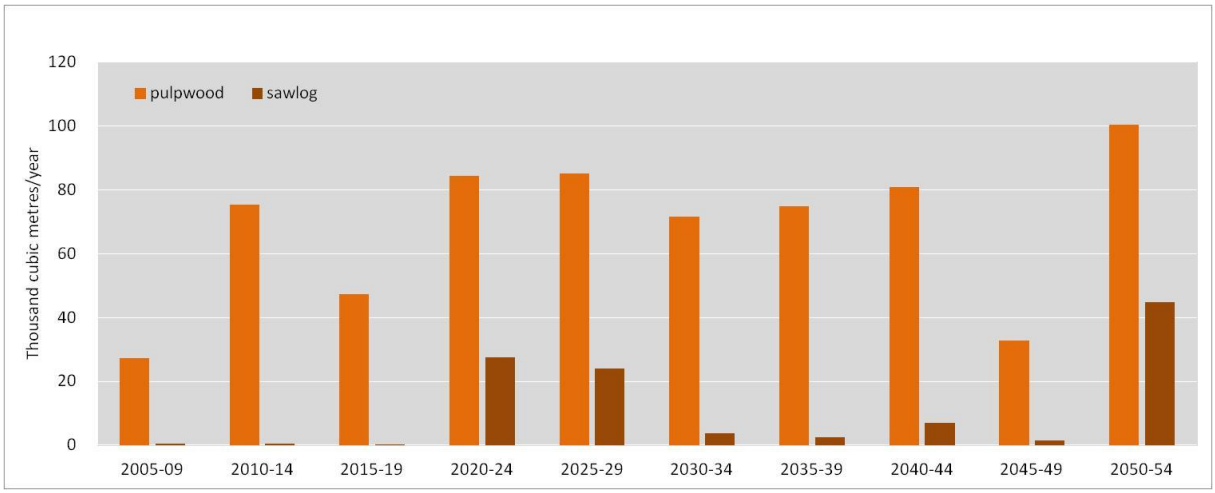
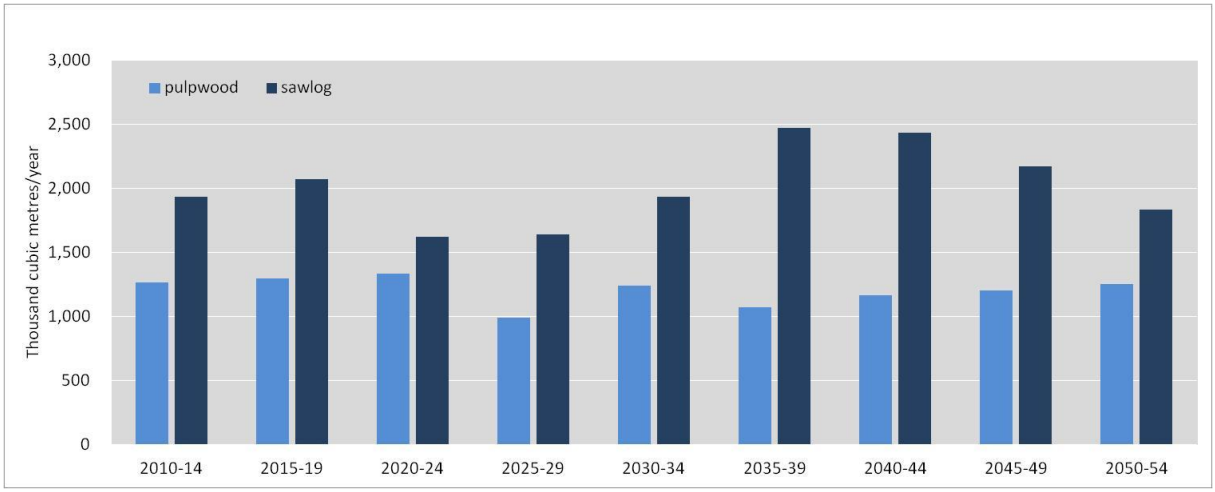
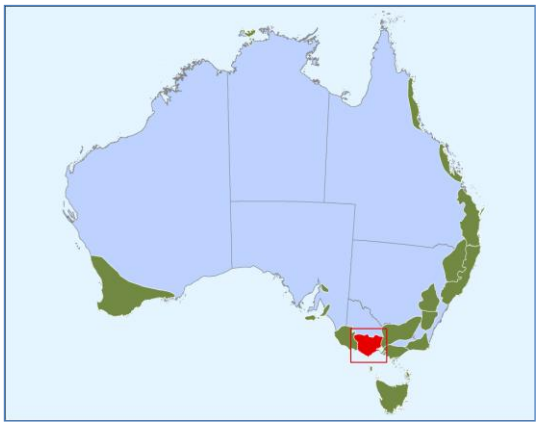


Figure 40 Forecast coniferous plantation log supply, Murray Valley



Central Victoria



Source: ABARES

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 coniferous plantations. The coniferous plantations area has been steadily planted since the 1976–80 period, with a peak in planting in the 2006–10 period, and most of the broadleaved plantations were established from 1995–96 onward (Figure 41).

The plantations supply coniferous sawlogs and small-diameter logs to timber-processing industries at Ballarat, Beaufort, Colac and around Geelong. Coniferous sawlogs and coniferous and broadleaved woodchips are exported from the port of Geelong. The main coniferous species planted is radiata pine (*P. radiata*), and the main broadleaved species is blue gum (*E. globulus*).

The plantation area in the Central Victoria region has increased by 20 per cent since 2004–05 to 68 800 hectares in 2009–10, of which 37 200 hectares are broadleaved plantation and 31 700 hectares are coniferous plantation. Since 2004–05, the coniferous area has increased by 900 hectares and the broadleaved area has increased by 11 000 hectares. About 95 per cent of the broadleaved plantations are managed for pulpwood.

In the Central Victoria region, the small area of broadleaved plantations managed mainly for sawlog production amount to only a few thousand cubic metres of log supply.

The broadleaved pulpwood production is forecast to peak at 707 000 cubic metres a year in the 2015–19 period and to decline to 422 000 cubic metres a year in the 2020–24 period (Table 13, Figure 42).

