

Socio-economic impacts of the forest industry

Victoria (exc. the Green Triangle)

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Jacki Schirmer^{1,2}, Mel Mylek¹, Anders Magnusson³, Brigitta Yabsley¹ and Julian Morison³

¹ Health Research Institute, University of Canberra

² Institute for Applied Ecology, University of Canberra

³ EconSearch

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Executive Summary

Introduction

The forest industry in Australia contributes to jobs and economic activity in many communities. During the last decade, there has been little information on how the industry is changing in different regions, including change in the number of jobs generated, dependence of different communities on the economic activity generated by the industry, the type and quality of work generated in the industry, and how residents of forest-industry dependent communities view the industry and its effects. Forest and Wood Products Australia has invested in research to produce up-to-date information on the socio-economic impacts of the forest industry. This report presents findings for the forest industry in Victoria, excluding the 'Green Triangle' in south-west Victoria, which is examined in a separate report. For simplicity, this region is referred to as the 'Victorian forest industry' in this report; in all cases, this excludes plantation areas in the south-west.

The data analysed for this report was drawn from (i) a survey of forest industry businesses conducted in 2016 to 2017, in which 62% of businesses completed the survey, while data on the remaining 38% was obtained from industry experts, other businesses, and publicly available information; (ii) the 2006, 2011 and 2016 Australian Bureau of Statistics (ABS) *Census of Population and Housing*; (iii) economic modelling using EconSearch's RISE regional input-output model; and (iv) the 2016 Regional Wellbeing Survey, used to examine perceptions of the forest industry by residents living in communities in which the forest industry operates.

Understanding the forest industry

Victoria's forest industry is diverse, and includes wood and fibre production from native forest, hardwood plantations and softwood plantations grown within the state, as well as the processing of timber imported from other states and countries. It has a supply chain with three distinct parts. In the first two parts – primary production and primary processing - native forest and plantations are grown and harvested (primary production), and logs are processed into primary products such as sawntimber, woodchips, pulp and paper (primary processing). In primary production and primary processing the jobs generated depend almost entirely on harvest of wood and fibre from native forest and plantations grown in Victoria, with only small volumes of logs imported for processing from nearby locations in bordering states. These 'primary' products are then either sold directly into end-use markets, for example into industries such as construction; or are sold for further processing into 'secondary' products by other processors. In the third part of the supply chain, the 'secondary processing' sector, those primary wood and fibre products sold for further processing are further processed into a range of products (for example, cabinets, furniture, and paper packaging products). While secondary processing jobs still rely on wood and fibre as a key input in processing, the wood or fibre used can be sourced either from Victorian-grown wood and fibre or from wood and fibre that has been grown and undergone primary processing in other parts of Australia or other countries. All parts of the forest industry generate both direct jobs (jobs directly generated by primary production, primary production or secondary processing) and 'flow-on' jobs (jobs generated in the rest of the economy as a result of activities of the forest industry, also called 'indirect' jobs).

Which parts of the forest industry are analysed in this report?

This report examines the primary production and primary processing parts of the forest industry, including both direct and flow-on effects of these parts of the forest industry. In addition, a limited amount of data on direct employment in secondary processing is provided, drawing on employment data from the Australian Bureau of Statistics (ABS) *Census of Population and Housing*. However, the report does not estimate the economic value of secondary processing, or flow-on effects of secondary processing through the economy. This report focuses on the employment and economic activity generated as a result of harvesting of wood and fibre from native forest and plantations, and the production of wood and paper products. The plantations and native forest managed for timber production in Victoria also often provide a base for other socio-economic activities, such as bee keeping, livestock grazing, mountain biking, bushwalking, horse riding, and hunting. These activities are not examined in this report.

In this report, forest industry activities in Victoria (excluding plantations in the south-west) are analysed for the region as a whole. Data are also produced for the sub-regions of (i) the Central Highlands and Gippsland, which includes almost all native forest timber harvesting and associated processing activities, as well as large areas of softwood plantations and some hardwood plantations, and includes the Central Highlands, Gippsland and East Gippsland Regional Forest Agreement (RFA) regions; (ii) North Central Victoria, in which the industry is predominantly based on the softwood plantations of the 'Murray Valley' region with small areas of hardwood plantation and native forest harvesting, and which includes the North East RFA region; and (iii) Western Victoria, with softwood plantations and hardwood plantations, together with a small amount of native forest harvesting, and which includes the Western Victorian RFA region.

Economic value

In 2015-16, the direct value of output generated by the Victorian forest industry at the point of sale of primary processed products was \$1,576 million, increasing to \$4,844 million when flow-on effects generated in other industries as a result of spending by the forest industry are included. This total included \$1,836 million in the Central Highlands and Gippsland region, \$514 million in the North Central region and \$463 million in the Western region, with much of the remainder of the \$4,844 million generated in Melbourne. However, value of output is not always a good indicator of the industry's overall contribution to the local economy, as it does not identify the extent to which the economy of a given region benefited from the industry's activity in the form of returns to business owners, wages and salaries, and taxes. Measuring the industry's contribution to Gross Regional Product (GRP – the regional equivalent of Gross Domestic Product) helps address this. Measures of GRP quantify the value added by the industry to the local economy as a whole, meaning value contributed after subtracting non-wage expenditure from revenue. In 2015-16, the forest industry directly contributed around \$598 million to GRP in Victoria (excluding the Green Triangle), and a total of \$2,144 million once flow-on effects through the entire economy were included. This total included \$644 million from business dependent on native forests, \$1,037 million dependent on softwood plantations, \$245 million dependent on hardwood plantations, and \$217 million dependent on forests outside of Victoria. The contributions to total GRP by region were \$741 million in the Central Highlands and Gippsland, \$231 million in the North Central region and \$204 million in the Western region.

Employment

The forest industry in Victoria (excluding the Green Triangle) generated a total of 5,115 direct jobs up to the point of primary processing as of mid-2017. A further estimated 9,360 further direct jobs were generated by secondary processing activities that use wood and fibre products both from the Victoria forest industry and imported from interstate or overseas. This means a total of 14,475 direct jobs were generated in the Victorian forest industry as of 2017. The estimated flow-on employment generated by activities up to and including primary processing was an additional 10,581 jobs, which were generated in other industries as a result of demand generated from the forest industry. Secondary processing activities will also generate flow-on impacts in other industries, but the extent of these could not be estimated for this report.

Of the 5,115 jobs generated up to the point of primary processing in 2017, 1,639 direct jobs were generated by the native forest industry, 2,437 by softwood plantations, and 457 by hardwood plantations grown in Victoria. A further 581 Victorians were employed in jobs that depended on native forest or plantations grown outside Victoria (for example, harvest contractors who live in Victoria, but work harvesting plantations or native forest in New South Wales or South Australia). In the secondary processing sector, it was not possible to identify how many jobs were dependent on different types of native forest and plantation grown in Victoria or on timber imported from other regions.

Of the 1,639 jobs generated by the native forest industry (up to and including primary processing), the majority – between 1,060 and 1,170 – rely on logs harvest from native forests located in the Central Highlands Regional Forest Agreement (RFA) region. The range of this estimate reflects that there is variance in the jobs generated year to year due to factors such as changes in the volume and type of logs harvested in each RFA region each year. This is followed by the East Gippsland RFA region, with 230 to 260 jobs dependent on harvest of forests located in this region; the Gippsland RFA region (190 to 210 jobs); North East RFA region (70 to 80 jobs); and Western RFA region (30 to 40 jobs). Importantly, not all the jobs generated by logs harvested in each RFA region are located in that region: in many cases logs harvested in an RFA region are processed at mills located outside that region. For example, this means that some of the 190 to 210 jobs generated by logs harvested in the Gippsland RFA region are generated outside this RFA region.

The number of jobs generated by the Victorian forest industry varied by region. Of the 14,475 direct jobs generated up to and including secondary processing, 3,646 were generated in the Central Highlands and Gippsland, 1,435 in the North Central region, 1,677 in the Western region, and 7,717 in Melbourne. In Melbourne, the large majority of direct jobs (7,084) were in secondary processing.

Many of the jobs generated by the Victorian forest industry are located in just a few local government areas (LGAs). In seven LGAs, more than two per cent of the employed labour force was directly employed in the forest industry (in jobs up to and including secondary processing) in early 2017: Alpine (6.8%), Latrobe (4.7%), Benalla (4.7%), Colac-Otway (4.5%), Wellington (3.2%), East Gippsland (2.1%), and Murrundindi (2.0%).

There is little information available on how employment is changing in the forest industry over time. The only two sources of data on change over time are (i) the ABS Census of Population and Housing (Census), and (ii) surveys of the forest industry up to the point of primary processing. Data from both

these sources show an overall decline in forest industry employment over time. Census data show a 28.4% decline in total employment in the forest industry between 2006 and 2016, including a 5% decline from 2006 to 2011, and a 25% decline between 2011 and 2016. This overall trend masks some differing trends within different industry sectors. Between 2011 and 2016, ABS Census data record growth of 22% in employment in the primary production part of the industry, driven in part by growth in harvest and haulage of hardwood plantations. During the same period, employment in wood and paper product manufacturing declined by 29%. This is consistent with declines observed in surveys of the forest industry.

Working conditions

Successfully recruiting and maintaining a strong workforce can be challenging for a regionally-based industry, with many rural and regional areas having a relatively small labour force compared to larger urban areas. The Victorian forest industry generates more full-time jobs than other industries, with 84% of those employed in the industry working full-time in 2016, compared to 61% of the broader workforce in Victoria. Workers in some parts of the industry work longer hours than is typical in most industries, particularly those employed in harvest and haulage contracting firms. In 2016, forest industry workers were less likely than those in other industries to earn lower incomes (less than \$649 per week), and similarly to earn higher incomes (above \$1,250 per week).

Workforce diversity and sustainability

To be sustainable over time, every industry needs to successfully recruit and retain workers. In the Victorian forest industry, only 16% of workers were female in 2016 (compared to 48% of the broader employed labour force). There was also a decline in participation of Aboriginal and Torres Strait Islanders in the forest industry workforce between 2006 and 2016, while participation grew in other industries. The industry's workforce aged at a slightly faster rate between 2006 and 2016 than the rest of the workforce, but due to a relatively young age structure in 2006, has a similar age structure to the rest of the workforce in 2016.

When asked how easy or difficult they found it to recruit different types of workers, 70% of forest industry businesses reported finding it difficult to recruit managers and high level professional staff, followed by transport workers (69% finding it difficult to recruit staff), heavy machine operators (67%) and field staff (63%). Only 30% per cent found it challenging to source finance/book keeping staff, and most businesses (57%) found it easy to source administration staff. Two-thirds of forest and plantation managers (67%) found it difficult recruiting harvest contractors. Factors that made recruitment challenging included a lack of available workers with appropriate skills (88% of businesses), lack of suitable workers based locally (65%), the time required to build the right skills (59%), workers not wishing to shift to local areas (50%) and negative perceptions of the industry (46%).

Industry skills and training needs

Forest industry businesses were asked what types of skills were needed by their workforce, whether they required workers to have formal accreditation in these skills, and how they currently provided training. Businesses most commonly reported needing workers with skills in occupational health and safety training (100% of businesses), operation of heavy machinery (89%) and chainsaws (85%),

compliance training (89%), business and financial management (80%) and fire-fighting (70%). There was variation in needs for skills and accreditation between businesses types, with some skills specialised to particular parts of the industry.

Businesses were also asked to identify whether they delivered skills training in different competency areas via in-house training by other staff, in-house training by an expert, or training via a registered training organisation (RTO). RTOs were most commonly used to provide training in forest ecology and silviculture, hand-held machinery operation, road transport and driver training and heavy machinery operation; in some cases this was supplemented by in-house training. RTOs were also the most common methods for training in occupational health and safety training, business and financial management, and fire-fighting, although less than 70% of businesses used RTOs and many businesses opted for in-house training by other staff. Compliance training was delivered through an RTO for just over half of all businesses, and in-house training by other staff or experts for most remaining businesses was almost half, suggesting opportunities for additional provision of training in this area through more formal mechanisms. In-house training was more common than use of a RTO for marketing/sales, IT/software training, and community relations/engagement.

As of 2016, forest industry workers in most parts of the industry were less likely to have completed high school than those working in other industries, and the rate of growth in high school attainment rates between 2011 and 2016 was slightly slower in the forest industry compared to the rest of the workforce. However, forest industry workers were more likely to have completed a certificate qualification than those in other parts of the workforce (39% compared to 29% as of 2016). Completion of a Bachelor degree or other university qualification was lower than the average for the employed labour force in all parts of the industry.

Business and market outlook

Businesses were asked about the business and market conditions and challenges they were experiencing, and the extent to which they could cope with difficult business conditions. Fifty one per cent of businesses described business condition in early 2017 as 'more challenging than usual', 33% as 'the same as usual' and 16% as 'easier than usual'. These questions help identify both areas of strength and areas of challenge being experienced by the industry. Businesses were also asked whether they felt that, over the next 12 months, demand for their services or products were likely to grow, remain about the same, or shrink. About half (51%) felt demand would remain the same, about one third (31%) felt that that demand would grow and few (18%) that demand would reduce.

Businesses were asked to rate the extent to which different factors had been a challenge or problems for their business in the last three years. The most common challenges in the last three years were government regulation (61% of businesses reporting this as a big challenge), increasing cost of labour (52%), difficulty obtaining labour (44%), rising input costs (41%) and lack of investment in the industry (39%). These issues varied between sectors: native forest dependent businesses were more likely to report government regulation (89%), rising input costs (63%), lack of investment in the industry (44%), difficulty obtaining certification (22%), and lack of access to telecommunications (33%) than other businesses. Softwood plantation dependent businesses were more likely than others to report that difficulty maintaining competitiveness with other similar businesses (29%), decreasing prices (41%), and lack of demand (24%) were problems. Hardwood plantation dependent

businesses were more likely to report difficulty obtaining labour (75%) and lack of investment in the industry (50%) as key issues.

Community perceptions of the social, economic, service and infrastructure effects of the forest industry

To further evaluate the socio-economic effects of the forest industry in the communities in which it operates, residents living in the Central Highlands and Gippsland region, North Central region and Western region were asked about (i) their overall views about quality of life and liveability of their community, and (ii) the extent to which they felt the different industries that operated in their region affected different social and economic aspects of their lives. Overall, the results suggest that those living in regions with higher dependence on the forest industry are just as likely to rate their community as highly liveable, friendly, safe and aesthetically pleasant as those living in nearby communities with less dependence on the forest industry.

Of those living in communities with higher dependence on the forest industry, most reported that the forest industry was important to their local community, including 60% of those who lived in the Central Highlands and Gippsland LGAs of East Gippsland, Latrobe, Murrindindi, Wellington and Yarra Ranges; 47% of those living in the North Central LGAs of Alpine, Benalla and Wangaratta; and 58% of those living in the Western Victorian LGA of Colac-Otway.

When asked to assess the effects they felt the forest industry had on their community, the large majority of residents – 79% in the Central Highlands and Gippsland region, 77% in the North Central region and 64% in the Western region - felt the forest industry had positive impacts on local employment. However, when asked about contributions other than employment, residents generally perceived the forest industry as having fewer positive effects than the farming and tourism industries, and more negative effects. When views about negative impacts were examined, the most common concerns reported about the forest industry were related to road impacts and landscape aesthetics, with a majority reporting concerns about impacts of the industry on the quality of and traffic on local roads, and between 46% (North Central) and 58% (Western region) feeling the industry had a negative impact on the attractiveness of the local landscape.

Conclusions

This report quantifies the employment and economic activity generated by the forest industry, and identifies the communities in which the industry generates a significant proportion of local jobs. The analysis shows that, overall, the number of jobs generated by the industry has declined significantly since 2006, although employment generated by hardwood plantations has grown since 2012. The majority of jobs generated by the industry are generated by the processing sector, as is the majority of the flow-on economic impact of the industry. This highlights the importance of local processing of wood and fibre for generation of jobs from the industry; far fewer jobs are created if logs are harvested and exported with no or little processing. While relatively few businesses feel demand will decline for their products, half report business conditions as being more challenging than usual, and many find it difficult to recruit some types of workers. Increasing labour and input costs and lack of investment in the industry are concerns for many businesses. These challenges suggest that the current trend of ongoing decline in employment – particularly in processing of wood and fibre

products - is likely to continue unless there is significant new opportunity for investment in the industry.

Introduction

The forest industry in Australia contributes to jobs and economic activity in many communities. This contribution results from the growing, management and harvesting of plantations and native forests (primary production), and primary and secondary processing of logs into wood and fibre products such as sawn timber for use in construction, appearance products such as flooring and decking, woodchips for export, pulp and paper.

Like many other industries, Australia's forest, wood and paper industries are changing rapidly, with ongoing investment in new technology, skills and changing markets all contributing to evolving skills, training and technology needs. During the last decade, there has been little information on how the industry is changing in different regions, including change in the number of jobs generated, dependence of different communities on the economic activity generated by the industry, the type and quality of work generated in the industry, and how residents of forest-industry dependent communities view the industry and its effects.