The coniferous sawlog volume is forecast to be 342 000 cubic metres a year in the 2015–19 period and to peak at 581 000 cubic metres a year in the 2040–44 period (Table 13, Figure 43). Coniferous pulpwood volume will be 233 000 cubic metres a year in the 2015–19 period, with a peak of 265 000 cubic metres in the period 2025–2029.

Plantation owners and managers provided 75 per cent of the forecasts of broadleaved plantation log supply and 87 per cent of the forecasts of coniferous plantation log supply.

Figure 41 Area planted by five-year period, Central Victoria

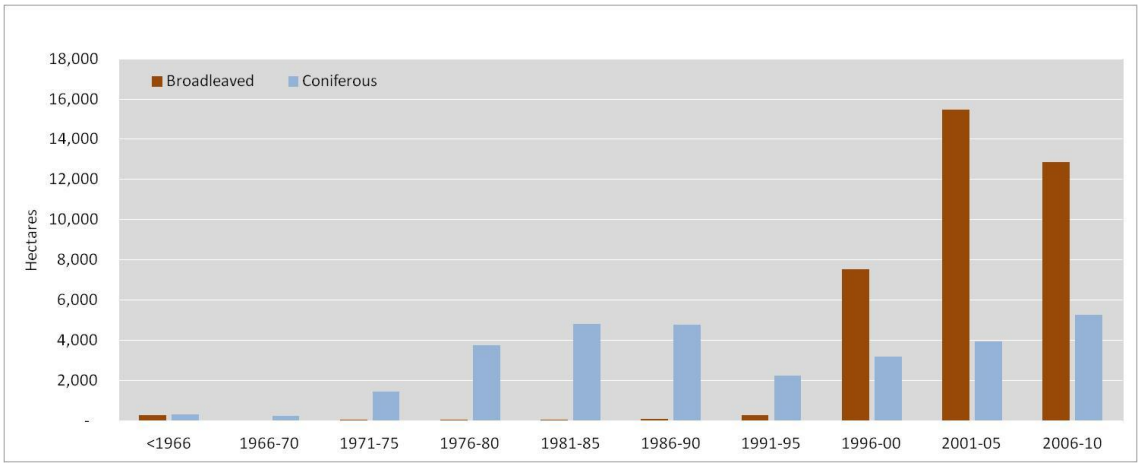


Table 13 Forecast plantation log supply, Central Victoria

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	295	707	422	450	406	563	389	589	263
- sawlog	0	0	3	4	6	8	0	16	1
Coniferous									
- pulpwood	222	233	238	265	247	223	232	219	214
- sawlog	404	342	246	231	305	333	581	549	379
Overall total	920	1 282	908	949	964	1 127	1 201	1 373	858

Figure 42 Forecast broadleaved plantation log supply, Central Victoria

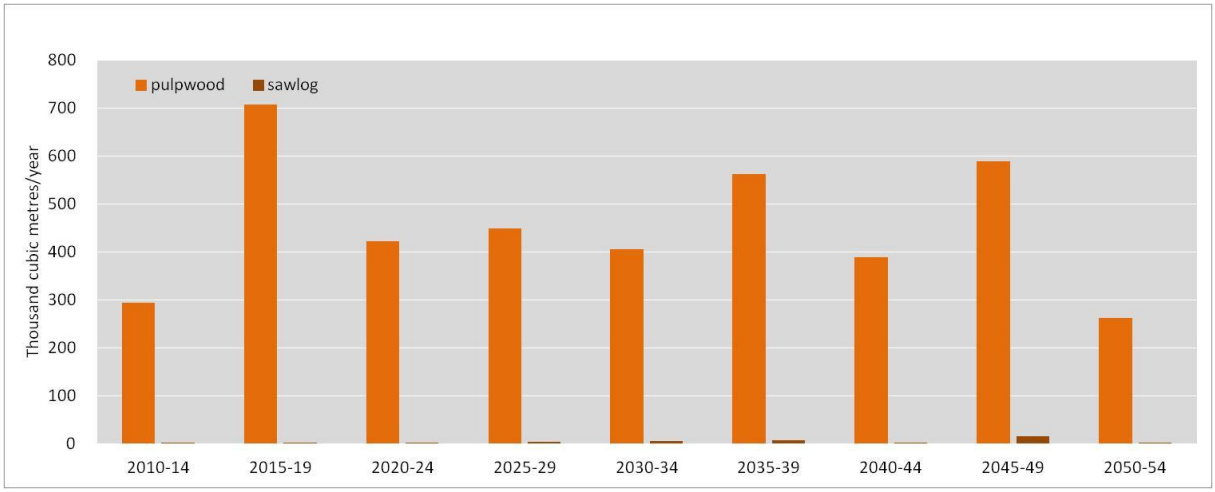
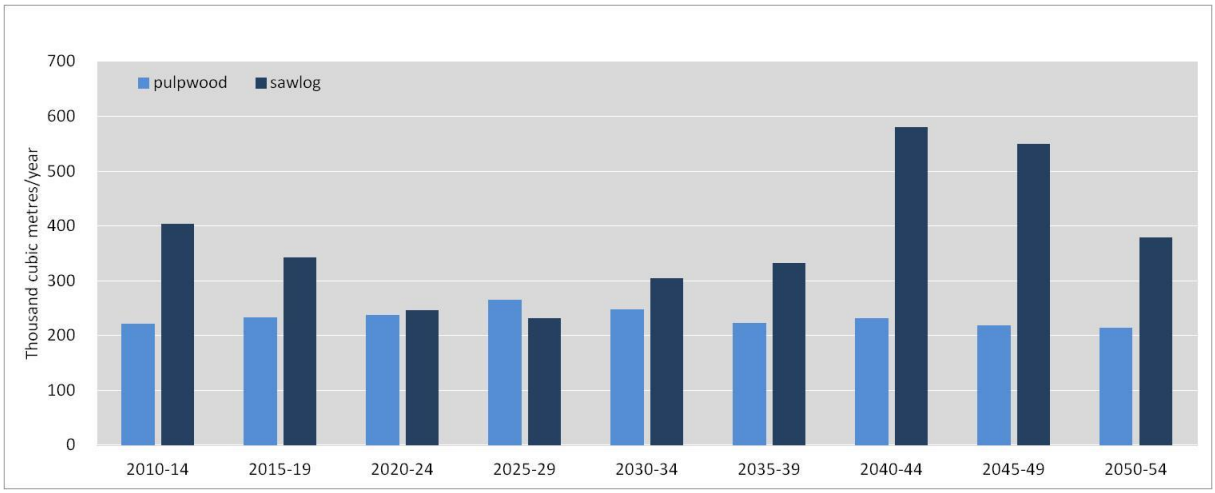
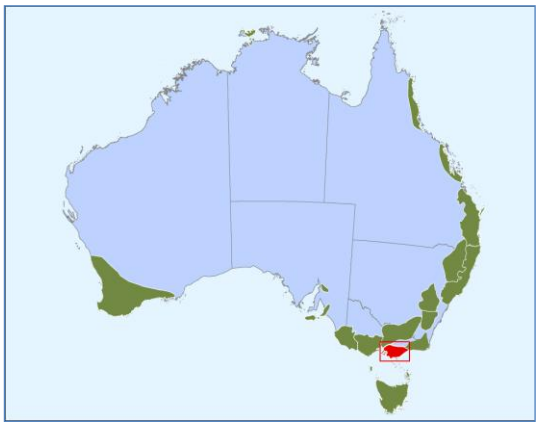


Figure 43 Forecast coniferous plantation log supply, Central Victoria



Central Gippsland



Source: ABARES

The Central Gippsland region extends east from Melbourne to Bairnsdale and south to the Great Dividing Range. The coniferous plantations supply several sawmills, the largest of which are at Morwell and Yarram. The broadleaved logs are milled at Morwell and a number of other locations within and outside the region. Figure 44 shows the coniferous plantations area has been steadily planted since 1980–81, with a peak in planting in the 2001–05 period, and the broadleaved plantations were planted before 1965–66, with a peak in planting in the 1996–00 period. Most of the broadleaved plantations managed for pulpwood have been planted from the 1991–95 period onward (Figure 44).

The plantation area in the Central Gippsland region has changed little in the past five years. The coniferous plantation area has increased slightly since 2004–05 to 62 300 hectares in 2009–10, and the main species planted is radiata pine (*P. radiata*). The broadleaved plantation area decreased slightly to 33 200 hectares and the main species planted are blue gum (*E. globulus*) and shining gum (*E. nitens*). Seventy-five per cent of the broadleaved plantations are managed for pulpwood production and 25 per cent is managed for pulpwood and sawlog production. A marginal decline in area reported in 2009–10 (Gavran & Parsons 2011) was caused by fire losses and revisions to previously reported areas.

The broadleaved pulpwood production is forecast to peak at 511 000 cubic metres a year in the 2015–19 period and to decrease to 358 000 cubic metres a year in the following period. From 2025, pulpwood supply volume will vary between 258 000 and 488 000 cubic metres a year (Table 14, Figure 45). The decrease in the forecast broadleaved sawlog production in this report compared with the 2007 report (Parsons et al. 2007) is because a major grower changed their management to maximise pulpwood production.

The coniferous sawlog volume is forecast to be 521 000 cubic metres a year in the 2015–19 period and to increase to 963 000 cubic metres a year in the 2045–49 period (Table 14, Figure 46).

Plantation owners and managers provided 98 per cent of the forecasts of broadleaved plantation log supply and 94 per cent of the forecasts of coniferous plantation log supply.

Figure 44 Area planted by five-year period, Central Gippsland

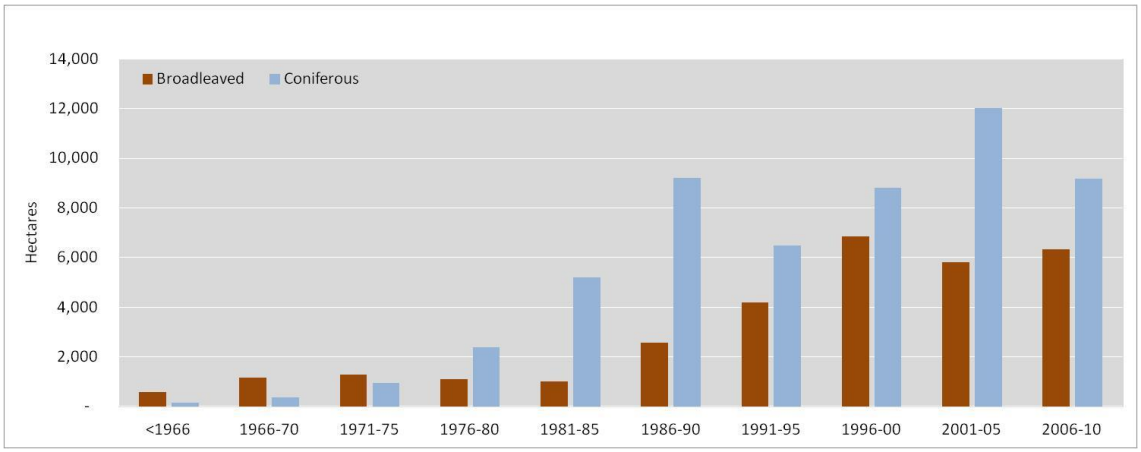


Table 14 Forecast plantation log supply, Central Gippsland

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	305	511	358	298	419	278	488	258	430
- sawlog	20	20	0	10	20	20	44	40	42
Coniferous									
- pulpwood	531	657	552	550	721	861	796	814	722
- sawlog	524	521	452	540	746	921	939	963	952
Overall total	1 380	1 710	1 371	1 399	1 906	2 080	2 268	2 075	2 146