Forest and Wood Products Australia has invested in research to produce up-to-date information on the socio-economic impacts of the forest industry in Victoria, South Australia, Tasmania, Queensland, Western Australia and parts of New South Wales. This report presents findings for the forest industry in Victoria, excluding only the parts of south-west Victoria that form part of the Green Triangle (which is examined in a separate report). For simplicity, this is referred to as the 'Victorian forest industry' in this report; in all cases, this excludes plantation areas in the south-west.

This report examines activity dependent on the harvest of timber from softwood plantation, hardwood plantation and native forests in Victoria (excluding plantations in the south west). It examines the following aspects of the Victorian forest industry:

- Employment generated by the industry, including direct and flow-on jobs
- Economic value of the industry, including direct and flow-on economic activity
- Working conditions, workforce diversity, and workforce sustainability
- Skills and training needs for the forest industry
- Business and market outlook reported by businesses operating in the industry, and
- Community perceptions of the industry.

Methods

The data analysed for this report was drawn from the following sources:

- **2016-17 Industry Survey:** A survey of forest industry businesses operating in both Victoria (examined in this report) and the Green Triangle (south west Victoria and south east South Australia, reported in a separate report), conducted between February 2017 and May 2017. As many businesses operate in both these regions, survey participation rates are reported for both regions together. Of 156 key businesses operating in the industry (including nurseries, plantation management businesses, silvicultural contractors, harvest and haulage contractors, and wood and paper processors), 62% completed the survey, while 38% (60 businesses) did not take part. A further 60 small contracting businesses were not asked to take part, with information instead obtained via data provided by forest managers who used their services. Of the 62% of the 156 surveyed businesses who completed the survey, 32 businesses completed every question, including most large businesses operating in the industry, and 64 completed a shorter version over the phone. Most non-participants managed smaller businesses, particularly contracting businesses. Information on non-participating businesses was identified based on (i) information provided by forest and plantation managers on their use of contracting services, (ii) information from past surveys, (iii) advice from industry experts familiar with the businesses, and (iv) publicly available data on non-responding businesses.
- **2006, 2011 and 2016 Census:** Data from the 2006 and 2011 Australian Bureau of Statistics (ABS) *Census of Population and Housing* were drawn on to examine working conditions and socio-demographic characteristics of the industry's workforce.
- **Economic modelling:** Economic modelling using EconSearch's RISE regional input-output model was used to identify flow-on jobs and economic activity generated by the forest industry.
- **2016 Regional Wellbeing Survey:** Perceptions of the forest industry by residents living in communities in which the forest industry operates were measured as part of the Regional Wellbeing Survey, a large survey of 13,000 Australians living in regional and rural areas.

Overview of the industry – Victoria

Victoria's forest industry is diverse, and includes wood and fibre production from native forest, hardwood plantations and softwood plantations grown within the state, as well as the processing of timber imported from other states and countries. This section briefly describes the industry. First, the structure of the industry is described based on the supply chain from plantation and native forest management and harvesting through to processing of a range of products based on both Victorian-grown wood and fibre and wood and fibre imported from other locations. The second part then describes the industry sectors that are dependent on native forest, softwood plantation and hardwood plantations in Victoria in more detail, focusing on the location of the forests and plantations these three key industry sectors depend on, and which types of processors utilise wood and fibre from each.

Industry structure

The forest industry in Victoria, like most of Australia, has a supply chain with three distinct parts: primary production, primary processing and secondary processing. Primary production involves the establishing, growing and harvesting of logs ready for primary processing. Primary processing involves processing of roundwood (harvested logs) into initial products such as sawn timber, woodchips and basic pulp and paper products, and usually uses logs from plantation or native forest grown within a relatively short distance of the processing plant (less than 200 kilometres in most cases). Secondary processing involves further processing of these initial products into a wide range of further processed products, and is less reliant on locally-grown timber, with secondary processors often importing their wood and paper inputs from other states or other countries as well as purchasing them from local primary processors. All parts of the forest industry supply chain generate both direct jobs (jobs directly generated by primary production, primary production or secondary processing) and 'flow-on' jobs (jobs generated in the rest of the economy as a result of activities of the forest industry, also called 'indirect' jobs). Primary production, primary processing and secondary processing are described in more detail below, and Figure 1 provides a stylised representation of the supply chain.

1. Jobs generated in primary production of wood and fibre products. In this part of the industry, trees are grown and harvested to produce roundwood (logs), in native forests and plantations. The activities involved in primary production include management of native forest and plantation by forest management businesses and agencies, silvicultural contractors, and harvesting and haulage of logs to primary processors.

2. Jobs generated up to and including primary processing of wood and fibre products. Primary processing means processing of logs into initial products. This part of the wood and paper processing sector is based almost entirely on wood and fibre grown in Victoria, with only small volumes of logs imported for processing from nearby locations in bordering states. This means that the primary production of logs and primary processing combine to create a strongly inter-linked supply chain within Victoria. This supply chain generates employment and economic activity based on the management and harvesting of mostly Victorian-grown logs for wood and fibre production from native forests, softwood plantations and hardwood plantations. Harvested logs from native forest and plantations are processed from logs into a range of primary products including sawn timber, composite wood products such as particleboard, and woodchips. The products from primary

processing are then either sold directly into end use markets such as the construction industry, or sold for further processing into 'secondary' products by other processors.

3. Jobs generated in 'secondary' processing. Secondary processing involves further processing of primary processed wood and fibre (for example, rough sawn timber or paper) into a range of further products (for example, cabinets, furniture, paper packaging products). While these jobs still rely on wood and fibre as a key input in processing, the wood and fibre inputs are often combined with other products (for example, fabric covers on furniture, plastic components), and may be sourced from Victorian-grown wood and fibre, or from wood and fibre that has been grown and undergone primary processing in other parts of Australia or other countries. In addition to this, many of the residues produced in primary processing (for example, bark, sawdust and docking ends of logs) are sold to businesses such as firewood sellers, agricultural businesses for use as animal bedding, and garden and landscape businesses.

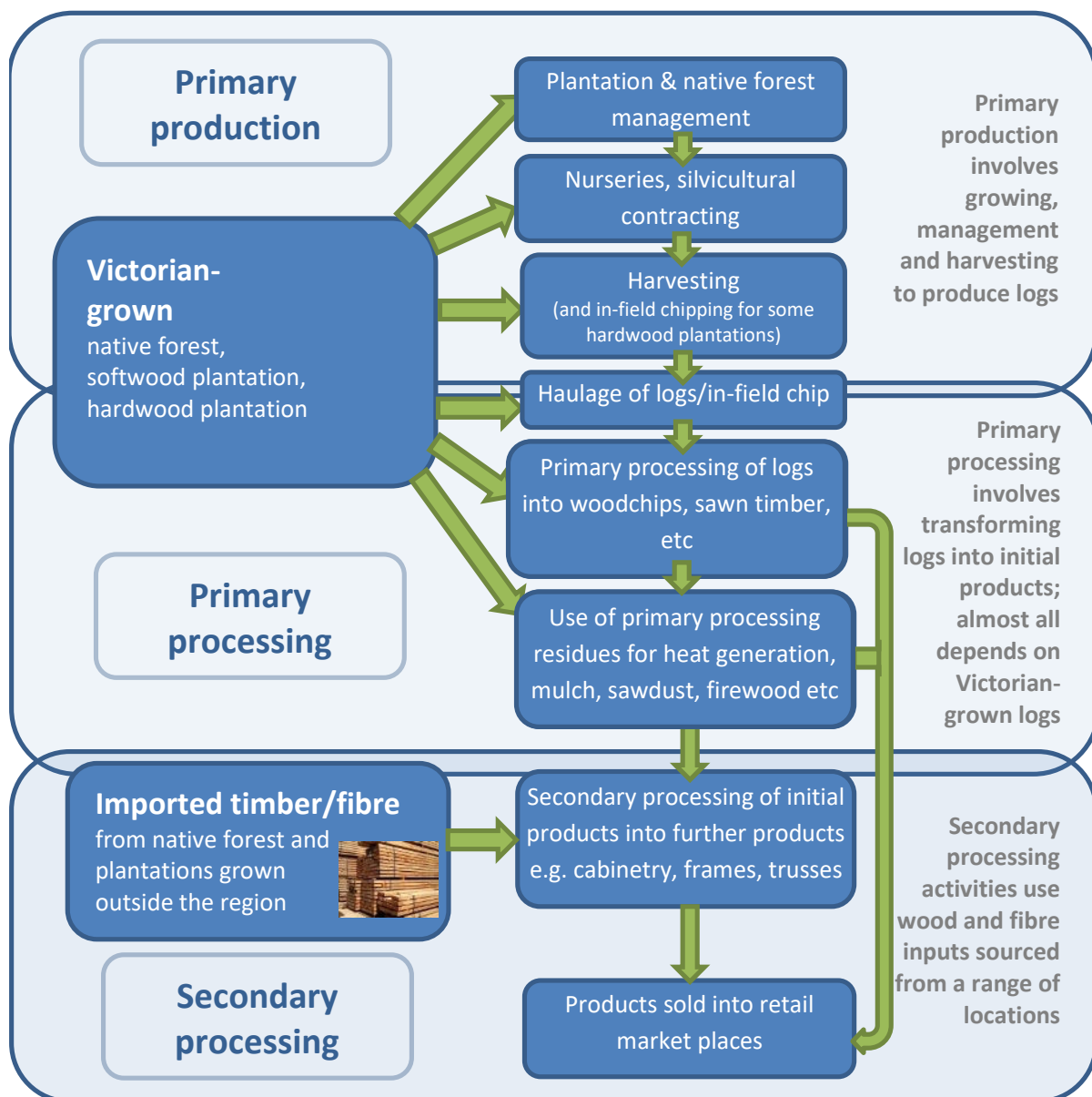


Figure 1 Stylised structure of the forest and wood products industry

This report focuses primarily on understanding the employment and activity generated by the industry up to and including the 'primary processing' stage, including both direct and flow-on effects of these parts of the forest industry. The primary processing stage was defined for this report as including all processors who take roundwood (logs) harvested from native forest or plantations, and includes all products from those processors. In some cases, a single processor may process roundwood into multiple products on a single site, including engaging in some activities often considered part of the secondary processing sector. In these cases, all that processor's activities were included in the analysis.

In addition to examining the industry up to and including primary processing, basic data on secondary processing is provided in this report, using data from the Australian Bureau of Statistics (ABS) *Census of Population and Housing* to estimate the jobs generated in secondary processing of fibre and wood products in Victoria (see Appendix 2 for a detailed description of the methods and definitions used). However, these data do not enable identification of what proportion of these jobs rely on wood or fibre from native forest or plantation grown in Victoria versus in other states or other countries. The report does not estimate the economic value of secondary processing, or flow-on effects of secondary processing through the economy.

Industry sectors

The native forest, softwood plantation, and hardwood plantation industries in Victoria are distinct sectors, each of which products different types of products, and services different markets. Each is described briefly below, followed by an overview of economic activities other than wood and fibre production that also occur in native forest and plantation areas.

Native forest sector

The native forest industry in Victoria predominantly depends on harvesting of multiple use public forests located in Victoria's east and north east, with a very small amount of harvesting occurring in areas of native forest west of Melbourne. Figure 2 shows the distribution of the native forests available for timber harvest in Victoria, with the multiple-use public native forests used for timber harvest for the forest industry shown in orange. Multiple-use native forest is managed by the Victorian Department of Environment, Land, Water and Planning. Areas that are to be harvested are formally identified as part of timber release plans, and once approved, VicForests manages timber harvesting and regeneration in these areas.

Once harvested, logs from native forests are processed at 34 processing sites located in Victoria, including pulp and paper production (Australian Paper), 28 sawmills, and a small number of woodchip mills and portable sawmills. Of these 34 processors, three process logs from a mix of native forest and plantations, while the remainder rely solely on logs from native forests.

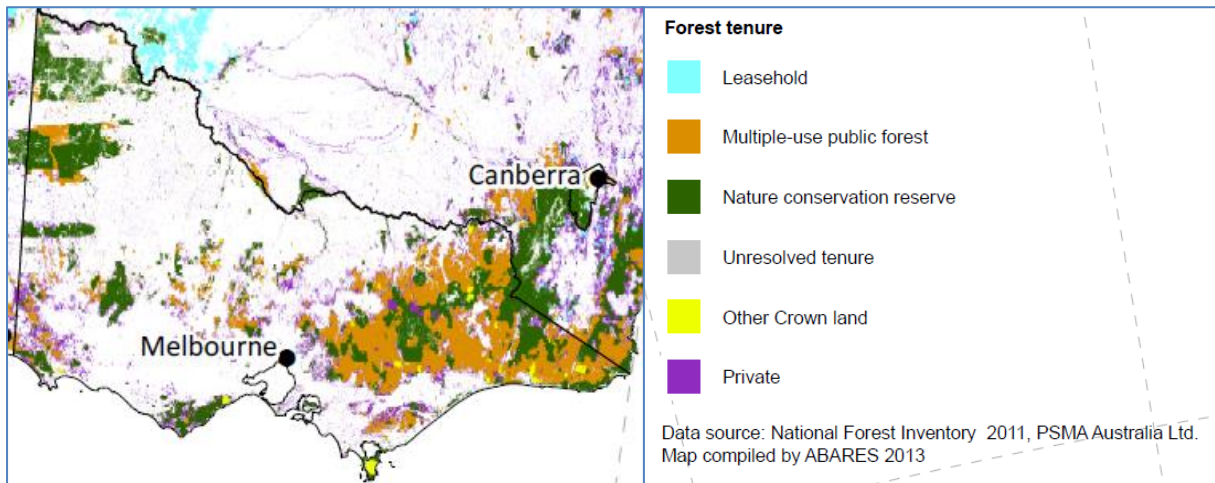


Figure 2 Victoria's forest cover by tenure (Source: Reproduced from MPIGA & NFISC 2013)

Softwood plantation sector

Softwood plantations in Victoria are clustered in several regions, as shown in Figure 3:

- North-Central region: softwood plantations extend in a band through central Victoria from Wodonga in the north through to regions near Colac; this band of plantations includes what is commonly termed the 'Murray Valley' region in the northern part and the 'Central Victoria' part in the south
- Green Triangle region: Reported on in a separate report, plantations are clustered near the South Australian border and support an industry that crosses the Victoria-South Australian border
- Gippsland region: In this region, most softwood plantations are in Central Gippsland, predominantly in an area stretching from Bairnsdale in the east to Warragul in the west, with a much smaller area in East Gippsland.

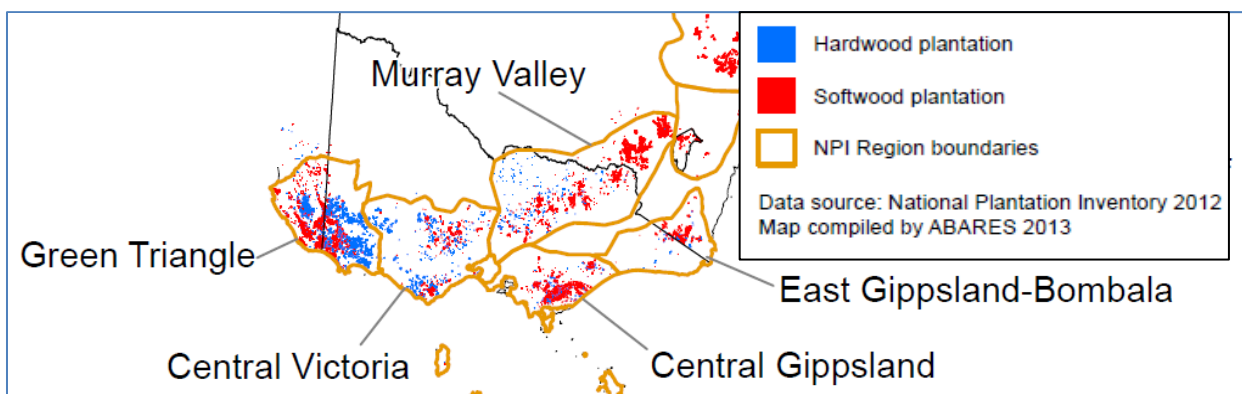


Figure 3 Distribution of softwood and hardwood plantations in Victoria (Source: Reproduced from MPIGA & NFISC 2013)

Logs harvested from softwood plantations in Victoria (excluding the Green Triangle) are predominantly processed at 19 processing sites located across Victoria and in southern NSW, the majority of which produce sawntimber products, with a small number focused primarily on production of woodchips and one on pulp and paper. Of these 19, 15 rely solely on softwood

plantation logs, while four (predominantly those not involved in sawmilling, e.g. woodchip mills) process logs from both softwood plantations and other sources (native forest or hardwood plantation).

In addition, softwood plantation logs harvested in the Green Triangle region are processed at 11 further sites located in the 'Green Triangle' region of South Australia and Victoria. There is some cross-over of supply between the Green Triangle and the rest of Victoria, but it is relatively small.

Hardwood plantation sector

Most of the hardwood plantations established in the state of Victoria are located in the Green Triangle region, which is not examined in this report. In 2017, the National Plantation Inventory estimated that of the 199,000 hectares of hardwood plantation established in Victoria, around 115,500 was located in the Green Triangle, with 37,700 located in the Central Victorian region and 29,800 in the Central Gippsland region and small amounts in other locations (Downham and Gavran 2017).

Hardwood plantations were predominantly established from the late 1990s to the mid-2000s by Managed Investment Scheme (MIS) companies. Following collapse of most of these MIS companies in the late 2000s, institutional investors acquired many hardwood plantation areas, and the first rotation of hardwood plantations began to be progressively harvested. Not all harvested plantations are being re-established post-harvest, with a range of outcomes. The majority of plantation is re-grown for a further rotation, while other areas are re-established to agriculture. Where a plantation was established on land leased from a farmer, some leases are relinquished to the landholder after harvest, with the landholder then making the decision on whether or not to re-grow the plantation (either from coppice growth from stumps or by planting new seedlings), or to revert the land use back to agriculture.

Most hardwood plantation timber is either woodchipped as part of the harvest process (in-field chipping) and sent to export facilities, sent to a woodchip mill for woodchipping and export, or used as inputs for pulp and paper production at the Australian Paper mill. In addition, a small volume of woodchip is exported for other uses such as rayon production, and a small amount of hardwood plantation sawlog is exported for peeling.

Other activities

In addition to producing fibre to supply the wood and paper processing industry in Victoria, the plantations and native forest managed for timber production in Victoria provide a base for other socio-economic activities.

Publicly owned native forest that is used for multiple purposes, including timber harvest, is managed by the Victorian Department of Environment, Land, Water and Planning. Uses other than timber harvest include tourism, bee keeping, firewood production, and a wide range of recreational activities and events including bushwalking, picnic and camping areas, bike riding trails, and four wheel driving areas.

Managers of plantations reported a range of activities occurring on the land they managed:

- **Livestock grazing:** This occurred on several thousand hectares of plantation land
- **Bee keeping:** Bee keeping occurred on many areas of plantation land

- **Mountain biking, bushwalking, horse riding and camping areas:** These were available on some areas of plantation land
- **Hunting:** Recreational hunting occurs in some plantation areas
- **Other uses** identified by plantation land managers were mushrooming and use for filming for TV production.

The economic value of these other activities has not been estimated as part of this report, which examines only the economic value of the fibre, wood and paper products produced from plantations and native forest.

Regions analysed in this report

In this report, forest industry activities in Victoria are analysed for the region as a whole, and for four key subregions:

- **Central Highlands and Gippsland:** This region includes almost all native forest timber harvesting and associated processing activity, as well as a key area of softwood plantations and some hardwood plantations. The region includes the 'Central Gippsland', and 'East Gippsland' plantation regions of the National Plantation Inventory, and the Central Highlands, Gippsland and East Gippsland Regional Forest Agreement (RFA) regions
- **North Central Victoria:** This region includes predominantly softwood plantation activity based on the softwood plantations of the 'Murray Valley' region as shown in Figure 3, and a small area of hardwood plantations and some native forest harvesting. This region includes the entirety of the North East RFA region.
- **Western Victoria:** This region includes the softwood plantations and hardwood plantations of the 'Central Victoria' region shown in Figure 3, and a small amount of native forest harvesting occurring in Western Victoria, including the entire Western RFA region. However, softwood and plantation activities occurring in the 'Green Triangle' part of Victoria were excluded from the analysis as they are reported as part of our report on the Green Triangle region.
- **Melbourne:** This includes the jobs generated by some processors located in the greater city and suburbs of Melbourne, as well as in head offices of some businesses in Melbourne, and some consulting and contracting businesses located in the city.

Economic value

This section examines the economic value generated by the Victorian forest industry. As economic value can be estimated using multiple approaches, we first describe the measures used in this report. This is followed by analysis of:

- (i) the *direct* value of the industry – the value of the activity generated by the forest industry, without including flow-on effects of this activity through the broader economy, and
- (ii) the *total economic value* of the industry, which includes both economic activity generated directly by forest industry businesses, and the flow-on effects of this activity through the broader economy.

Measuring economic impact

A number of economic indicators can be used to examine the value of an industry and estimate its impact on a specific regional economy. These range from simple measures of expenditure, to modelled estimates of the net contribution of an industry to the total value of economic activity in a given region (Gross Regional Production, or GRP). This section explains the measures used in this report, and why each is used.

Categories of economic impact

When using any measure of economic impact – whether it is value of output, expenditure by an industry, contribution of an industry to GRP, or generation of employment – it is possible to model this with a focus solely on the industry’s direct activities, or with a broader focus on how these activities flow-on through the economy. In this report, we model economic impact based on (i) direct impacts of the industry, and (ii) total impacts which are the sum of direct impacts plus flow-on (indirect) impacts of the industry across the whole economy:

- *Direct impact* is generated directly by firms, businesses and organisations engaged in a particular industry, in this case the forest industry.
- *Flow-on or indirect* impacts are the economic activity generated in other industries as a result of the activity of the forest industry. Total flow-on or indirect impact is the sum of *production-induced* and *consumption-induced* impacts.
 - *Production-induced impact* is generated by businesses outside the forest industry that supply forest industry businesses. It also includes impacts generated by the suppliers of those suppliers and so on as successive waves of impact occur in the economy.
 - *Consumption-induced impact* is generated when workers involved in the forest industry, and in businesses that supply the forest industry, spend their wages on goods and services. The impact generated as a result of spending of wages on these goods and services is *consumption-induced*.
- *Total impact* is the sum of *direct* and *flow-on (or indirect)* impacts.

When calculating direct and total economic value in this report, the forest industry is treated as a vertically integrated industry (one part of the industry supplies goods and services to the next in a chain of supply), in which there are transfers between different parts of the industry at each point in the supply chain. When calculating economic value of a vertically integrated industry, transfers

between forest industry businesses are cancelled out so economic value can be quantified in terms of the interaction between the forest industry and the rest of the economy. Unless otherwise specified, all economic value estimates exclude transfers occurring within the forest industry.

Direct and flow-on (indirect) impacts of the industry are estimated using four key measures of economic impact: value of output, value of industry expenditure, contribution to GRP, and employment.

Value of output

The total *value of output* of an industry is a relatively simple measure: it is the total revenue earned by forest industry businesses from sales of goods and services. This provides useful information about the total economic size of an industry and its output. When reporting value of output, it is important to estimate value at a specific 'end point of sale' – i.e. a particular point in the supply chain. In this report, the 'end point of sale' is the value of the sale of goods from primary processing. Note that this value excludes sales of products and services between industry businesses at earlier points in the forest industry supply chain to avoid double counting.

While this indicator provides a useful estimate of total value of an industry at a particular stage of production – in this case, at the point of sale of primary processed wood and paper products – it does not provide substantial information about how that industry has contributed to the local economy, for two key reasons. First, it doesn't consider the cost of producing the output. For example, an industry with a turnover (output) of two billion dollars and expenditure on goods and services of two billion dollars creates less value-add than one that has a turnover of two billion dollars and expenditure on goods and services of one billion dollars. Secondly, it matters where expenditures occur when considering flow-on impact. For example, an industry might generate two billion dollars of sales in a given region, but rely largely on imported goods and services to produce its output, generating very little local spending or employment as a result. Another industry, meanwhile, might also generate two billion dollars of sales, but do this through a locally-based supply chain, generating substantial jobs and expenditure in the local area as a result. To better understand this, economic modelling can be used to estimate how much additional value of output is generated in other industries in a given region as a result of the expenditure of the forest industry in that region. This can be done by modelling *production-induced* and *consumption-induced* effects, as defined earlier.

Given the importance of expenditure to understand how an industry contributes to an economy, it follows that the amount and location of expenditure should be considered when determining the economic value of an industry to a region.

Industry expenditure

Industry activity can also be measured by examining *value of expenditure*. This indicator measures how much is spent by the industry on goods and services as part of generating the final goods and services sold. When measured at regional level, this indicator provides an idea of the extent to which the industry contributes to the economy locally, as it will show how much the industry has spent within the region versus outside it.

Measures of expenditure differ to value of output, for a range of reasons. In particular, expenditure excludes business profits (which are captured in value of output), expenditure can sometimes be

higher than value of sales over a given period depending on business investment and timing of production; and not all the expenditure used to produce a given amount of output will have occurred in the region in which expenditure is being estimated. For example, a business may generate \$1 million in sales in a given region, but only spend \$200,000 in that region as part of generating those sales, with the business purchasing most goods and services from other regions as part of the production process.

Value of expenditure can be measured in two ways, both of which are presented in this report:

- Gross expenditure – total expenditure by all forest industry businesses, including spending within and outside the industry. This means some expenditure is ‘double counted’ as it involves ‘within industry transfers’. For example, if expenditure by a wood processor purchasing logs from a plantation growing company is included as well as the expenditure incurred by that company in growing the plantations, this results in ‘double counting’: the gross expenditure includes the amount spent by the processor on the logs, and also includes the amount spent by growers to produce those logs. Because of this double counting, gross expenditure does not indicate the extent to which spending by the industry contributes to the broader economy.
- Net expenditure – expenditure by the forest industry excluding transfers within the industry. This measure excludes payments made by businesses in one part of the industry to businesses in another part of the industry. It is a better indicator of the overall economic activity the industry provides to the local economy, as it identifies the net expenditure the industry as a whole contributes to the rest of the economy.

Industry expenditure is a useful indicator and provides more concrete data on the extent to which production of wood and paper products results in local economic activity compared to value of output measures. However, it is still subject to some problems of double counting: if the net expenditure of all industries in a region is added together, it will result in a value that is larger than the total value of production in that economy. This is due to the multiple transactions occurring between different industries in any given economy, some of which are double counted when expenditure of each individual industry is added together. This potential for double counting means it is also important to identify the *net* contribution of the industry to a regional economy, after taking into account the interactions between all sectors of the economy. This is done through identifying industry contribution to Gross Regional Production (GRP), described below.

Industry contribution to Gross Regional Product (GRP)

Gross Regional Product (GRP) is the total value of economic production in a region over a period of time. This can be defined as the sale value of all final goods and services produced in a region over a given period, less the expenditure on goods and services used to produce them (such as fuel, utilities, wood and fibre, accountants, office supplies, etc.). Operating a business requires more than just goods and services as inputs, it also requires capital (such as vehicles, machines and buildings), labour and land. These are known as ‘primary factors of production’ and GRP is the total amount paid to the owners of these primary factors. Workers ‘own’ labour and are paid a wage for it, business owners own land and/or capital and are paid a profit for them. Different types of businesses use different amounts of each primary factor.

GRP includes taxes because it concerns the whole economy, not just the business sector. Even though the business sector pays some profit to governments, that value is just a transfer within the economy of value that each business produced. By the same logic, donations made by businesses are also included in GRP. Annuities paid by growers are payments to the owner of the land used in production. While these are costs to businesses, they are income to owners of land so are included in GRP.

This report describes the direct and total contribution to GRP of the forest industry. The direct contribution to GRP is the GRP created by forest businesses themselves. Total contribution to GRP is the GRP created by forest businesses, plus the proportion of GRP created in the rest of the economy of Victoria due to the flow-on demand created by the forest industry (the production-induced and consumption induced flow-on effects described earlier). GRP is the preferred measure of economic contribution because it avoids the problem of double counting that can arise from using value of output or industry expenditure.

Employment

Subsequent parts of this report describe the employment generated by the forest industry in detail. Employment is defined in this report as the total number of people employed in the industry. It is measured as both direct employment (generated by the forest industry) and flow-on/indirect employment generated in other industries as a result of forest industry activity. Employment in this report is reported based on the total number of people employed, rather than full-time equivalents (FTE). This is done for two reasons: first, because a person whose job is in the industry is likely to rely on that income for their livelihood irrespective of whether the job is part-time or full-time; and second, because data from other sources such as the Australian Bureau of Statistics (ABS) measure jobs in terms of numbers of people, not FTE.

Direct economic value

This section examines the 'direct' value of the industry, meaning the value of the output produced by the industry, expenditure made by the industry, and the subsequent contribution of the industry to GRP. These direct estimates do not take into account the flow-on, or indirect, activity that is generated in other parts of the economy as a result of forest industry activity. This information provides context on the overall economic size of the industry and its activities. The next section then examines the total economic contribution of the industry after taking into account interactions between the forest industry and other parts of the economy.

Direct value of output of the Victorian forest industry

In 2015-16, the direct value of output from the Victorian forest industry at the point of sale of primary processed products was \$1,576 million. This excludes sales of products or services occurring at earlier points in the supply chain prior to primary processing, to avoid double counting. This included \$462 million of sales generated by the native forest industry, \$778 million by activities dependent on softwood plantations, \$187 million dependent on hardwood plantations, and \$149 million dependent on forests outside of Victoria¹. These figures do not include the value of the output generated beyond this point by secondary processing which, as described earlier, generates

¹ For example, head office activity in Melbourne that supports activity in locations outside Victoria, or cross-border consulting, silviculture, harvest or haulage businesses based in Victoria.

additional value and draws on both wood and fibre produced in Victoria, and on wood and fibre products imported from other states or from other countries.

Direct expenditure by the Victorian forest industry

Value of output does not provide a picture of the extent to which an industry contributes directly to the region it is located in. Examining expenditure helps to answer questions such as whether industry expenditure largely occurs locally, or is mostly occurring some distance from the region in which the business is located.

In total, in 2015-16, the forest industry generated \$1,379 million in direct net expenditure (including \$1,132 million within Victoria) as a whole, up to and including primary processing, including \$803 million in the Central Highlands and Gippsland region, \$226 million in the North Central region, and \$185 million in the Western region. A substantial proportion of expenditure in the state as a whole was generated in Melbourne, accounting for much of the \$165 million difference between total expenditure in Victoria and the expenditure in the three regions examined in detail in this report.

To help understand where industry expenditure is generated, Tables 1 and 2 show both gross and net expenditure: while gross expenditure is not a true measure of economic contribution, as it double counts some expenditure that involves transfers within the industry, it helps show the relative size of different parts of the supply chain. Net expenditure is a measure of economic contribution and shows how much expenditure outside of the forest industry is added at different points in the supply chain. Most expenditure is generated at the stage of primary processing of wood and paper products, as shown in Table 1 and 2.

Table 1 Direct expenditure generated by the Victorian forest industry in different regions by growing, harvesting and primary processing, 2015-16, by supply chain stage

Supply chain stage	Central Highlands and Gippsland		North Central		Western		Victoria excluding Green Triangle	
	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)
Establishing & growing native forest & plantations	166	56	61	19	61	18	424	137
Harvest & haulage of logs to processors	206	206	81	81	43	43	335	335
Primary wood & paper processing	723	542	186	126	315	124	1375	907
TOTAL	1095	804	328	226	419	185	2134	1379

This table shows both 'gross' expenditure, and expenditure net of transfers within the industry. The net figure ensures there is no double counting by ensuring that payments made from one part of the industry to another (and then expended in that other part of the industry) are not included. The transfers excluded from net figures include payments made to harvest, haulage, roading, earthworks and silvicultural contractors by plantation managers, and payments made to plantation managers or to other processors for fibre inputs used by wood and paper processors.

Table 2 Direct expenditure generated by different parts of the Victorian forest industry by growing, harvesting and primary processing, 2015-16, by supply chain stage

Supply chain stage	Native forest dependent industry		Softwood plantation industry		Hardwood plantation industry		Forests outside of Victoria	
	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)	Gross expenditure in 2015-16 (\$m)	Net expenditure exc. transfers to other parts of industry (\$m)
Establishing & growing plantations	113	34	230	68	50	18	31	17
Harvest & haulage of logs to processors	91	91	198	198	40	40	6	6
Primary wood and paper processing	474	292	555	400	189	117	157	97
TOTAL	678	417	983	666	279	175	194	120
This table shows both 'gross' expenditure, and expenditure net of transfers within the industry. The net figure ensures there is no double counting by ensuring that payments made from one part of the industry to another (and then expended in that other part of the industry) are not included. The transfers excluded from net figures include payments made to harvest, haulage, roading, earthworks and silvicultural contractors by plantation managers, and payments made to plantation managers or to other processors for fibre inputs used by wood and paper processors.								