Figure 45 Forecast broadleaved plantation log supply, Central Gippsland

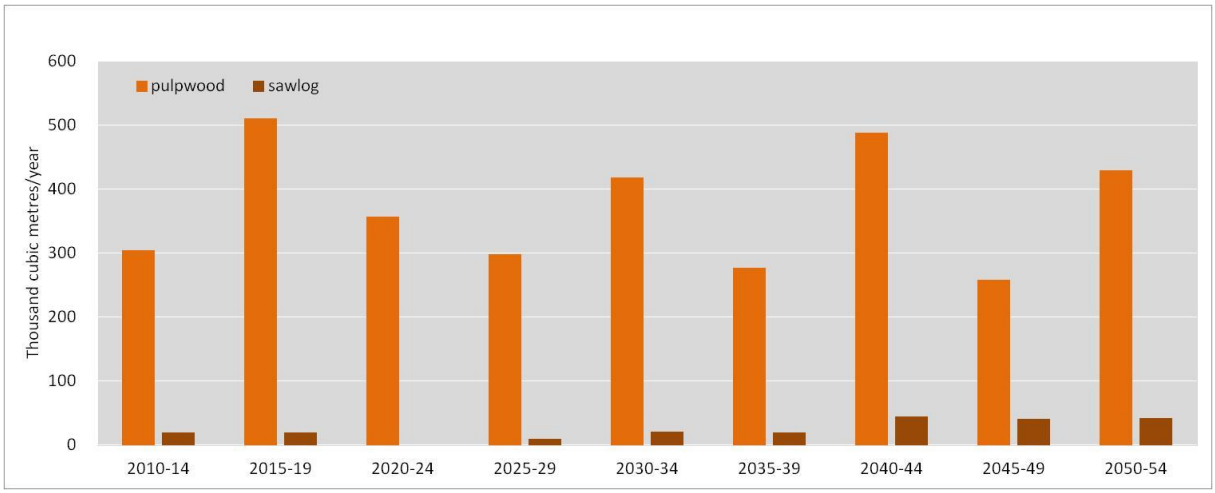
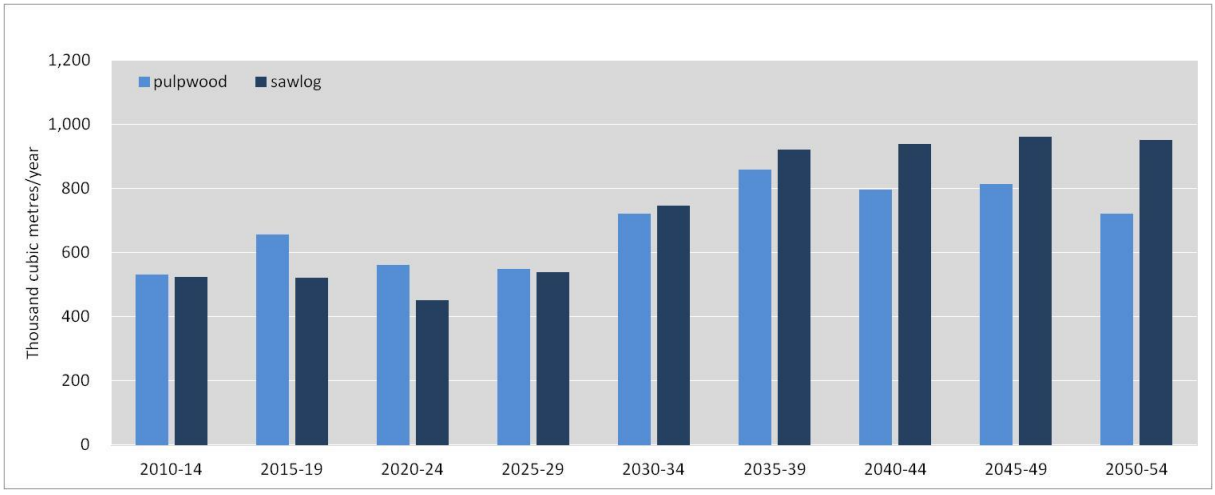
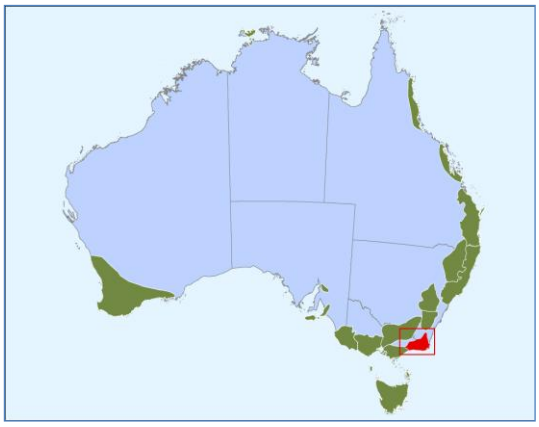


Figure 46 Forecast coniferous plantation log supply, Central Gippsland



East Gippsland–Bombala



Source: ABARES

The East Gippsland–Bombala plantation region is centred near 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 and Eden. The coniferous plantations area has been steadily planted since the 1976–80 period, with a peak in planting in the 1981–85 period, and most of the broadleaved plantations were established from 1995–96 onward (Figure 47).

The plantation area in the East Gippsland–Bombala region has increased by 12 per cent since 2004–05. The coniferous plantation area has increased slightly since 2004–05 to 46 100 hectares, with radiata pine (*P. radiata*) the main species planted.

The broadleaved plantation area has increased slightly to 5400 hectares and the main species planted is shining gum (*E. nitens*). Eighty-five per cent of the broadleaved plantations are managed for pulpwood production and 25 per cent is managed for pulpwood and sawlog production. The broadleaved pulpwood volume is forecast to be 63 000 cubic metres a year in 2015–19 and to increase to a peak of 120 000 cubic metres a year in the 2035–39 period (Table 15, Figure 48).

The small areas of broadleaved plantations managed for sawlog production will amount to only a few thousand cubic metres of log being available. No forecasts production are provided in this report.

The coniferous sawlog volume is forecast to be 287 000 cubic metres a year in the 2015–19 period, and to peak in the 2030–34 period at 570 000 cubic metres a year (Table 15, Figure 49). Coniferous pulpwood volumes vary from 283 000 to 414 000 cubic metres a year in the projection period. The coniferous forecasts should be considered provisional because updated data could not be obtained from one private plantation management company with significant plantations in this region.

Plantation owners and managers provided 85 per cent of the forecasts of broadleaved plantation log supply and 64 per cent of the forecasts of coniferous plantation log supply. A major coniferous plantation manager was unable to supply forecast data as the company is in receivership.