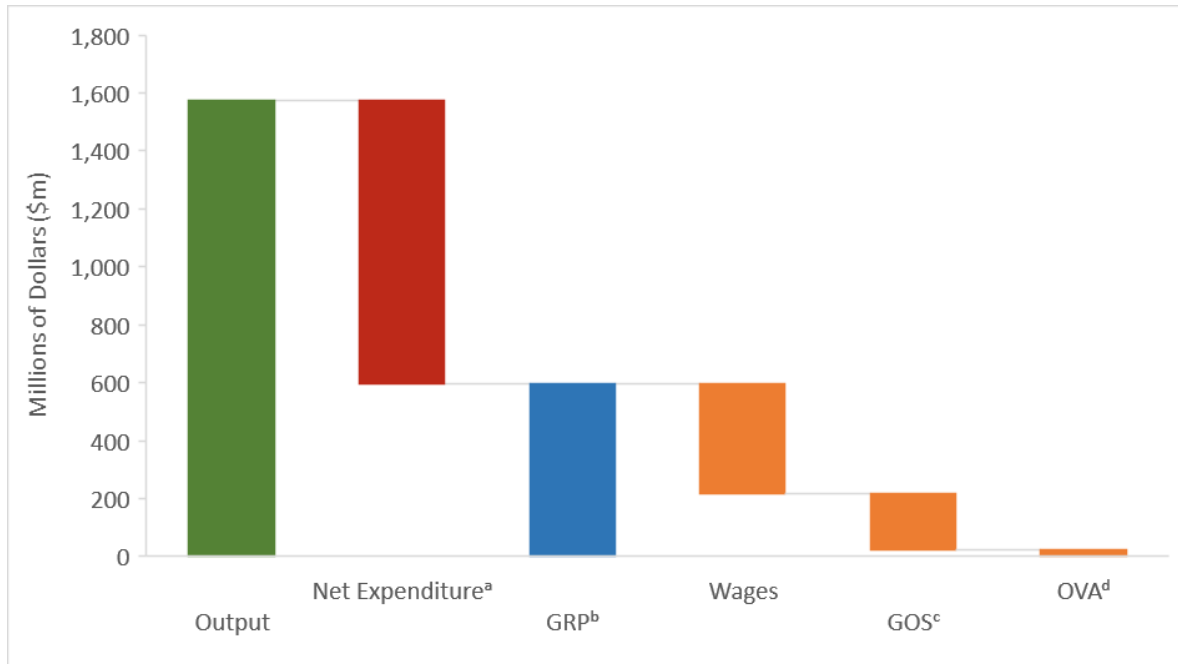
While substantial additional expenditure is generated by the secondary processing sector, it was not possible to estimate the value of this or the extent to which expenditure in the secondary processing sector relies on Victorian-grown wood and fibre, versus wood and fibre imported from other parts of Australia or from other countries.

The types of expenditure generated by different industries vary. Of the direct expenditure by the forest industry, the largest single item is wages and salaries, as shown in Appendix 1, with around \$1 in every \$3.60 of expenditure on wages and salaries (the industry spends a total of \$379 million on wages and salaries of workers in Victoria). Comparing the sectors, the native forest and softwood plantation sectors spend relatively more on wages and salaries (\$1 in every \$3.30 and \$3.90 of expenditure, respectively) than the hardwood plantation sector (\$1 in every \$5.10). The softwood sector spends the most on wages directly (around \$170 million) followed by the native forest (\$127 million) and hardwood (\$35 million) sectors. Wages make up a high proportion of expenditure for business activities dependent on forests outside of Victoria, around \$1 in every \$2.50 spent.

Contribution of the forest industry to Gross Regional Production

Measures of the forest industry's contribution to GRP can be thought of as the value-added by the industry to the economy, or the value left once non-wage expenditure is subtracted from revenue. This means GRP represents the value contributed to the economy in the form of returns to business/resource owners (in the form of profits), workers (in the form of wages and salaries), and taxes to governments. In 2015-16, the direct contribution to GRP from the growing, harvesting and primary processing of wood and paper products in Victoria was \$598 million. This included \$179 million generated by the native forest industry, \$291 million by activities dependent on

softwood plantations, \$48 million dependent on hardwood plantations, and \$80 million dependent on forests outside of Victoria. These figures do not include the GRP generated beyond this point by secondary processing. Figure 4 shows the derivation of direct contribution to GRP by the forest industry in Victoria. The figure shows that GRP (blue) is what remains once non-wage net expenditure (red) is subtracted from value of output (green). The orange bars show that most of the direct contribution to GRP was wages, followed by gross operating surplus (GOS, before-tax business profit) and a small amount of Other Value Added (OVA, in this case annuities and donations).



a - Net expenditure is as defined in Table 1 except that wages are excluded because they are a component of GRP.

b - Gross Regional Product (GRP).

c - Gross Operating Surplus (GOS) is before-tax business profit.

d - Other Value-Added is other kinds of income not already counted. In this case it is annuities paid by growers and donations made by businesses anywhere along the forest industry supply chain up to and including primary processing.

Figure 4 Calculation and decomposition of direct contribution to GRP, Victoria – all parts of the industry

Total economic value including both direct and flow-on effects

The direct expenditure of any industry generates further flow-on effects: expenditure by one industry generates economic activity in other parts of the economy, and therefore generates further jobs and economic activity beyond that occurring directly within the first industry. This flow-on activity can be *production-induced*, meaning it is generated as a result of the purchase of goods and services by the industry (e.g. purchasing fuel, mechanical services, accounting or financial services, to name a few), or *consumption-induced*, meaning it is generated as a result of workers in the industry and service industries spending their wages/salaries. 'Total' economic value refers to the total value an industry contributes to the economy when both direct and flow-on effects are included.

When these flow-on effects are taken into account (see Table 3 and Appendix 1 for detailed data) and examined by region:

- The total value of output contributed by the industry in 2015-16 was \$4,844 million in Victoria for the industry as a whole, including \$1,836 million in the Central Highlands and Gippsland, \$514 million in the North Central region and \$463 million in the Western region, with much of the remainder generated in Melbourne
- The total contribution to the value of GRP was \$2,144 million in Victoria for the industry as a whole, including \$741 million in the Central Highlands and Gippsland, \$231 million in the North Central region and \$204 million in the Western region
- The total contribution to the household income component of GRP was \$1,256 million in Victoria for the industry as a whole, including \$472 million in the Central Highlands and Gippsland, \$135 million in the North Central region and \$117 million in the Western region, with much of the remainder generated in Melbourne.

Table 3 Economic impacts of the Victorian forest industry, by region – all parts of the industry

	Central Highlands & Gippsland	North Central	Western	Victoria (excluding south west) ^a
Output^b (\$m)	1,836.1	513.5	463.0	4,843.6
Direct (\$m)	880.2	270.6	221.6	1,576.1
Production-induced (\$m)	579.0	139.4	129.3	1,496.0
Consumption-induced (\$m)	376.8	103.5	112.2	1,771.6
GRP (\$m)	740.5	231.1	203.6	2,143.7
Direct (\$m)	290.9	115.1	90.4	597.5
Production-induced (\$m)	242.1	58.5	53.2	629.4
Consumption-induced (\$m)	207.4	57.6	60.0	916.8
Household Income (\$m)	471.9	135.3	117.2	1,256.2
Direct (\$m)	206.0	67.3	50.5	378.8
Production-induced (\$m)	161.4	39.3	35.3	387.2
Consumption-induced (\$m)	104.6	28.6	31.4	490.2
Employment (total)	6,618	2,052	1,604	15,696
Direct (total to point of sale of primary processed products)	2,830	1,002	650	5,115
Production-induced (total)	2,079	554	454	4,191
Consumption-induced (total)	1,710	496	499	6,389

a - Direct and indirect impacts in Victoria are each greater than the sum of the three reported regions as some direct impacts occur outside of the three regions (primarily in Melbourne) and indirect impacts are smaller for the regions due to a higher proportion of imports from outside of these smaller regions by industries within them.

b - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

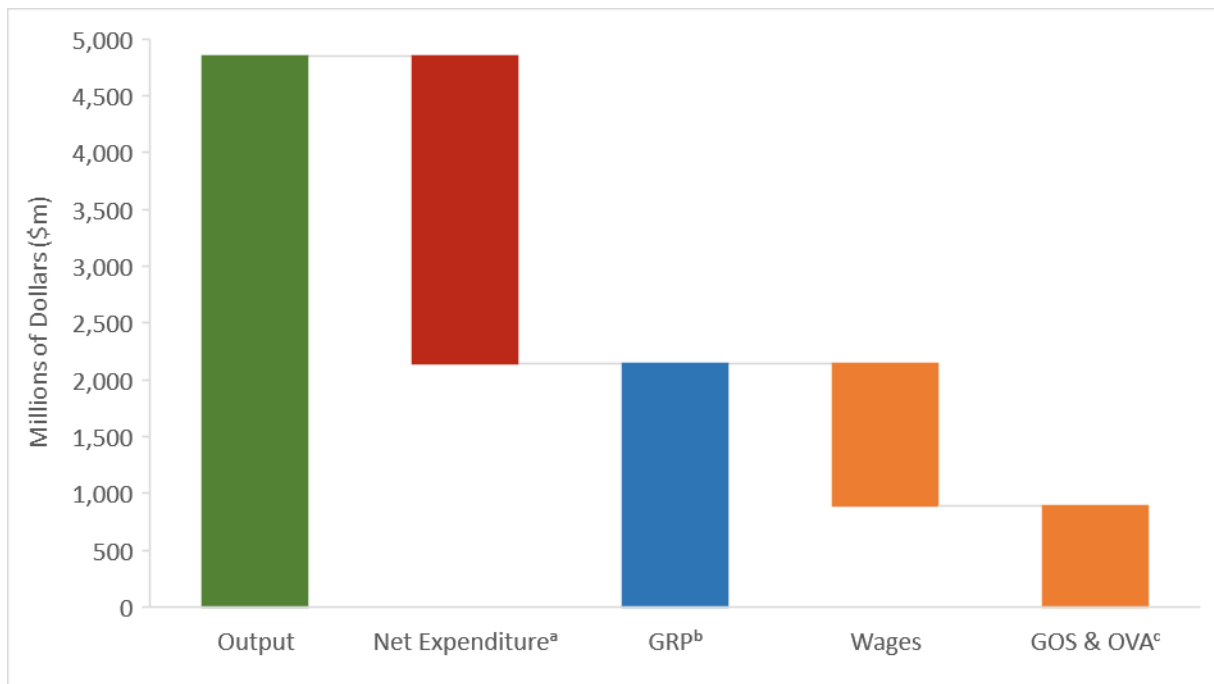
When examined by sector of the industry up to and including the point of primary processing (see also Appendix 1):

- The total value of output contributed by the industry in 2015-16 was \$4,844 million in Victoria for the industry as a whole, including \$1,444 million dependent on native forests,

\$2,358 million dependent on softwood plantations, \$609 million dependent on hardwood plantations, and \$432 million dependent on forests outside of Victoria.

- The total contribution to the value of GRP was \$2,144 million in Victoria for the industry as a whole, including \$644 million dependent on native forests, \$1,037 million dependent on softwood plantations, \$245 million dependent on hardwood plantations, and \$217 million dependent on forests outside of Victoria.
- The total contribution to the household income component of GRP was \$1,256 million in Victoria for the industry as a whole, including \$388 million dependent on native forests, \$596 million dependent on softwood plantations, \$148 million dependent on hardwood plantations, and \$125 million dependent on forests outside of Victoria.

Figure 5 shows the derivation of total contribution to GRP by the forest industry in Victoria, including flow-on effects. The figure shows that GRP (blue) is what remains once non-wage net expenditure (red) is subtracted from value of output (green) for all activity that occurred at Victorian businesses as a result of forest industry activity. The orange bars show that most of the direct contribution to GRP was wages, the rest was gross operating surplus (GOS, before-tax business profit) and Other Value Added (OVA, such as lease costs, annuities and donations). The contribution of the industry to the economy of Victoria is larger than the sum of the Central Highlands and Gippsland, North Central and Western regions as some of the direct and indirect expenditure by the industry occurs outside of these regions.



a - Net expenditure is as defined in Table 1 except that wages are excluded because they are a component of GRP.

b - Gross Regional Product (GRP).

c - Gross Operating Surplus (GOS) is before-tax business profit and Other Value-Added is other kinds of GRP not already counted. Since this chart includes flow-on effects, OVA includes a broader range of items such as donations, lease costs, annuities, etc.

Figure 5 Calculation and decomposition of total contribution to GRP, Victoria – all parts of the industry

Employment

This chapter examines the employment generated in the forest industry in Victoria (excluding the Green Triangle). This section provides a brief summary of key findings. This is followed by more detailed examination of the direct employment generated in the industry, with direct employment first defined, followed by analysis of the number of jobs generated directly in different regions, different local government areas, and different sectors of the industry. This is followed by examination of the flow-on jobs generated in other industries as a result of the activity generated by the forest industry.

The forest industry in Victoria (excluding the Green Triangle) generated a total of 5,115 direct jobs up to the point of primary processing as of mid-2017. A further estimated 9,360 further direct jobs were generated by secondary processing activities that use wood and fibre products both from the Victoria forest industry and imported from interstate or overseas (as of August 2016, based on data from the ABS Census)². This means a total of 14,475 direct jobs were generated in the Victorian forest industry as of 2017. The estimated flow-on employment generated by activities up to and including primary processing was an additional 10,581 jobs, which were generated in other industries as a result of demand generated from the forest industry. Secondary processing activities will also generate flow-on impacts in other industries, but the extent of these could not be estimated for this report.

Of the 5,115 jobs generated up to the point of primary processing in 2017, 1,639 direct jobs were generated by the native forest industry, 2,437 by softwood plantations, and 457 by hardwood plantations grown in Victoria. A further 581 Victorians were employed in jobs that depended on native forest or plantations grown outside Victoria (for example, harvest contractors who live in Victoria, but work harvesting plantations or native forest in New South Wales or South Australia). In the secondary processing sector, it was not possible to identify how many jobs were dependent on different types of native forest and plantation grown in Victoria or on timber imported from other regions.

The number of jobs varied by region. Of the 14,475 direct jobs generated up to and including secondary processing, 3,646 were generated in the Central Highlands and Gippsland, 1,435 in the North Central region, 1,677 in the Western region, and 7,717 in Melbourne. In Melbourne, the large majority of direct jobs (7,084) were in secondary processing.

Direct employment

This section examines the employment generated directly in the Victorian forest industry, including detailed examination of where jobs are located and some analysis of change over time.

Defining 'direct' employment

In this chapter, the industry's direct employment is defined as including:

- Primary production: Forest and plantation managers, harvest and haulage contractors, nurseries growing seedlings for commercial plantations, and silvicultural contractors.

² See Appendix 2 for a detailed description of how secondary processing was defined and estimated using data from the Australian Bureau of Statistics *Census of Population and Housing*.

Employment estimates are based on the direct survey of the industry undertaken for this project, unless otherwise stated.

- **Primary processing:** All types of manufacturing in which roundwood (logs) are processed into initial wood and fibre products. All manufacturing on a site is included, even if initial wood products are further processed into more complex products in a multiple-stage process. Employment estimates are based on the direct survey of the industry undertaken for this project, unless otherwise stated.
- **Secondary processing:** Further manufacturing of initial wood products into further products, for example processing of sawn timber into trusses and frames, or construction of wooden cabinetry such as kitchen cabinets. Employment estimates are based on data from the ABS Census, as businesses in this part of the industry were not directly surveyed.

In addition to these three core parts of the industry, when comparing employment over time using ABS Census data, employment in timber and paper wholesaling is included in the total estimates (this is noted in the relevant tables).

Some employment generated by the forest industry is not included in the estimates. In particular, employment in wooden furniture manufacturing is not included in figures presented in this chapter. This is because the ABS Census does not produce statistics for wooden furniture manufacturing as a separate category, instead combining it with upholstered seat manufacturing jobs (which often involve no use of timber).

Data on employment are presented based on a worker's place of residence (where they usually live), rather than based on their office location (where they work). This is done for two reasons. First, some forest industry workers have multiple work locations, rather than working from a single office: for example, harvest and haulage contractors will work in multiple locations in a given year. This means it is often easier to identify these types of workers based on their place of residence rather than the location of their work. Second, the wages and salaries earned by workers are typically predominantly spent in the communities they live in, rather than near their place of work. While many workers live and work in the same community, there are some who do not, and in these cases using their place of residence enables better estimation of the true economic impact of the industry, as it enables estimation of spending of wages and salaries by workers in the local government areas (LGAs) they live in.

Direct employment generated by the industry in 2017

As shown in Tables 4 and 5, up to the point of sale of primary processed products, the forest industry generated 5,115 direct jobs located in Victoria (excluding the Green Triangle) in the first half of 2017, and a total of 14,475 jobs when secondary processing jobs were included. 'Direct' jobs include jobs that depend on the presence of the industry, in nurseries, silvicultural contracting, harvest and haulage of logs to processors (primary production), in primary processing of logs and residues into wood and paper products, and further (secondary) processing of these products into a wider range of wood and paper-derived products. Direct jobs do not include jobs generated in mechanical services, fuel supply, or supply of other goods and services to the industry, which are included in flow-on employment. The majority of jobs – two thirds – are generated by the primary and secondary processing of wood and paper products, while just over 30% are generated by the

growing and harvest of native forest and plantations. This highlights the importance of having local processing facilities for generating regional jobs from the industry.