Figure 47 Area planted by five-year period, East Gippsland–Bombala

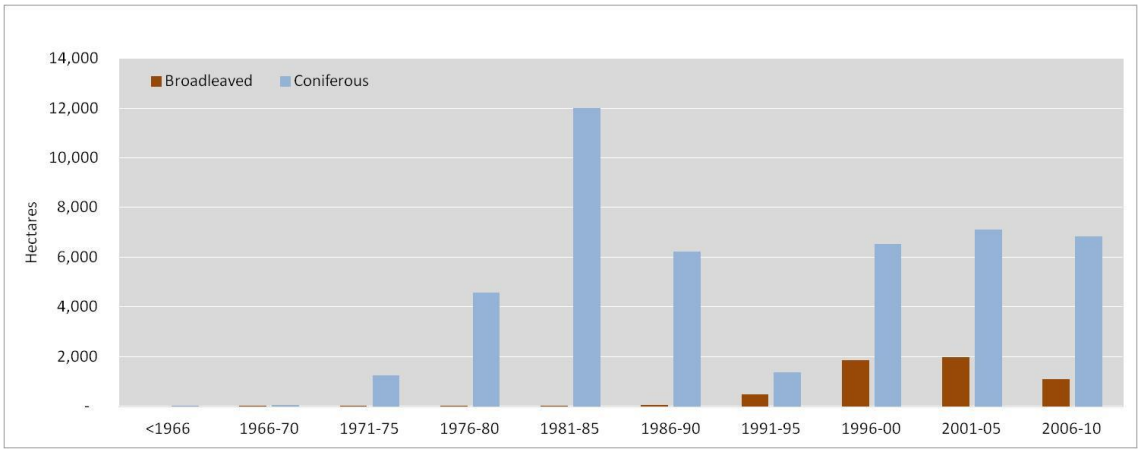


Table 15 Forecast plantation log supply, East Gippsland–Bombala

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	116	63	105	95	89	120	67	107	74
Coniferous									
- pulpwood	373	372	375	414	332	283	360	377	376
- sawlog	341	287	360	527	570	330	452	299	354
Overall total	830	723	840	1 037	991	733	879	782	804

Figure 48 Forecast broadleaved plantation log supply, East Gippsland–Bombala

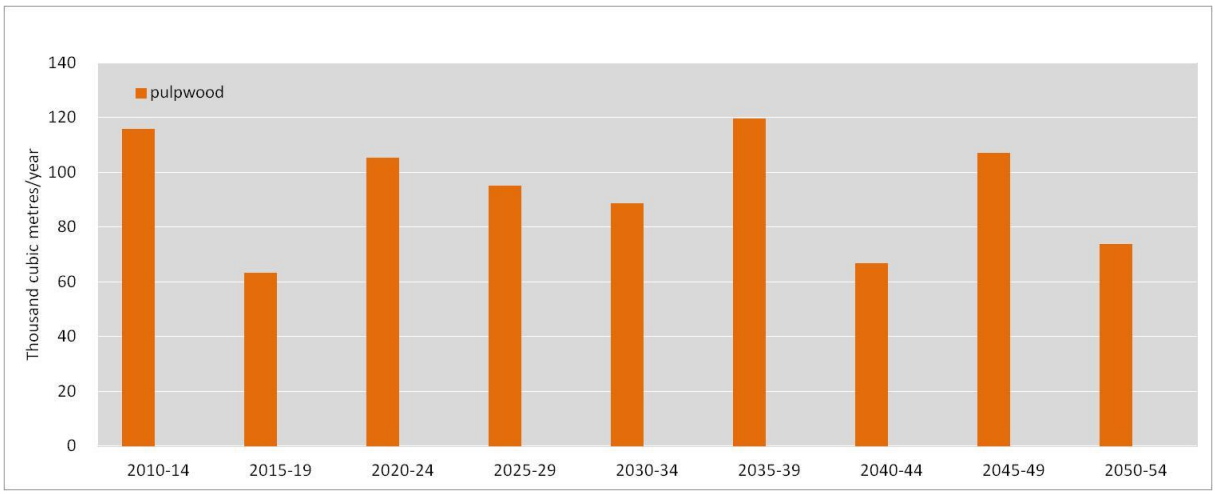
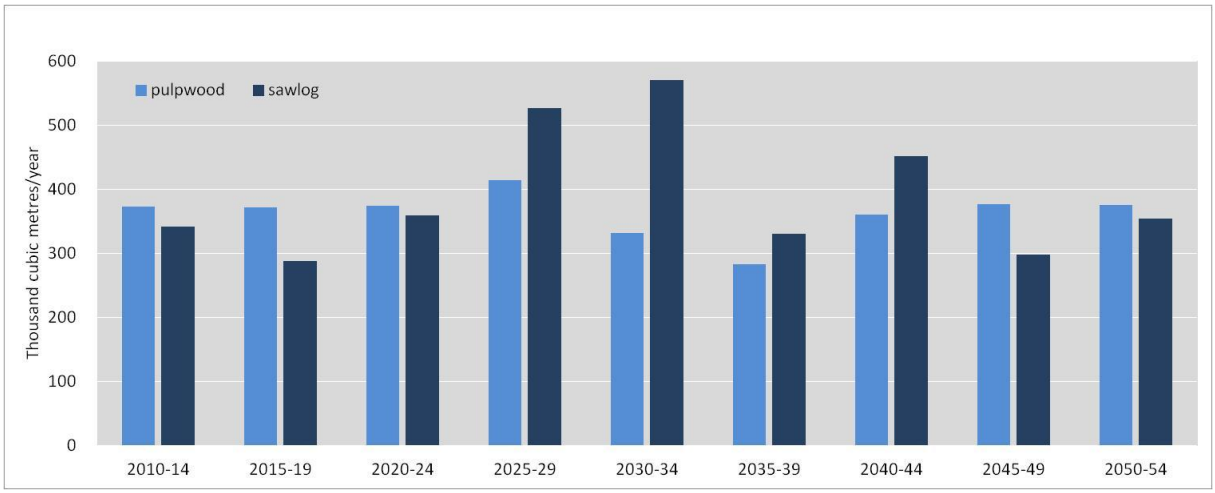
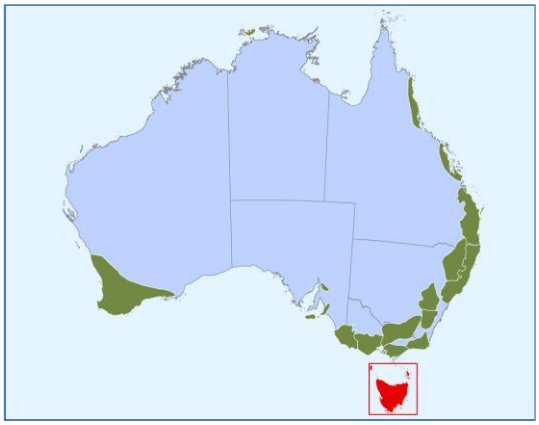


Figure 49 Forecast coniferous plantation log supply, East Gippsland–Bombala



Tasmania



Source: ABARES

The entire state of Tasmania is considered to be one region in this report. Tasmania's plantations are concentrated in the north of the state and in the south-east corner inland from Hobart. The coniferous plantations area has been steadily planted since the 1991–95 planting period, and most of the broadleaved plantations were established from 1995–96 onward (Figure 50).

The state's coniferous plantations supply a pulp mill at Boyer and several sawmills. Most of the broadleaved plantations were established to supply the export woodchip market via ports at Burnie, Bell Bay and Triabunna. Work has commenced on a pulp mill at Bell Bay that will use a large proportion of the available broadleaved plantation pulpwood in Tasmania (de Fégely 2006). The main coniferous species planted is radiata pine (*P. radiata*), and the main broadleaved species are shining gum (*E. nitens*) and blue gum (*E. globulus*).

In 2009–10, the total plantation area in the Tasmanian region increased by 36 per cent from 2004–05. The coniferous plantation area has increased by 4 per cent since 2004–05 to 74 700 hectares in 2009–10, and the broadleaved plantation area has increased by 51 per cent to 234 400 hectares. Eighty-two per cent of the broadleaved plantations are managed for pulpwood production and 18 per cent are managed for sawlog production. Broadleaved

plantations managed for sawlog production are expected to supply around 150 000 cubic metres of high-quality sawlog each year in Tasmania from 2025 (Forestry Tasmania 2007). The remaining sawlog supply will be lower-grade sawlog (Table 16). The broadleaved plantations managed for sawlog production require specific thinning and pruning to produce high-quality sawlogs.

The broadleaved pulpwood volume is forecast to be 3 450 000 cubic metres a year in the 2015–19 period and to peak in the 2050–54 period at 3 778 000 cubic metres a year. The broadleaved sawlog volume is forecast to be 251 000 cubic metres a year in the 2015–19 period and to peak at around 931 000 cubic metres a year in the 2025–29 period (Table 16, Figure 51).

The coniferous sawlog production is forecast to be 568 000 cubic metres a year in the 2015–19 period and to peak in the 2030–34 period at 857 000 cubic metres a year. Coniferous pulpwood supply is forecast to vary from 487 000 cubic metres a year in the 2015–19 period to 739 000 cubic metres a year in the 2020–24 period (Table 16, Figure 52).

Plantation owners and managers provided 86 per cent of the forecasts of broadleaved plantation log supply and 83 per cent of the forecasts of coniferous plantation log supply.

Figure 50 Area planted by five-year period, Tasmania

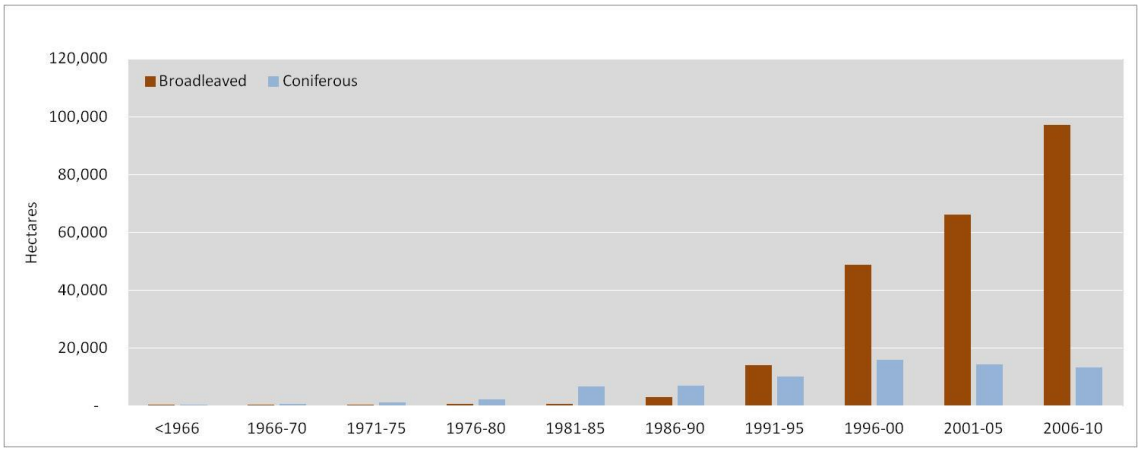


Table 16 Forecast plantation log supply, Tasmania

	(thousands cubic metres a year average for each five-year period)								
Period	**2010–14**	**2015–19**	**2020–24**	**2025–29**	**2030–34**	**2035–39**	**2040–44**	**2045–49**	**2050–54**
Broadleaved									
- pulpwood	2 296	3 450	3 557	3 273	3 480	3 674	3 156	3 665	3 778
- sawlog	87	251	714	931	442	524	590	685	636
Coniferous									
- pulpwood	558	487	739	606	683	642	542	678	664
- sawlog	483	568	525	567	857	617	725	679	630
Overall total	3 424	4 755	5 535	5 377	5 462	5 357	5 013	5 707	5 709