When direct jobs up to the point of primary processing are compared, the majority of the direct jobs in the industry in Victoria (47.7%) are generated by softwood plantations, followed by native forests (32.0%) and hardwood plantations (8.9%), with the remaining 11.4% dependent on native forests and plantations grown in other regions (particularly parts of the Green Triangle, and of southern NSW). In the neighbouring Green Triangle region, all employment is generated by growing of softwood and hardwood plantations.

There is regional variation as well, with 55.3% of all jobs generated up to and including primary processing being based in the Central Highlands and Gippsland, 19.6% in the North Central region, 12.7% in the Western region, and 12.4% in Melbourne. When secondary processing is included, this changes substantially, with 53.3% of all jobs including secondary processing located in Melbourne due to the large concentration of secondary processing in the city's suburbs, 25.2% in the Central Highlands and Gippsland, 11.6% in the Western region, and 9.9% in the North Central region.

Table 4 Direct employment generated by the forest industry in Victoria (excluding the Green Triangle), 2017, by sector (Data source: 2017 industry survey, unless otherwise noted)

Industry sector	Jobs located in Victoria (excluding Green Triangle) that depend on...				Total direct forest industry jobs located in Victoria	% forest industry jobs based in Victoria dependent on forest & plantation grown in Victoria (excluding Green Triangle)	Additional jobs generated <i>outside</i> Victoria that depend on plantations or native forest grown in Victoria
	NATIVE FOREST grown in the region	SOFTWOOD PLANTATION grown in the region	HARDWOOD PLANTATION grown in the region	Native forest or plantations grown OUTSIDE VICTORIA			
Growers (forest management companies)	131	84	21	36	272	87%	A small number
Nurseries, silvicultural & roading contracting businesses	40	362	71	10	483	98%	A small number
Harvest & haulage contracting businesses (including in-field chipping)	426	811	162	23	1422	98%	25
Primary wood and paper processing ¹	1034	1163	193	495	2885	83%	89
Other (including consultants, equipment sales, training)	8	17	10	17	52	67%	A small number
Total – excluding secondary processing	1639	2437	457	581	5115	89%	135
Secondary wood and paper processing (2011 ABS data)	Unknown	Unknown	Unknown	Unknown	9360	Unknown	Unknown
Total – including secondary processing	Unknown	Unknown	Unknown	Unknown	14475	Unknown	Unknown

¹The jobs generated in these sectors includes people involved in wholesaling of products produced by these processors.

Table 5 Direct employment generated by the forest industry in Victoria (excluding the Green Triangle), 2017, by region (Data source: 2017 industry survey, unless otherwise noted)

Industry sector	TOTAL direct employment, 2017				
	Central Highlands and Gippsland	North Central	Western	Melbourne	Victoria (excluding south-west region)
Growers (forest management companies)	99	24	32	117	272
Nurseries, silvicultural & roading contracting businesses	261	102	58	62	483
Harvest & haulage contracting businesses	893	327	177	25	1422
Primary wood and paper processing ¹	1564	543	381	397	2886
Other (including consultants, equipment sales, training)	13	5	2	32	52
Total – excluding secondary processing	2830	1002	650	633	5115
Secondary wood and paper processing (2016 ABS data)	816	433	1027	7084	9360
TOTAL	3646	1435	1677	7717	14475

¹The jobs generated in these sectors includes people involved in wholesaling of products produced by these processors.

Direct employment by local government area

Many of the jobs generated by the Victorian forest industry are located in just a few local government areas (LGAs). To understand how dependent an LGA is on the industry, it helps to examine both the total number of jobs generated, and also the overall proportion of jobs that depend on the industry. This provides an understanding of the extent to which a local area depends on the industry for employment of its workforce. To do this, we identified the proportion of the *employed workforce* in each LGA that was employed directly in the forest industry (Table 6).

The largest number of direct jobs up to and including primary processing were generated in Latrobe, due not only to the presence of Australian Paper's large processing facility, but also jobs in harvest and haulage contracting and forest/plantation management: 1,305 jobs in Latrobe were generated in the industry up to the point of primary processing, as well as a further 79 jobs in secondary processing. In total, 4.7% of the labour force of Latrobe was directly employed in the industry; this does not take into account flow-on jobs generated in other industries as a result of demand generated by the forest industry. The only other LGAs with more than four per cent of the workforce employed in forestry were:

- Colac-Otway, with 4.5% of the relatively small workforce of this LGA employed in the forest industry, predominantly in jobs dependent on softwood plantations
- Alpine, with 6.8% of workers employed in the industry, dependent predominantly on softwood plantations
- Benalla, with 4.7% of workers employed, again dependent largely on softwood plantations.

Two to three per cent of the workforce were employed directly in the industry in four LGAs, in all cases largely dependent on native forest employment: the Shire of Wellington (3.2% of the workforce, 567 workers), East Gippsland (2.1% of the workforce, 363 workers), Wangaratta (2.1% of the workforce, 264 workers) and Murrundindi (2.0% of the workforce, 119 workers). In other LGAs less than 2% of workers were employed in the forest industry.

Table 6 Direct employment generated by the Victorian forest industry, 2017, by local government area

Region	Local government area name (2017)	Growing, harvest, haulage, primary processing (2017 industry survey)	Secondary processing (2016 ABS Census)	Total forest industry jobs, 2017 (including secondary processing)	Size of employed labour force, all industries, 2016 ³	% employed labour force working in forest industry ³	Employment by industry sector (excludes secondary processing jobs; data from 2017 industry survey)			
							Native forest	Softwood plantation	Hardwood plantation	Non-Victorian forest/ plantation
Central Highlands & Gippsland	Bass Coast	0	19	19	12542	0.2%				
	Baw Baw	273	64	337	21260	1.6%				
	East Gippsland	330	33	363	17002	2.1%				
	Latrobe	1305	79	1384	29492	4.7%				
	Mansfield	16	3	19	3782	0.5%				
	Mitchell	1	150	151	18409	0.8%				
	Murrindindi	110	9	119	5954	2.0%				
	South Gippsland	48	33	81	12186	0.7%				
	Wellington	543	24	567	17946	3.2%				
	Yarra Ranges	197	402	599	74415	0.8%				
	TOTAL (inc. other LGAs)	2830	816	3646	313049	1.2%	1335	1177	301	18
North Central	Alpine	372	3	375	5491	6.8%				
	Benalla	253	14	267	5659	4.7%				
	Gr. Shepparton & Campaspe	24	84	108	42921	0.3%				
	Indigo	29	14	43	7488	0.6%				
	Wangaratta	143	121	264	12621	2.1%				
	Wodonga	61	139	200	18197	1.1%				
	Other LGAs ¹	120	58	178	56948	0.3%				
		TOTAL	1002	433	1435	149325	1.0%	57	891	26
Western	Colac-Otway	405	22	427	9544	4.5%				
	Other LGAs ²	245	1005	1250	296316	0.4%				
		TOTAL	650	1027	1677	305864	0.5%	67	199	84
Melbourne	TOTAL	633	7084	7717	1907920	0.4%	180	171	46	236
TOTAL VIC	Exc. south-west	5115	9360	14475	2676158	0.5%	1639	2437	457	581

¹ Gannawarra, Moira, Strathbogie, Swan Hill, Towong, Yarriambiack. ²Ararat, Ballarat, Central Goldfields, Corangamite, Golden Plains, Greater Bendigo, Greater Geelong, Hepburn, Macedon Ranges, Mildura, Moorabool, Mount Alexander, Queenscliffe, Surf Coast, Northern Grampians, Pyrenees.

Direct employment dependent on native forests, by Regional Forest Agreement region

Most of the 1,639 jobs up to the point of primary processing that depend on native forests rely on timber harvested from one of Victoria's five Regional Forest Agreement (RFA) regions: the Western, North East, Central Highlands, Gippsland and East Gippsland regions (Figure 6)³. This section identifies the number of native forest-dependent jobs up to and including primary processing that relied on timber harvested in each of these RFA regions as of 2016-17⁴. This section examines only jobs dependent on native forests, and only jobs up to the point of primary processing. Harvest of native forests also generates further jobs in the secondary processing sector, however it was not possible in this study to estimate the number of jobs generated in secondary processing that depend on native forests.

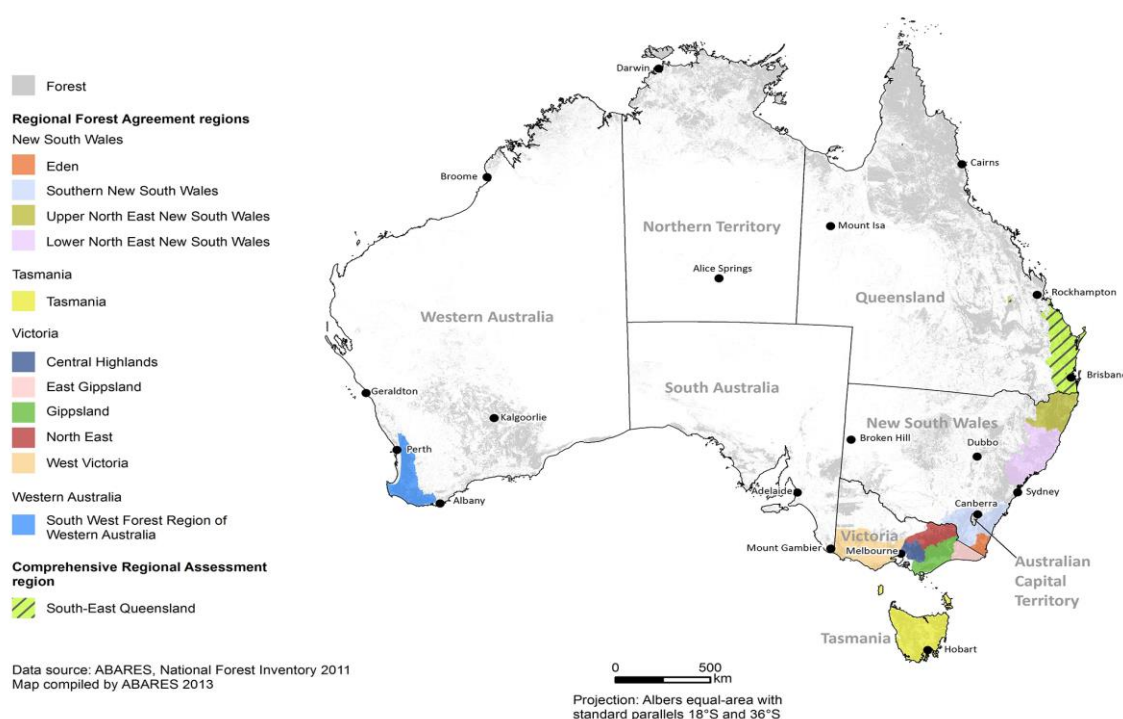


Figure 6 Australia's Regional Forest Agreement regions (source: Department of Agriculture and Water Resources, n.d.)

Estimates of the number of jobs up to and including primary processing generated by timber harvest in different RFA regions were produced by tracing the flow of timber from native forest in each RFA region to the mills that utilise this timber, based on information available in the public domain as well as information provided in surveys of the industry conducted for this study. Employment estimates are provided as a range rather than an exact estimate. This is for two reasons. The first is that there is some variation in the volume and type of logs harvested from each RFA region each year: this means that the employment generated by logs harvested in each region also varies year to

³ For more information about Regional Forest Agreements, see <http://www.agriculture.gov.au/forestry/policies/rfa/>.

⁴ Data for 2015-16 and 2017-18 (up to February 2018) were also drawn on to identify the extent to which the volume and type of logs produced from each RFA regions typically varies year to year. This enabled identification of the typical year-to-year variation in employment generated from each RFA region during 2016 to early 2018.

year. The range given encompasses the variation occurring during 2016 to February 2018. The second is that it is complex to estimate which jobs rely on timber from different RFA regions, as some mills receive logs from more than one RFA region and the volume received from different regions varies year to year; and mills in some cases store logs for a period of time before they are processed (meaning that logs processed in one year may have been delivered to the mill in a previous period in which harvesting of logs occurred in a different RFA region). This means that it is not possible to provide a specific estimate that can be considered reliable to more than $\pm 5\%$. The range presented in Table 7 therefore reflects the uncertainty of estimation due to variability in the volume of logs sourced from different RFA regions each year and in their market destinations. To further reflect uncertainty in estimates, all estimates have been rounded to the nearest 10 jobs, increasing the range reported slightly.

Table 7 shows that the largest numbers of jobs – between 1,060 and 1,170 – rely on native forests located in the Central Highlands RFA region. This figure will vary within this range year to year due to changing volumes of harvest from different RFA regions, and where logs from each RFA region are delivered. It is important to note that many of these jobs are not located within this RFA region, with logs harvested in this region transported to mills located outside the region as well as to mills within the region. The job estimates in Table 7 include all jobs reliant on the timber harvested in this region, irrespective of whether the mill in question is located within the Central Highlands region.

Table 7 Estimated number of jobs dependent on native forest in different Regional Forest Agreement regions

	Central Highlands RFA region	Gippsland RFA region	East Gippsland RFA region	North East RFA region	Western RFA region
Primary production and primary processing	1060 to 1170 jobs	190 to 210 jobs	230 to 260 jobs	70-80 jobs	30 to 40 jobs
Firewood collection	Not estimated	Not estimated	Not estimated	Not estimated	Not estimated
Secondary processing	Not estimated	Not estimated	Not estimated	Not estimated	Not estimated

The next highest number of jobs is generated in the East Gippsland RFA region, with 230 to 260 jobs dependent on harvest of forests located in this region. This is followed by the Gippsland RFA region (190 to 210 jobs), North East RFA region (70 to 80 jobs) and Western RFA region (30 to 40 jobs).

The native forests in these regions also generate some jobs from harvesting of firewood: the number of these jobs was not estimated for this report.

The number of jobs generated from native forests in different RFA regions varies depending not only on the volume of logs harvested in different regions, but also depends on the type of logs harvested, and how they are subsequently processed. In general, fewer jobs are generated from pulplogs compared to sawlogs, meaning that in regions where the proportion of pulplog to sawlog is higher, there are relatively fewer jobs generated. For example, a higher proportion of the logs harvested from the mixed species eucalypt forests of the East Gippsland region are pulplogs, whereas in the Central Highlands a smaller proportion of harvested logs are pulplogs. This has important effects on the number of jobs generated from logs harvested in these two regions: with more of the logs from the East Gippsland region used for woodchip production, which generates substantially fewer jobs

compared to sawmilling, the number of jobs generated per volume of logs harvested is also lower for this region compared to the Central Highlands. Pulplogs processed for paper production also generated a larger amount of jobs compared to those processed for woodchip export, further contributing to some of the differences in jobs generated from each RFA region, with the pulplogs from some regions more commonly being processed for woodchip exports, while those from other RFA regions are predominantly used for domestic paper production (generating more jobs for the same volume of timber compared to woodchip export).

Flow-on employment

When flow-on impacts are included, a total of 15,696 direct and indirect jobs were generated in the Victorian forest industry up to and including primary processing in the first half of 2017. This includes jobs generated in the forest industry (direct jobs), and jobs generated in other industries as a result of (i) the demand created by the forest industry for supplies and inputs such as fuel and mechanical servicing (production-induced demand), and (ii) spending of salaries and wages by workers (consumption-induced demand). Economic modelling using the EconSearch RISE model identified that for every direct job generated by the industry in Victoria up to the point of primary processing, a total of 3.1 jobs were created in the region through a combination of production-induced and consumption-induced effects. EconSearch modelling suggests that this multiplier is similar to that of the construction services and professional services industries (each around 3.1), greater than the education and training (2.2) and retail industries (2.1), and less than the communication services (4.2) and non-residential construction industries (5.2) sectors.

The employment multipliers varied depending on the sector, with a total of 2.9 jobs created for every direct job in native forests, 3.1 for softwood plantations and 4.0 for hardwood plantations (see Table 8). The lower multiplier for native forests is primarily because the supply chain for this sector is more labour intensive than that for softwood and hardwood plantations. That is, the employment multiplier for native forests is low because the direct jobs are high relative to total expenditure in the sector, not because the indirect jobs are low. For each \$1 million expended by the native forest sector, around 3.9 workers are employed directly, compared to around 3.7 for the softwood and 2.6 for the hardwood sector. When examined by region, a total of 2.3 jobs are generated in the Central Highlands and Gippsland for every direct job in the region, a total of 2.0 in the North Central region, and 2.5 in the Western region (see Table 9). Each regional employment multiplier is smaller than the Victorian multiplier as some indirect expenditure occurs outside of the smaller regions but stays within Victoria. For example, a proportion of wages earned in each region is spent on consumption goods manufactured in Melbourne; this causes economic activity within Victoria that is captured in the Victorian multiplier, but not in the regional multipliers.

Table 8 Employment multipliers: indirect employment generated by the Victorian forest industry, by sector

Type of multiplier	Description	Native forest		Softwood plantation		Hardwood plantation		Victoria exc. south-west (all)	
		Multi-plier	Total jobs	Multi-plier	Total jobs	Multi-plier	Total jobs	Multi-plier	Total jobs
None	Direct jobs only	1.0	1,639	1.0	2,437	1.0	457	1.0	5,115
Type I	Direct jobs + production-induced jobs	1.7	2,819	1.9	4,547	2.3	1,058	1.8	9,305

Type II	Direct jobs + production- induced jobs + consumption- induced jobs	2.9 4,792	3.1 7,577	4.0 1,808	3.1 6
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Table 9 Employment multipliers: indirect employment generated by the Victorian forest industry, by region

Type of multiplier	Description	Central Highlands & Gippsland		North Central		Western		Victoria exc. south-west (all)	
		Multi-plier	Total jobs	Multi-plier	Total jobs	Multi-plier	Total jobs	Multi-plier	Total jobs
None	Direct jobs only	1.0	2,830	1.0	1,002	1.0	650	1.0	5,115
Type I	Direct jobs + production-induced jobs	1.7	4,909	1.6	1,556	1.7	1,104	1.8	9,305
Type II	Direct jobs + production-induced jobs + consumption-induced jobs	2.3	6,618	2.0	2,052	2.5	1,604	3.1	15,696

The flow-on effects vary in size in different parts of the industry (see Appendix 1), with the largest flow-on effects generated by the processing of wood and paper products, and silviculture and harvest and haulage activities having smaller flow-on effects to the rest of the economy.

Comparing direct employment estimates

There are relatively few sources of information available on employment in the forest industry. Other than specific surveys of businesses operating in the industry, the only regularly collected data on employment comes from two types of data produced by the Australian Bureau of Statistics (ABS): the *Census of Population and Housing* (Census), and the *Labour Force Survey* (LFS). In both cases, people who are employed are asked to describe the type of work they do. This information is then coded to identify each person's industry of employment, using the Australian and New Zealand Standard Industrial Classification (ANZSIC) (ABS/SNZ 2013).

The Census is conducted once every five years, and is a complete Census of the population, meaning it captures all Australians except the small proportion (<5%) who do not participate in this compulsory survey. Data produced from the Census has the highest reliability of any dataset on employment, because it is based on the largest possible sample of people. However, it is only available every five years (data from the 2016 Census on industry of employment were released in November 2017). The LFS is based on data collected monthly from a sample of 26,000 Australian households representing around 0.32% of Australia's population (ABS 2017). In terms of the forest industry, this means that if the industry employed around 50,000 people nationally, the survey would include only a relatively small number of people from the industry (around 160). This means that estimates of employment in the forest industry generated from the LFS have high rates of sampling error, as a change of 5-10 people in the number sampled in the survey will be extrapolated to be a large change in total industry employment. Past reviews of the robustness of LFS survey for estimating employment in the forest, wood and paper industries have identified that the sampling error is too large to enable accurate estimation of trends in industry employment, or of total employment levels (Schirmer et al. 2013). This means that the only robust source of data other than direct surveys of the industry is the Census.

Both the Census and the LFS classify employment into several 'industry classifications' that form part of the forest industry, specifically in the industry categories of Forestry, Logging, Services to Forestry, Wood Product Manufacturing and Paper Product Manufacturing. Wood Product Manufacturing, and Paper Product Manufacturing, are further disaggregated into multiple types of wood and paper product manufacturing. However, some jobs directly dependent on the forest industry are classified into other industries. In particular, many log haulage workers are classified as being part of the transport industry. This means that Census data typically underestimate the total number of people employed in the industry, particularly in regions where there is substantial employment in harvest and haulage of logs. Additionally, Census data do not identify whether workers are based in jobs that depend on plantation or native forest. ABS data do, however, capture employment in secondary processing, something difficult to do in direct surveys of the industry.

Table 10 compares estimates of employment generated up to the point of primary processing by our survey (data collected in the first half of 2017), and in the 2016 Census (data collected in August 2016). The ABS uses a process called data randomisation to protect privacy, which means that in any local government area or industry group, total numbers of workers will be randomly changed by a small amount to protect privacy. This, combined with the likelihood that employment in many businesses changed between the time of the Census (August 2016) and when industry survey data were collected (first half of 2017), means that very small differences (of, for example, less than 10-15 workers) are unlikely to represent meaningful differences between the two datasets.

Table 10 Comparison of forest industry employment generated up to point of sale of primary processed products: 2016 Census and 2017 Forest Industry Survey

Region	Local government area name	2016 ABS Census			2017 Forest Industry Survey			Difference in estimates	Reasons for differences in estimates
		Forestry, Logging, Services to Forestry	Wood & Paper Product Manufacturing – primary processing	Total forest industry jobs (2016)	Forestry, Logging, Services to Forestry	Wood and Paper Product Manufacturing – primary processing	Total forest industry jobs (2017)		
		2016	2016	2016	2017	2017	2017		
Central Highlands & Gippsland	Bass Coast	19	6	25	0	0	0	-25	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Baw Baw	83	100	183	132	142	273	90	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census. Some jobs in paper manufacturing were not identified in the Census and were in the forest industry survey
	East Gippsland	131	113	244	198	132	330	86	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census
	Latrobe	228	879	1107	443	862	1305	198	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census
	Mansfield	17	9	26	16	0	16	-10	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Mitchell	4	9	13	1	0	1	-12	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Murrindindi	35	27	62	102	8	110	48	Census records some jobs in harvest and haulage as part of the transport industry. Randomisation of Census data & changes in employment 2016 to 2017.
	South Gippsland	20	17	37	27	21	48	11	Randomisation of Census data and small changes in employment between Aug 2016 and 2017.
	Wellington	126	280	406	227	316	543	137	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census. Processing employment also grew in 2017 due to opening of Radial Timber mill in Yarram.
	Yarra Ranges	92	85	177	121	76	197	20	Census records some jobs in harvest and haulage as part of the transport industry. Randomisation of Census data & changes in employment 2016 to 2017.
	TOTAL (inc. other LGAs)	814	1525	2339	1267	1564	2830	491	
North Central	Alpine	61	175	236	187	185	372	136	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census.

Region	Local government area name	2016 ABS Census			2017 Forest Industry Survey			Difference in estimates	Reasons for differences in estimates
		Forestry, Logging, Services to Forestry	Wood & Paper Product Manufacturing – primary processing	Total forest industry jobs (2016)	Forestry, Logging, Services to Forestry	Wood and Paper Product Manufacturing – primary processing	Total forest industry jobs (2017)		
	Benalla	21	143	164	51	197	253	89	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census. Additionally, some wood product manufacturing jobs not captured in Census.
	Greater Shepparton, Campaspe	10	37	47	1	23	24	-23	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Indigo	9	36	45	19	10	29	-16	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Wangaratta	32	106	138	50	93	143	5	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	Wodonga	26	40	66	61	0	61	-5	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census. Some workers employed in NSW wood and paper processing facilities recorded in the Census and not in our survey.
	Other LGAs ¹	70	24	94	68	52	120	26	Randomisation of Census data and small changes in employment between Aug 2016 and 2017
	TOTAL	216	561	777	437	560	1002	225	
Western	Colac-Otway	87	268	355	120	285	405	50	Some jobs in harvest and haulage were recorded as part of the transport industry in the Census. Randomisation of Census data and small changes in employment between Aug 2016 and 2017.
	Other LGAs ²	209	88	297	149	96	245	-52	Randomisation of Census data and small changes in employment between Aug 2016 and 2017.
	TOTAL	297	356	653	269	381	650	-3	
Melbourne	TOTAL	358	406	764	230	403	633	-131	Census records some jobs in harvest and haulage as part of the transport industry. Randomisation of Census data & changes in employment 2016 to 2017.
TOTAL VIC	Exc. Green Triangle	1685	2848	4533	2203	2908	5115	582	

Region	Local government area name	2016 ABS Census			2017 Forest Industry Survey			Difference in estimates	Reasons for differences in estimates
		<i>Forestry, Logging, Services to Forestry</i>	<i>Wood & Paper Product Manufacturing – primary processing</i>	Total forest industry jobs (2016)	<i>Forestry, Logging, Services to Forestry</i>	<i>Wood and Paper Product Manufacturing – primary processing</i>	Total forest industry jobs (2017)		
¹ Gannawarra, Moira, Hepburn, Strathbogie, Swan Hill, Towong, Yarriambiack. ² Ararat, Ballarat, Central Goldfields, Corangamite, Golden Plains, Greater Bendigo, Greater Geelong, Macedon Ranges, Mildura, Moorabool, Mount Alexander, Queenscliffe, Surf Coast, Northern Grampians, Pyrenees.									

The 2016 Census recorded fewer forest industry workers in some parts of Victoria compared to the survey of businesses conducted for this report. This is predominantly because the Census data record a large number of harvest and haulage workers as being employed in the transport industry, rather than recording them as a part of the forest industry. There has been rapid growth in harvest and haulage employment related to harvesting of hardwood plantations in recent years, and while Census data captures some of this growth, it does not capture all of it due to the limitation of log haulage workers being classified as belonging to the transport industry, rather than to an industry category that is specific to the forest industry.

Overall, almost all differences in estimates were a result of three factors:

- (i) classification of some log haulage workers into the transport industry in the Census, who are recorded as part of the forest industry in the survey data, which in some LGAs led to large differences between Census data and Forest Industry Survey data
- (ii) randomisation of Census data, which led to small differences
- (iii) small changes in employment are likely to have occurred between the time of Census data collection (August 2016) and the time at which the Forest Industry Survey data were collected (late 2016 and the first part of 2017). This will also contribute to some of the differences observed.

Once these differences are accounted for, Census and Forest Industry Survey data are reasonably consistent. The only remaining areas of discrepancy were that the survey identified a larger number of jobs in wood processing based in Benalla compared to the Census, and the survey conducted for this project did not capture a small number of forest industry workers based in Wodonga who worked for forest industry businesses based in NSW.

Direct employment over time

There is little information on how employment is changing in the forest industry over time. Few studies have estimated the employment generated by the industry in Victoria as a whole, or in each of the regions examined in this report. Differences in definitions and methods used means the figures published in past studies are not always comparable.

In Victoria, two sources of data are available that enable comparison of employment over time in the forest industry: (i) the ABS Census (described in the previous section in detail) and (ii) surveys of the forest industry up to the point of primary processing undertaken in 2009, 2012 and for this report in 2017 (Forest Industry Survey).

Census data (Table 11) show a 28.4% decline in total employment in the forest industry between 2006 and 2016, including a 5% decline from 2006 to 2011, and a 25% decline between 2011 and 2016. This overall trend masks some differing trends within different industry sectors. Between 2011 and 2016, ABS Census data record growth of 22% in employment in the primary production part of the industry, driven in part by growth in harvest and haulage of hardwood plantations. During the same period, employment in wood and paper product manufacturing declined by 29%. At the regional scale, there were similar trends: between 2006 and 2016, employment in the industry declined by 23.7% in the North Central and Western regions, by 26.9% in the Central Highlands and Gippsland, and by 30.1% in Melbourne. However, the timing of job decline varied: job losses were highest between 2011 and 2016 in the Central Highlands and Gippsland, Western and Melbourne regions, and higher between 2006 and 2011 in the North Central region.

Forest Industry Surveys (FIS) undertaken in Victoria in 2009 and 2012 captured detailed data on employment generated up to the point of primary processing, but did not capture employment in secondary processing (Schirmer et al. 2013). These surveys also included the entirety of Victoria, rather than excluding the part located in the Green Triangle. Table 12 therefore shows trends over time in employment generated up to the point of finished products leaving the primary processing sector, and does not include secondary processing except where this secondary processing occurs on the same site as primary processing. It also shows data for the entire state of Victoria, including the plantation areas in the Victorian part of the Green Triangle. This shows that employment fell by 22% in the industry overall between 2009 to 2012, and by a further 8% between 2012 and 2017. Decline in employment in each period was driven by differing factors:

- Between 2009 and 2012, the largest decline in employment occurred in businesses managing forest and plantations and those providing forestry support services, a result largely of collapse of Managed Investment Schemes and associated cessation of plantation expansion in most parts of Australia, including Victoria; this was accompanied by some decline in processing employment.
- Between 2012 and 2017, changes in employment included:
 - Continued decline in employment by plantation and forest managers, of 12%, associated with change in ownership and management of much of the hardwood plantation estate in particular
 - Growth in employment in forestry support services, driven almost entirely by growth in harvesting and haulage associated with rapidly growing harvest volumes in the hardwood plantation sector

- Decline in primary processing employment of 33% (if jobs shifted into secondary processing are not included), or by 18% after accounting for jobs shifted into the 'secondary processing' part of the industry. This decline was caused by two factors:
 - Some processors who previously undertook both primary processing and secondary processing shifting to secondary processing only. In most cases, these processors had only a small decline in employment, and as such some of the 'decline' in primary processing is in fact a re-classification of jobs from primary to secondary processing, rather than a loss of jobs
 - Decline in employment at several primary processors. This included a small number of mill closures, but more often involved downsizing of the workforce at a mill, with a large proportion of mills reporting slightly lower employment in 2017 compared to 2012.

While the exact magnitude of change varies between the different information sources available, the overall trend is one of substantial decline in employment over time in most parts of the industry, with the exception of expansion in harvesting and haulage associated with harvest of hardwood plantations since 2012.

Table 11 Forest industry employment recorded in the ABS Census of Population and Housing over time

Region	Local government area name (2017)	Jobs in Forestry, Logging, Services to Forestry					Jobs in Wood and Paper Product Manufacturing (primary and secondary processing)					Total forest industry dependent jobs recorded in Census (includes wholesaling)				
		2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹	2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹	2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹
Central Highlands & Gippsland	Bass Coast	10	3	19			35	48	24	37%	-50%	77	97	75	26%	-23%
	Baw Baw	68	55	83	-19%	51%	200	171	166	-15%	-3%	288	263	288	-9%	10%
	East Gippsland	149	145	131	-3%	-10%	232	186	152	-20%	-18%	403	347	260	-14%	-25%
	Latrobe	182	156	228	-14%	46%	1285	1097	965	-15%	-12%	1504	1300	1112	-14%	-14%
	Mansfield	22	14	17	-36%	21%	26	12	13	-54%	8%	53	26	36	-51%	38%
	Mitchell	21	12	4	-43%		172	180	148	5%	-18%	220	207	172	-6%	-17%
	Mornington P'insula	27	41	37	52%	-10%	383	361	235	-6%	-35%	577	571	415	-1%	-27%
	Murrindindi	62	47	35	-24%	-26%	134	45	36	-66%	-20%	215	95	78	-56%	-18%
	Nillumbik	7	14	12		-14%	267	233	131	-13%	-44%	337	305	187	-9%	-39%
	South Gippsland	28	32	20	14%	-38%	64	67	58	5%	-13%	106	116	80	9%	-31%
	Wellington	132	128	126	-3%	-2%	255	272	310	7%	14%	418	406	423	-3%	4%
	Yarra Ranges	85	94	92	11%	-2%	810	703	481	-13%	-32%	1156	1028	787	-11%	-23%
	TOTAL	793	741	814	-7%	10%	3863	3375	2721	-13%	-19%	5354	4761	3912	-11%	-18%
North Central	Alpine	64	80	61	25%	-24%	243	165	179	-32%	8%	307	248	181	-19%	-27%
	Benalla	12	17	21	42%	24%	173	175	152	1%	-13%	185	199	182	8%	-9%
	Campaspe	11	0	3			63	70	35	11%	-50%	90	76	48	-16%	-37%
	Greater Shepparton	0	0	7			174	138	98	-21%	-29%	238	176	140	-26%	-20%
	Indigo	11	8	9			90	81	64	-10%	-21%	104	92	59	-12%	-36%
	Mildura	3	0	4			92	82	68	-11%	-17%	104	103	91	-1%	-12%
	Wangaratta	36	30	32	-17%	7%	220	201	225	-9%	12%	266	237	269	-11%	14%
	Wodonga	18	16	26	-11%	63%	272	195	187	-28%	-4%	301	229	231	-24%	1%
	Other LGAs	39	32	66	-18%	106%	193	163	186	-16%	14%	248	209	290	-16%	39%
	TOTAL	194	183	216	-6%	18%	1520	1270	1123	-16%	-12%	1843	1569	1406	-15%	-10%

Region	Local government area name (2017)	Jobs in Forestry, Logging, Services to Forestry					Jobs in Wood and Paper Product Manufacturing (primary and secondary processing)					Total forest industry dependent jobs recorded in Census (includes wholesaling)				
		2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹	2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹	2006	2011	2016	Change, 2006-2011 ¹	Change, 2011-2016 ¹
Western	Colac-Otway	63	57	87	-10%	53%	280	315	185	13%	-41%	360	384	362	7%	-6%
	Other LGAs	156	131	209	-16%	60%	1761	1768	1140	0%	-36%	2228	2208	1900	-1%	-14%
	TOTAL	219	188	297	-14%	58%	2041	2083	1429	2%	-31%	2588	2592	1974	0%	-24%
Melbourne	TOTAL	216	265	358	23%	35%	12475	11605	7708	-7%	-34%	16802	16331	11747	-3%	-28%
TOTAL VIC	Exc. south-west Vic	1422	1377	1685	-3%	22%	19899	18333	12981	-8%	-29%	26587	25253	19039	-5%	-25%

¹Change has only been calculated where the total number of workers is >10 in both years, as randomisation of small numbers by the ABS means smaller changes may not be meaningful

Table 12 Forest industry employment recorded over time in Victorian Forest Industry Surveys – State of Victoria (includes Victorian part of the Green Triangle)

	Jobs – Estimated number of people employed up to point of primary processing			Change 2009-2012	Change 2012-2017
	2009 ¹	2012 ¹	2017		
Growers	610	385	337	-37%	-12%
Forestry support services (silvicultural contractors, harvest and haulage contractors, consultants)	3032	1973	2320	-35%	18%
Primary processing	5153	4478	2994 (approx. 3650 if including secondary processors who had some primary processing in 2012 and 2009 surveys) ²	-13%	-33% (-18% if employment retained in secondary processing included)
Total (excludes secondary processing)	8795	6836	5651	-22%	-17%
Total (includes retained secondary processing jobs where a primary processor shifted to secondary processing only)	8795	6836	6307	-22%	-8%

¹ Data source: Schirmer et al. (2013). ²The substantial decline in primary processing employment between 2012 and 2017 is partly due to loss of jobs at some mills (due to downsizing or closure of some processing operations). However, not all of the difference is due to this: a number of businesses who previously processed some whole logs but also undertook substantial secondary processing had not closed or downsized, but had ceased processing whole logs, instead buying in primary processed products and further processing them. This meant they

were no longer 'primary processors', despite having in most cases retained most of their employment. If these processors were still countries, the loss of primary processing employment between 2012 and 2017 is 18%, rather than 33%.