Figure 51 Forecast broadleaved plantation log supply, Tasmania

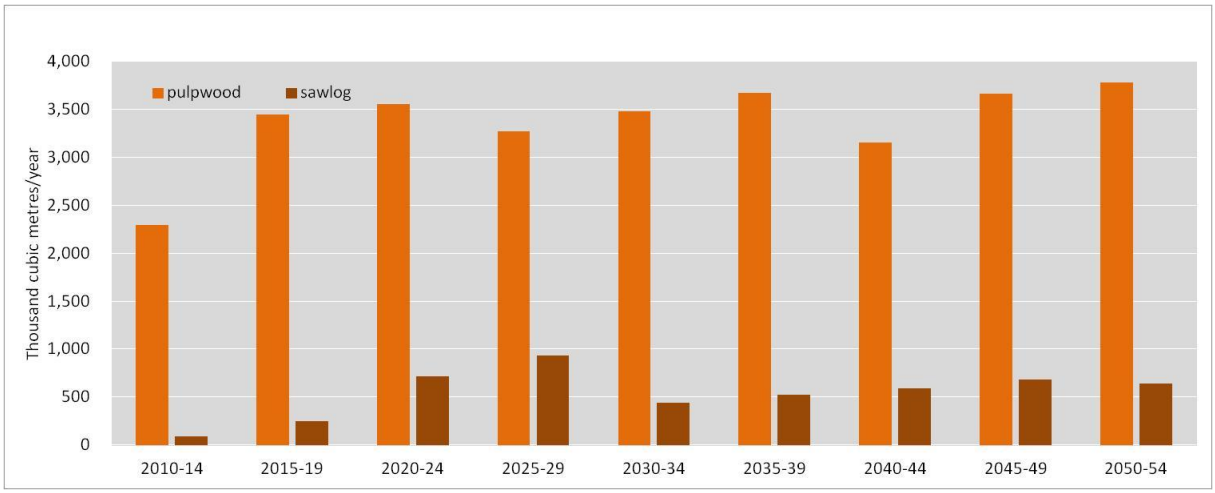
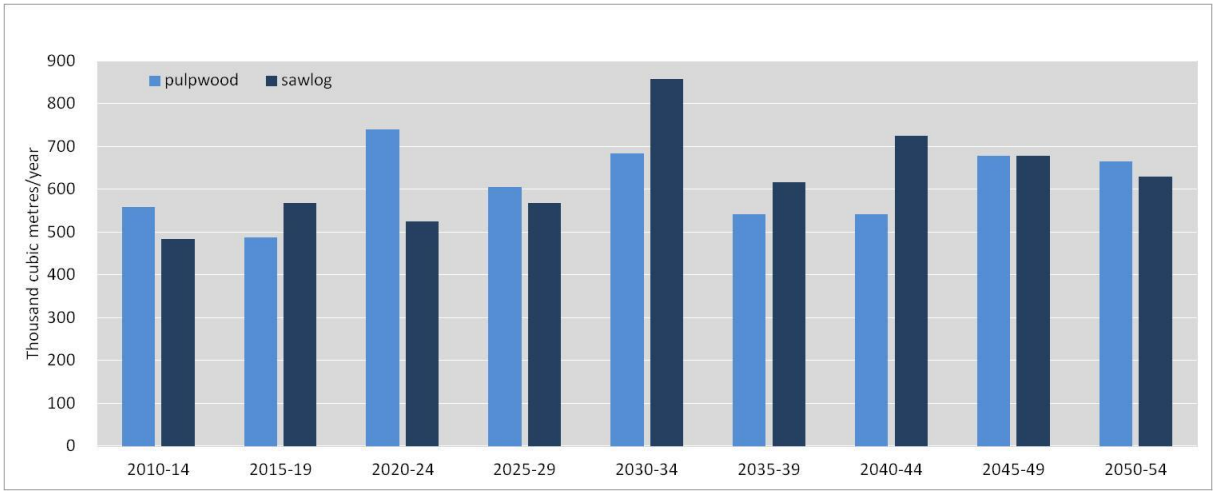


Figure 52 Forecast coniferous plantation log supply, Tasmania



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		cubic metres per hectare per year
Western Australia													
Eucalypt sawlog	25	150	170	-	-	-	15	-	100	9	-	80	20
Eucalypt pulpwood	12	-	204	-	-	-	-	-	-	-	-	-	17
Pinus radiata	30	270	50	24	60	40	18	60	40	12	-	80	20
P. pinaster	40	110	60	35	90	20	25	40	20	18	-	90	11
Northern Territory													
Araucaria mangium	8	-	250	-	-	-	-	-	-	-	-	-	31
Mahogany	20	137	-	-	-	-	-	-	-	13	173	-	16
P. caribaea	30	270	30	-	-	-	-	-	-	18	35	35	12
Mt Lofty Ranges and Kangaroo Island													
Eucalypt sawlog	25	150	170	-	-	-	15	-	100	9	-	80	20
Eucalypt pulpwood	12	-	204	-	-	-	-	-	-	-	-	-	17
P. radiata	30	350	20	23	55	25	18	15	50	13	-	110	21
Green Triangle													
Eucalypt pulpwood	12	-	204	-	-	-	-	-	-	-	-	-	17
P. radiata	30	350	20	23	55	25	18	15	50	13	-	110	21
North Queensland													
Hardwood sawlog	45	340	40	-	-	-	35	170	40	20	50	190	18
Hardwood sawlog	12	-	216	-	-	-	-	-	-	-	-	-	18
Hoop pine	50	600	-	-	-	-	-	-	-	25	70	-	13
Eucalypt pulpwood	20	140	-	-	-	-	14	70	-	9	70	-	14
Southern pines	30	270	30	-	-	-	-	-	-	18	35	35	12
South East Queensland and North Coast													
Eucalypt pulpwood	12	-	216	-	-	-	-	-	-	-	-	-	18
Eucalypt sawlog	45	340	40	-	-	-	35	170	40	20	50	190	18
Eucalypt sawlog	34	350	10	-	-	-	20	30	30	14	20	85	13
Araucaria spp.	50	600	-	-	-	-	-	-	-	25	70	-	15
Southern pines	30	270	20	-	-	-	20	100	20	14	5	40	18
Northern Tablelands													
Eucalypt sawlog	45	300	40	-	-	-	35	100	40	20	-	170	14
Eucalypt pulpwood	14	-	224	-	-	-	-	-	-	-	-	-	16
P. radiata	30	300	70	-	-	-	-	-	-	18	40	70	16
P. radiata-unthinned	30	137	168	-	-	-	-	-	-	-	-	-	10