Working conditions

Successfully recruiting and maintaining a strong workforce can be challenging for a regionally-based industry, with many rural and regional areas having a relatively small labour force compared to larger urban areas. This section examines whether the forest industry is providing positive working conditions relative to other industries in Victoria. The working conditions in the industry will influence the ability of businesses in the industry to both recruit new workers and to retain their existing workforce. Many factors are important to creating a positive working environment (see for example Mylek and Schirmer 2014, 2015). Two can be examined readily based on data from businesses in the industry, and the ABS Census: working hours, and income.

Note that in the following pages, most data are presented for the whole forest industry in Victoria, and are not typically broken into industry sector or different regions. This is due to limitations of available data, with ABS Census data unable to be separated based on industry sector, and forest industry survey data often not able to be analysed by region as a single business often operated across multiple regions, and answered the survey for all its workers.

Working hours

All businesses surveyed for this study were asked to report on the proportion of their workforce working full-time, part-time and in casual positions as part of the forest industry survey. The majority of jobs were full-time, comprising 70% of workers employed in forest and plantation management businesses (growers); 87% of harvest and haulage contractors; 93% of wood and paper processing workers, and 71% of silvicultural and nursery workers (Table 13). Overall, 88% of industry workers had full-time jobs⁵, 4% worked part-time and 7% were casual workers.

Table 13 Full-time, part-time and casual work in the softwood plantation industry, 2017 – industry survey results

	Full-time	Part-time	Casual
Growers	70%	9%	20%
Harvest and haulage contractors	87%	6%	7%
Processors	93%	2%	5%
Silvicultural contracting and nurseries	71%	19%	10%
Whole industry	88%	4%	7%

Data source: 2017 Industry Survey. Data are reported for all Victoria regions as many businesses operated across more than one region, and there were also few differences by region or by industry sector.

This is consistent with data from the ABS Census, which also shows a predominance of full-time workers in most parts of the industry. Table 14 shows that in 2016, 16% of forest industry workers were employed part-time, compared to 39% of the broader workforce in Victoria.

⁵ This includes a small number of workers who were subcontracted rather than directly employed: subcontractors typically worked full-time hours.

Table 14 Proportion of Victorian workforce employed full-time and part-time, 2006-2016 – ABS Census of Population and Housing (excluding Melbourne)

		Forestry	Logging	Forestry Support Services	Wood product manufacturing	Pulp and paper manufacturing	Forest industry workforce	Employed labour force (all industries)
% full-time - Victoria (exc. Green Triangle & Melbourne)	2006	92%	86%	93%	98%	99%	98%	65%
	2011	96%	98%	97%	98%	97%	92%	59%
	2016	76%	88%	69%	89%	91%	84%	61%
% part-time – Victoria (exc. Green Triangle & Melbourne)	2006	8%	14%	7%	2%	1%	2%	35%
	2011	4%	2%	3%	2%	3%	8%	34%
	2016	24%	12%	31%	11%	9%	16%	39%
% full-time-Central Highlands & Gippsland	2006	78%	84%	63%	87%	89%	85%	65%
	2011	67%	87%	66%	85%	90%	84%	59%
	2016	75%	86%	66%	87%	91%	84%	61%
% full-time-North Central	2006	82%	80%	73%	89%	88%	87%	67%
	2011	77%	91%	74%	90%	89%	87%	61%
	2016	79%	86%	78%	88%	92%	84%	63%
% full-time-Western region	2006	79%	93%	76%	88%	73%	84%	65%
	2011	78%	87%	43%	88%	97%	83%	59%
	2016	78%	93%	68%	90%	84%	84%	61%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who were away from work or did not report their working hours were excluded from the analysis. Data do not include Melbourne as high numbers of employment in secondary processing in Melbourne reduce comparability to industry survey data.

Census data were also analysed to identify whether many workers were working high numbers of hours per week. Working long hours (often defined as more than 49 hours per week) has been shown to contribute to negative health and wellbeing outcomes for many workers. Under-employment – working fewer hours than desired – can also have negative impacts for workers, however it is not possible to identify from Census data whether a worker was satisfied with the number of hours they were working.

Across the entire workforce of Victoria (excluding the Green Triangle, and also excluding Melbourne where the large urban workforce has differing characteristics to the workforce in the rural regions in which most forest industry jobs up to and including primary processing are located), 15% of workers reported working 49 or more hours a week in 2011 (Table 15). In the forest industry, 19% of workers reported working 49 hours or more per week, particularly those working in logging. Forest industry workers were less likely than workers in other industries to be working less than 25 hours a week (13% of forest industry workers in 2016, compared to 29% amongst the broader employed labour force).

Table 15 Working hours by industry sector, 2006-2016 – ABS Census of Population and Housing

Industry sector (ABS classification)	% workers who worked < 25 hours in week prior to Census			% workers who worked > 48 hours in week prior to Census		
	2006	2011	2016	2006	2011	2016
Forestry	11%	19%	20%	25%	21%	26%
Logging	13%	16%	14%	50%	47%	49%
Forestry Support Services	20%	23%	19%	23%	17%	15%
Wood product manufacturing	7%	11%	9%	18%	17%	16%
Pulp and paper manufacturing	8%	11%	9%	20%	16%	17%
Forest industry workforce – Victoria exc. Green Triangle/Melbourne	10%	13%	13%	21%	18%	19%
Employed labour force (all industries) – Victoria exc. Green Triangle/Melbourne	27%	28%	29%	18%	16%	15%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016 TableBuilderPro *Place of Usual Residence* database. Data are reported for all regions together as results were very similar across regions. Workers who were away from work or did not report their working hours were excluded from the analysis. Data do not include Melbourne as high numbers of employment in secondary processing in Melbourne reduce comparability to industry survey data.

Income

ABS Census data shows that forest industry workers in Victoria generally earned higher incomes than the average for the region (Table 16): in 2016, only 16% of forest industry workers earned less than \$649 per week, compared to 31% of all workers working in Victorian forest industry regions other than Melbourne, and 38% earned \$1,250 or more per week, compared to only 30% of the overall employed labour force in the same regions. Much of this difference is due to the higher rates of full-time work in the forest industry, which result in overall higher income per worker on average. To identify whether the wages/salaries paid in the forest industry are higher than average after taking hours of work into account, the proportion of full-time workers earned low and high income was compared (Table 17). While differences were smaller when comparing only full-time workers, there was a difference. Forest industry workers were less likely to earn low levels of income (7% of full-time forestry workers earned less than \$649/week in 2016, compared to 12% of full-time workers across the workforce of the two regions), and similarly likely to earn \$1,250 or more a week (43% of forest industry workers and of the broader employed labour force). Forest industry workers are therefore less likely to earn low incomes than those employed in other industries.

Table 16 Income earned by workers, 2006-2016 – ABS Census of Population and Housing

Industry sector (ABS classification)	% all workers earning <\$600 or <\$649 per week			% all workers earning > \$1299 or \$1250 per week		
	2006 (\$600/ wk)	2011 (\$600/ wk)	2016 (\$649/ wk)	2006 (\$1299/ wk)	2011 (\$1250/ wk)	2016 (\$1250/ wk)
Forestry	33%	29%	22%	15%	21%	41%
Logging	19%	10%	14%	20%	47%	53%
Forestry Support Services	46%	31%	21%	4%	17%	30%
Wood product manufacturing	42%	22%	14%	6%	15%	25%
Pulp and paper manufacturing	16%	9%	5%	42%	58%	72%
Forest industry workforce – Victoria						
Victoria exc. Green Triangle/Melbourne	34%	20%	16%	16%	27%	38%
Employed labour force (all industries) – Victoria exc. Green Triangle/Melbourne	47%	42%	31%	12%	20%	30%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who were away from work or did not report their working hours were excluded from the analysis. Data do not include Melbourne as high numbers of employment in secondary processing in Melbourne reduce comparability to industry survey data.

Table 17 Income earned by full-time workers, 2006-2016 – ABS Census of Population and Housing

Industry sector (ABS classification)	% full-time workers earning <\$600 per week			% full-time workers earning > \$1299 or \$1250 per week		
	2006	2011	2016	2006 (\$1299/w k)	2011 (\$1250/w k)	2016
Forestry	22%	11%	10%	20%	35%	48%
Logging	10%	3%	8%	22%	53%	57%
Forestry Support Services	25%	11%	9%	6%	23%	39%
Wood product manufacturing	37%	15%	9%	7%	19%	28%
Pulp and paper manufacturing	9%	6%	2%	45%	48%	76%
Forest industry workforce – Victoria exc. Green Triangle/Melbourne	27%	12%	7%	18%	31%	43%
Employed labour force (all industries) – Victoria exc. Green Triangle/Melbourne	29%	16%	12%	17%	33%	43%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who were away from work or did not report their working hours were excluded from the analysis.

Workforce diversity and sustainability

To be sustainable over time, every industry needs to successfully recruit and retain workers. This section examines whether the forest industry is successfully recruiting workers from all parts of the labour force, and whether forest industry businesses in Victoria find it easy or difficult to recruit workers.

Gender

The forest industry in Australia has traditionally predominantly employed men, with relatively few women working in the industry (ABARES 2015). In 2017, results of the industry survey showed employment of women was highest amongst forest management companies (growers), where 16% of workers were female. Only 7% of harvest and haulage contractors were female, and 12% of those employed in wood and paper processing (Table 18). This suggests that, similar to the industry in other regions, the Victorian forest industry is not successfully accessing the female labour force. Analysis of Census data suggests that there has not been substantial change in this gender composition of the workforce over time, with little growth in the proportion of the forest industry workforce who are female (Table 19). As of 2016, 48% of the overall employed labour force in Victoria (excluding the Green Triangle and Melbourne) was female, a slight increase from 46% in 2006. In the forest industry workforce, however, female representation in the workforce was 16% in 2016, and had remained almost unchanged since 2006 (when it was 16%).

Table 18 Workforce characteristics: gender (2017 Industry survey)

	Male workers	Female workers	Full-time men	Full-time women	Part-time/casual men	Part-time/casual women
Growers	84%	16%	74%	61%	26%	39%
Harvest and haulage contractors	93%	7%	90%	50%	10%	50%
Processors	88%	12%	95%	78%	5%	22%
Silviculture/nurseries	92%	8%	74%	33%	26%	67%
Whole industry	87%	13%	91%	71%	9%	29%

Table 19 Workforce by gender composition, 2006-2016 – ABS Census of Population and Housing

Industry sector (ABS classification)	% male			% female		
	2006	2011	2016	2006	2011	2016
Forestry	81%	77%	81%	19%	23%	19%
Logging	86%	89%	89%	14%	11%	11%
Forestry Support Services	81%	80%	77%	19%	20%	23%
Wood product manufacturing	86%	86%	88%	14%	16%	12%
Pulp and paper manufacturing	83%	84%	87%	17%	16%	13%
Forest industry – North Central	84%	86%	86%	16%	14%	14%
Forest industry – Western	82%	84%	84%	18%	16%	16%
Forest industry – Cent. H'lands & Gippsland	83%	82%	83%	17%	18%	17%
Forest industry workforce – Victoria excluding Green Triangle & Melbourne	83%	83%	84%	17%	17%	16%
Employed labour force (all industries) – Victoria exc. Green Triangle & Melbourne	54%	53%	52%	46%	47%	48%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who were away from work or did not report their working hours were excluded from the analysis.

Age

Australia's workforce is ageing, as is the population overall. In 2016, the forest industry workforce had a relatively similar age distribution to the rest of the workforce in the regions in which Victoria's forest industry operates; this was a slight change from 2006, when the industry had a slightly younger age profile overall compared to other industries (Table 20). The age structure varies in different regions: forest industry workers are older on average in the Central Highlands and Gippsland, and younger in the Western parts of the state. The data in Table 20 do suggest the industry's workforce is ageing slightly more rapidly than the rest of the workforce, despite having a similar age structure in 2016 to the rest of the workforce.

Table 20 Workforce by age, 2006-2016 – ABS Census of Population and Housing

Industry sector (ABS classification)	% aged < 35 years			% aged 55 and older		
	2006	2011	2016	2006	2011	2016
Forestry	40%	33%	31%	13%	16%	25%
Logging	43%	31%	29%	12%	16%	22%
Forestry Support Services	45%	35%	37%	13%	20%	21%
Wood product manufacturing	44%	36%	34%	13%	15%	20%
Pulp and paper manufacturing	29%	21%	18%	16%	21%	30%
Forest industry workforce – Central Highlands & Gippsland	31%	28%	27%	16%	19%	25%
Forest industry workforce – North Central	36%	35%	31%	13%	16%	22%
Forest industry workforce – Western	43%	37%	34%	12%	15%	19%
Forest industry workforce – Victoria exc. Green Triangle & Melbourne	40%	32%	30%	14%	17%	23%
Employed labour force (all industries) – Victoria exc. Green Triangle & Melbourne	33%	32%	33%	17%	21%	24%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016 TableBuilderPro *Place of Usual Residence* database. Workers who did not complete this question on the Census were excluded from the analysis.

Aboriginal and Torres Strait Islanders

Employment of Aboriginal and Torres Strait Islander peoples was similar in the forest industry to the overall workforce in Victoria's forest industry regions in 2006. Between 2006 and 2016, the proportion of workers identifying as being Aboriginal or Torres Strait Islander decreased in the forest industry, and few in the broader employed labour force (Table 21). This suggests the forest industry is not maintaining or growing participation of Aboriginal and Torres Strait Islander people in the industry's workforce as successfully as other industries in Victoria.

Table 21 Aboriginal and Torres Strait Islander participation in workforce, 2006-2016 – ABS Census

Industry sector (ABS classification)	% workforce identifying as Aboriginal or Torres Strait Islander		
	2006	2011	2016
Forestry	1%	<1%	1%
Logging	1%	<1%	<1%
Forestry Support Services	1%	4%	4%
Wood product manufacturing	1%	1%	1%
Pulp and paper manufacturing	<1%	<1%	<1%
Forest industry workforce – Central Highlands & Gippsland	1%	<1%	1%
Forest industry workforce – North Central	1%	1%	1%
Forest industry workforce – Western	<1%	1%	1%
Forest industry workforce – Victoria exc. Green Triangle & Melbourne	1%	<1%	<1%
Employed labour force (all industries) – exc. Green Triangle & Melbourne	1%	1%	2%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who did not complete this question on the Census were excluded from the analysis.

Recruiting workers and contractors

Forest industry businesses were asked how easy or difficult they found it to recruit workers and contractors. They were then asked what factors contributed to difficulty recruiting workers. Data in this section combine responses for Victoria and the Green Triangle: this is done because more than 30% of businesses who answered these questions operated across both regions.

The types of staff that were most challenging to recruit were managers and high level professional staff (Figure 7), with 70% of businesses reporting difficulty recruiting these types of workers. This was followed by transport workers (69% finding it difficult to recruit staff), heavy machine operators (67% finding it difficult to recruit staff) and field staff (63% finding it difficult to recruit staff). Only 30% per cent found it challenging to source finance/book keeping staff, and most businesses (57%) found it easy to source administration staff.