Southern pines	30	270	20	-	-	-	20	100	20	14	5	40	15
Central Tablelands													
Eucalypt sawlog	45	300	40	-	-	-	35	100	40	20	-	170	14
Eucalypt pulpwood	14	-	224	-	-	-	-	-	-	-	-	-	16
P. radiata	30	300	70	-	-	-	-	-	-	18	40	70	16
P. radiata-unthinned	30	137	168	-	-	-	-	-	-	-	-	-	10
Southern pines	30	270	20	-	-	-	20	100	20	14	5	40	15
Southern Tablelands													
Eucalypt sawlog	45	300	40	-	-	-	35	100	40	20	-	170	14
P. radiata	30	220	30	-	-	-	24	70	40	16	-	110	16
Murray Valley													
Eucalypt sawlog	27	140	160	-	-	-	16	-	100	10	-	80	18
Eucalypt pulpwood	13	-	203	-	-	-	-	-	-	-	-	-	16
P. radiata	30	380	30	-	-	-	21	60	60	14	-	100	21
P. radiata-unthinned	30	180	220	-	-	-	-	-	-	-	-	-	13
Central Victoria													
Eucalypt pulpwood	12	-	210	-	-	-	-	-	-	-	-	-	18
Eucalypt sawlog	27	140	160	-	-	-	16	-	100	10	-	80	18
Eucalypt sawlog no pulp	27	480	-	-	-	-	-	-	-	-	-	-	18
P. radiata	30	300	30	-	-	-	21	50	60	14	-	100	18
Central Gippsland													
Eucalypt sawlog	40	200	450	-	-	-	-	-	-	20	-	150	20
Eucalypt pulpwood	12	-	216	-	-	-	-	-	-	-	-	-	18
P. radiata	30	240	170	-	-	-	20	-	110	15	-	80	20
East Gippsland–Bombala													
Eucalypt sawlog	27	112	128	-	-	-	16	-	80	10	-	64	14
Eucalypt pulpwood	12	-	228	-	-	-	-	-	-	-	-	-	19
P. radiata	30	220	30	-	-	-	24	70	40	16	-	110	16
Tasmania													
Eucalypt pulpwood	10	-	250	-	-	-	-	-	-	-	-	-	25
Eucalypt sawlog	25	150	170	-	-	-	15	-	100	9	-	80	20
E. nitens	15	-	220	-	-	-	-	-	-	-	-	-	15
P. radiata	30	320	40	-	-	-	17	40	80	12	-	100	19
P. radiata unthinned	20	-	200	-	-	-	-	-	-	-	-	-	10

Appendix 2

Sources and acknowledgements

Data and information for this report were provided by the many companies, government agencies, other organisations and individuals who own or manage plantations, and by regional private forestry organisations. The plantation and timber industry associations that represent plantation owners by participating in the NPI Reference Committee assist with data collection and provide advice as required. These people and organisations are listed below. Their support and assistance is gratefully acknowledged.

Abbeygate Afforestation Pty Ltd
ACT Territory and Municipal Services
AgriWealth Pty Limited
AKD Softwoods
Australian Bluegum Plantations Pty Ltd
Australian Forest Growers
Australian Forest Products Association
Australian Pines and Products
Birnam Forests Pty Ltd
Bulman, Mr Peter
Bunbury Treefarm Project
Central Highlands Water
Central Victorian Farm Plantations
Department of Environment and Conservation, Western Australia
Department of Employment, Economic Development and Innovation, Queensland
Department of Resources, Northern Territory
Elders Forestry Limited
Enots Pty Limited
Flanery, Mr Ross
Forest Enterprises Australia Limited
Forestry Plantations Queensland Pty Ltd
Forest Products Commission Western Australia
ForestrySA
Forestry Tasmania
Forests New South Wales
Fred Fairthorne and Son Pty Ltd
Gippsland Private Forestry Inc.
Green Triangle Forest Products
Green Triangle Plantation Forest Company of Australia Pty Ltd
GRO Group Pty Ltd
Gunns Limited
Hancock Victorian Plantations Pty Ltd
Hardy, Mr Bill
Henderson, Dr Roger
Hume Forests Limited
Hyne & Son Pty Ltd
Insignis Forestry Services Pty Ltd
Johnston, Mr Dougall
Khaya Plantation Services Pty Ltd
Macquarie Forestry Services
Midway Afforestation Ltd
Midway Plantations Pty Ltd
Mitchell, Mr Tim
Monterey Forestry Services Pty Ltd
New Forests
Norske Skog
PF Olsen (Aus) Pty Ltd
Plantation Timbers Group Pty Ltd
Plantation Tropical Timbers
Private Forests Tasmania
Private Forestry Service Queensland
Queensland Commodity Exports
Rewards Group
RuralAus Investments
Rural Solutions SA
South East Fibre Exports Pty Ltd
South East New South Wales Private Forestry
South East Resource Information Centre
Southern Forests Pty Ltd
Southern Tablelands Farm Forestry Network Inc
Synnot, Mr Richard
Taylor, Mr John
Taylor, Mr Max
Tiwi Land Council
Trees Victoria
URS Forestry
WA Plantation Resources Pty Ltd
Willmott Forests
W.J. Gittins and Associates Pty Ltd
Woakwine Forestry
Woollybutt Pty Ltd

Glossary

African mahogany (*Khaya senegalensis*)	A tall broadleaved tree from Africa that has shown promise for sawn timber production in northern Australia
Araucaria	A genus of large coniferous trees, two species of which—*Araucaria cunninghamii* (hoop pine) and *A. bidwillii* (bunya pine)—are native to Australia. *A. cunninghamii* is the only native coniferous tree used extensively in plantations in Australia
Blue gum (*Eucalyptus globulus subspecies globulus*)	A species of eucalypt native to Tasmania and parts of southern Victoria. One of the broadleaved 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
Broadleaved	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 broadleaved tree native to Queensland and Papua New Guinea, grown in tropical regions for pulpwood. Also known as brown salwood
Maritime pine (*Pinus pinaster*)	A coniferous tree species introduced to Australia from southern Europe and planted for sawlog production in lower-rainfall, temperate climates not suitable for radiata pine
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 NPI 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 coniferous 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
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 broadleaved 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'
Coniferous	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
Smoothing	Adjusting wood supply to achieve a more practicable pattern of supply over time
Southern pines	Coniferous species introduced from southern North America and the Caribbean. Species include Caribbean pine (*Pinus caribaea*) and slash pine (*P. elliottii*) and several varieties of these. A hybrid between southern pine

	varieties is now the preferred coniferous plantation in sub-tropical and tropical regions of Australia
Teak (*Tectona grandis*)	A broadleaved species originating in tropical areas of Asia and planted widely in Indonesia, India and other countries to produce cabinet and furniture timber

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