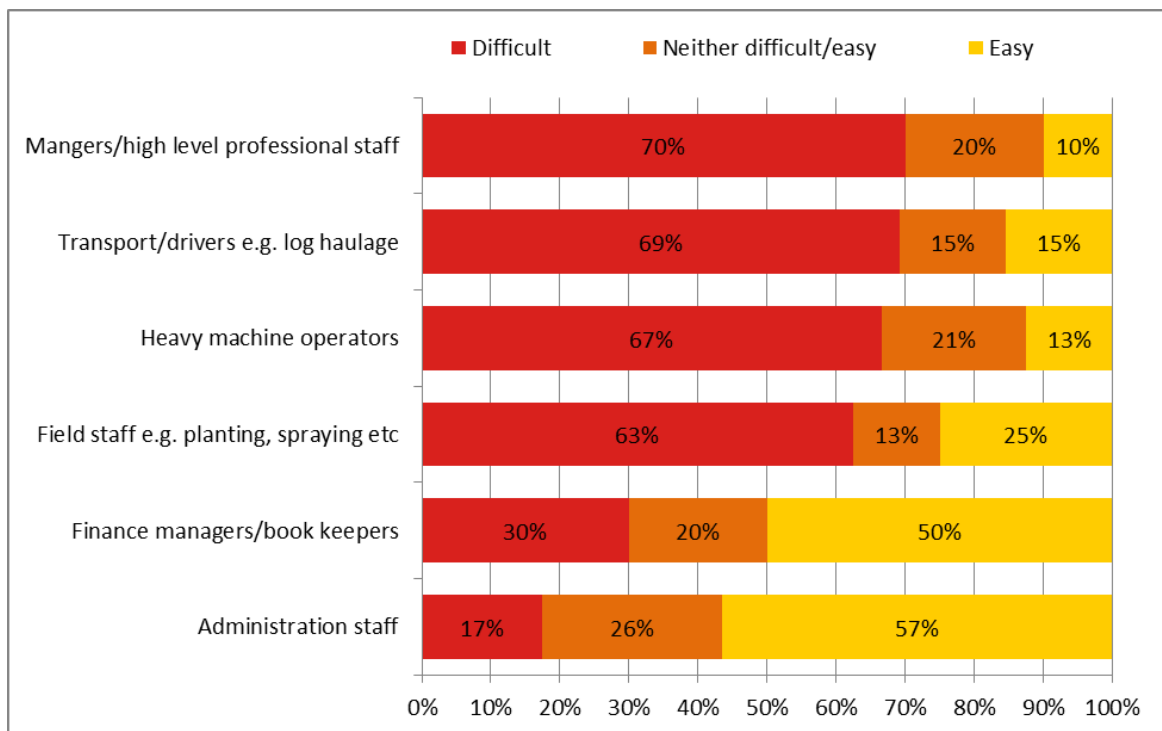


Figure 7 Level of difficulty involved in recruiting different types of workers, as rated by Victorian and Green Triangle forest industry businesses

When native forest and plantation managers were asked about accessing skilled contractors, most reported finding it easy to source nurseries to supply seedlings or seed (80%) and skilled contractors in the areas of roading and earthmoving (57%). More reported difficulty sourcing skilled contractors in the areas of harvesting (67%) and site preparation and planting (40%) (Figure 8).

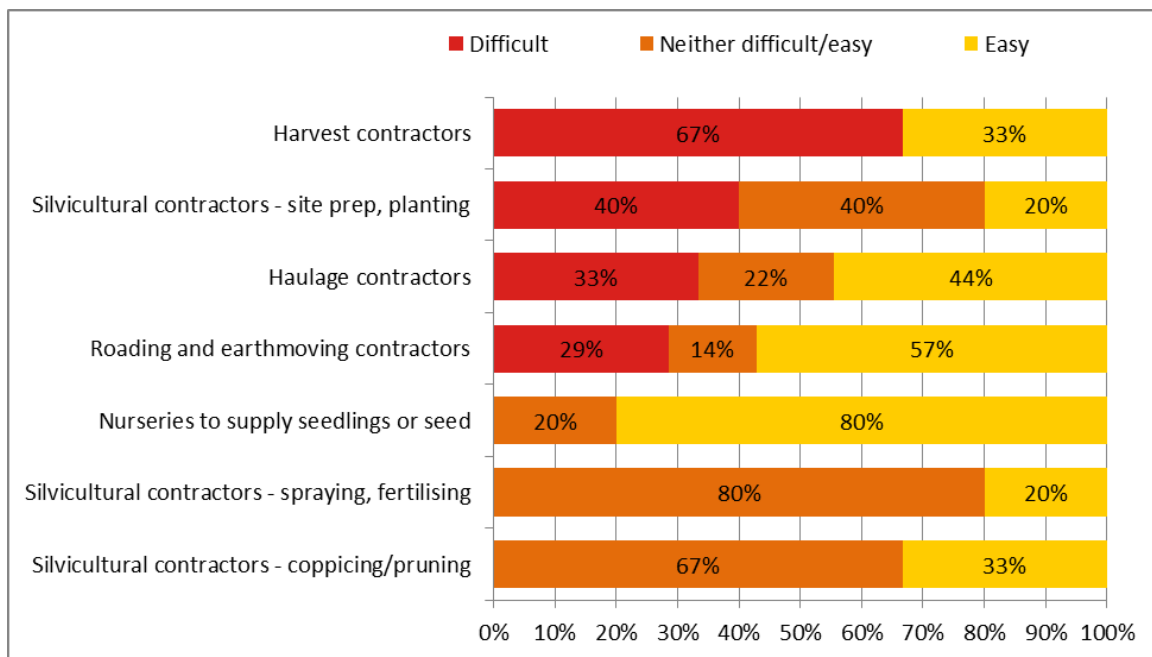


Figure 8 Level of difficulty involved in recruiting different types of contractors, as rated by Victorian and Green Triangle forest industry businesses involved in engaging contractors

When asked what factors made it difficult to recruit staff, a lack of available workers with appropriate skills was the top issue identified by businesses, with 88% reporting that this was a big issue for them (Figure 9). For 65%, the lack of suitable workers available in their local community was a big issue, and for 59% the investment and time required to build workforce skills was a big issue.

Fifty per cent of businesses reported that a key challenge was workers not wishing to shift to the community in which they were located. Related to this, 38% reported that a lack of employment opportunities for partners/spouses of workers in the local region affected their ability to recruit workers.

A large proportion of businesses (46%) reported that negative perceptions of the industry was a big problem, and only 12% of businesses felt that negative perceptions wasn't an issue, or a low issue, and 46% of businesses felt that a lack of certainty about the future of the industry was a bit issue.

In many cases (44% of businesses), skills obtained in other industries were not easily transferable to the forest industry, with only 7% indicating that this was not an issue or a low issue. A total of 44% of businesses also reported that other businesses being able to offer higher wages was an issue that substantially affected their ability to recruit workers. Less than 34% of businesses reported that competition from other industries on working conditions, or lack of affordable accommodation, were issues for recruitment.

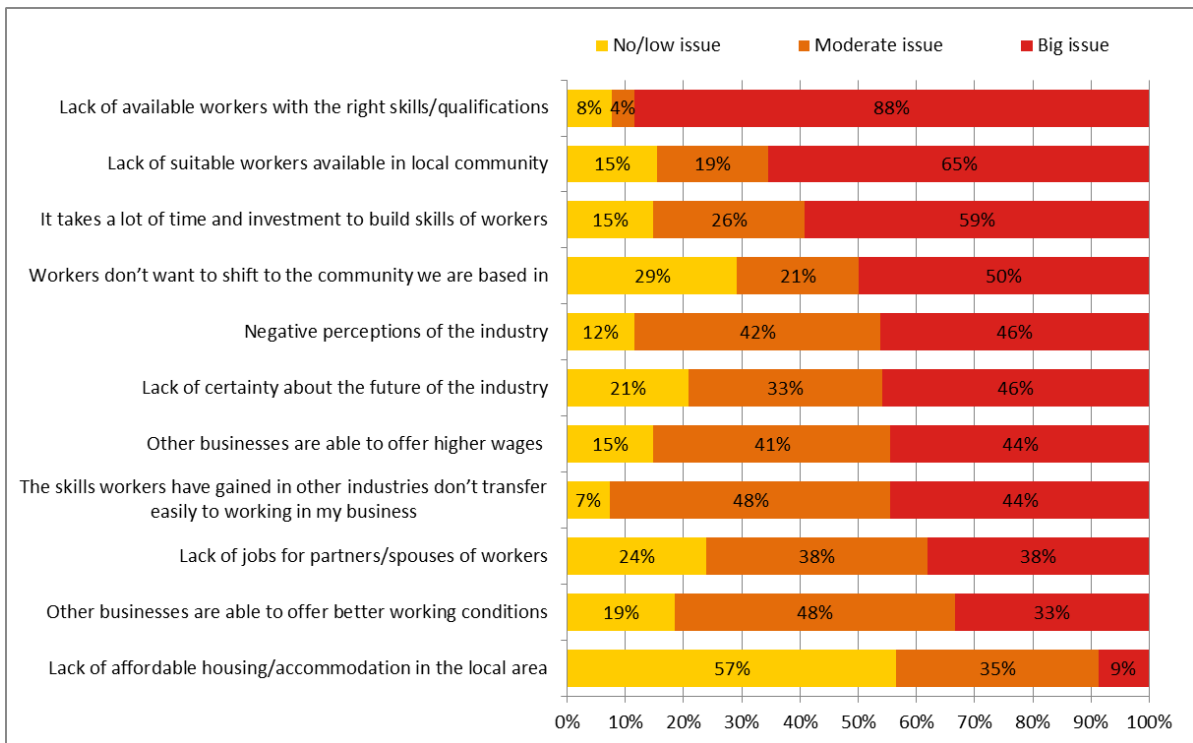


Figure 9 Key issues preventing recruitment of skilled workers into the Victorian forest industry

Industry skills and training needs

This section examines the skills and training needs of the forest industry in the Victorian and Green Triangle regions⁶. The forest industry needs workers with a diverse range of skills, which are evolving over time as the technologies used in the industry evolve.

Forest industry businesses were asked what types of skills were needed by their workforce, whether they required workers to have formal accreditation in these skills, and how they currently provided training. Table 22 shows the proportion of businesses reporting that some or all of their workers required skills in each of twelve competency areas, and the proportion of businesses who required formal accreditation of their workers in each. Businesses most commonly reported needing workers with skills in occupational health and safety training, with 100% of businesses reporting a need for this skill. Other common business requirements included skills that are used across forest types and business types, including operation of heavy machinery (89%) and chainsaws (85%), compliance training (89%), business and financial management (80%) and fire-fighting (70%).

Businesses operating in different forest types (softwood plantations, hardwood plantations and native forests) reported similar skill requirements in many competency areas. There were some exceptions: More businesses working in native forests reported a need for compliance training (100%), skills in IT/specialised software (86%) and marketing/sales (71%) compared to businesses operating in softwood plantations and hardwood plantations. A higher proportion of businesses operating in softwood and hardwood plantations indicated a need for skills in forest operations planning and management (44% and 50% respectively) and road transport/driver training for haulage drivers (65% and 63% respectively) compared to businesses working in native forests, and those working in hardwood plantations reported a higher need for skills in forest ecology and silviculture (50%) compared to softwood plantations (25%) and native forests (29%). Requirements for accredited training followed a similar pattern across the forest types.

There was more variation in needs for skills and accreditation between businesses types, with some skills specialised to particular parts of the industry. For example, processors less commonly require forest operations planning and management, forest ecology and silviculture and road/transport driving skills, while these were important competency areas for growers. Harvest and haulage contractors reported less need for skills in marketing/sales, community relations/engagement and forest ecology and silviculture compared to growers and processors. A total of 75% of growers required skills in marketing/sales, however none indicated a need for formal accreditation in this area, while 78% of processors required skills in marketing/sales and 50% reported needing accreditation.

⁶ Both regions are combined due to the large proportion of businesses who operated across both regions and did not differentiate skills and training needs by region.

Table 22 Skills and accreditation needs reported by businesses in Victoria and the Green Triangle

	All businesses (includes silvicultural contractors)		Softwood businesses		Hardwood businesses		Native forest businesses		Growers		Harvest and haulage contractors		Processors	
	Need skills	Require accreditation	Need skills	Require accreditation	Need skills	Require accreditation	Need skills	Require accreditation	Need skills	Require accreditation	Need skills	Require accreditation	Need skills	Require accreditation
Occupational health and safety training	100%	81%	100%	82%	100%	75%	100%	86%	100%	75%	100%	83%	100%	78%
Heavy machinery operation	89%	85%	94%	88%	75%	75%	88%	75%	50%	50%	100%	100%	100%	90%
Compliance training	89%	79%	88%	77%	75%	71%	100%	83%	75%	67%	92%	83%	100%	88%
Chainsaw and other hand-held machinery	85%	78%	82%	77%	88%	75%	75%	63%	100%	100%	75%	67%	90%	80%
Business and financial management	80%	64%	75%	56%	71%	57%	71%	57%	100%	100%	73%	36%	90%	90%
Fire fighting	70%	60%	71%	53%	63%	50%	75%	63%	100%	100%	58%	33%	70%	75%
IT/ software training specialised to the industry	69%	28%	65%	18%	38%	25%	86%	67%	100%	25%	50%	8%	78%	50%
Road transport/driver training for haulage drivers	54%	52%	65%	59%	63%	50%	29%	29%	50%	50%	75%	67%	33%	33%
Forest operations planning and management	48%	30%	44%	19%	50%	38%	29%	29%	100%	75%	46%	9%	33%	33%
Marketing/sales	42%	17%	35%	19%	13%	0%	71%	33%	75%	0%	8%	0%	78%	50%
Forest ecology and silviculture	32%	32%	25%	25%	50%	38%	29%	29%	100%	75%	9%	9%	22%	22%
Community relations/ engagement	31%	13%	29%	19%	25%	0%	29%	20%	75%	25%	8%	0%	44%	29%

Businesses were also asked to identify whether they delivered skills training in different competency areas via in-house training by other staff, in-house training by an expert, or training via a registered training organisation (RTO), and were able to select more than one of these (Table 23):

- RTOs were most commonly used to provide training in forest ecology and silviculture, hand-held machinery operation, road transport and driver training and heavy machinery operation; in some cases this was supplemented by in-house training
- RTOs were also the most common methods for training in occupational health and safety training, business and financial management, and fire-fighting, although less than 70% of businesses used RTOs and many businesses opted for in-house training by other staff
- Compliance training was delivered through an RTO for just over half of all businesses, and in-house training by other staff or experts for most remaining businesses was almost half, suggesting opportunities for additional provision of training in this area through more formal mechanisms
- In-house training was more common than use of a RTO for marketing/sales, IT/software training, and community relations/engagement.

Table 23 Types of training used by forest industry businesses in Victoria and the Green Triangle

	Registered training organisation	In-house training by expert	In-house training by other staff
Forest ecology and silviculture including plant identification	83%	17%	67%
Chainsaw and other hand-held machinery (eg brushcutter, pruning)	77%	23%	23%
Road transport/driver training for haulage drivers	77%	23%	23%
Heavy machinery operation	74%	13%	44%
Business and financial management	68%	21%	37%
Fire fighting	65%	35%	20%
Occupational health and safety training.	64%	48%	32%
Compliance training e.g. training in compliance needed for regulatory or certification bodies	52%	44%	44%
Forest operations planning and management	46%	18%	46%
Marketing/sales	40%	30%	80%
IT/ software training specialised to the industry e.g. for plant operation, in-field survey	12%	41%	65%
Community relations/community engagement	11%	33%	89%

Formal skills attainment

Formal qualifications do not always reflect the skills of a given workforce, particularly in cases where skills have been learned on the job – for example, through in-house business training such as that identified in the previous section. Having a formal qualification does, however, provide an idea of the extent to which workers have skills that are formally recognised and thus able to be better transferred between workplaces and even industries. Engaging in formal educational attainment is

also beneficial beyond enabling workers to attain specific competencies: the process of formal learning builds foundational learning, literacy and numeracy skills that enable workers to have the ability to more rapidly adapt to changing industry requirements, and which have been identified as critical to increasing the productivity of Australia's labour force into the future (Skills Australia 2010).

As of 2016, forest industry workers in most parts of the industry were less likely to have completed high school than those working in other industries (Table 24), and the rate of growth in high school attainment rates between 2011 and 2016 was slightly slower in the forest industry compared to the rest of the workforce. However, forest industry workers were more likely to have completed a certificate qualification than those in other parts of the workforce (39% compared to 29% as of 2016). Completion of a Bachelor degree or other university qualification was lower than the average for the employed labour force in all parts of the industry.

Table 24 Formal educational attainment: rates of attainment of high school and post-school qualifications in the Victorian forest industry, 2006 to 2016

Industry sector (ABS classification)	% completed high school (Year 12 or equivalent)			% with no post-school qualification			% with Certificate qualification			% with Bachelor or postgraduate degree		
	2006	2011	2016	2006	2011	2016	2006	2011	2016	2006	2011	2016
Forestry	39%	39%	51%	52%	51%	46%	34%	34%	36%	14%	16%	18%
Logging	23%	23%	24%	58%	58%	47%	34%	34%	40%	8%	8%	6%
Forestry Support Services	47%	47%	58%	41%	41%	30%	43%	38%	42%	16%	21%	27%
Wood product manufacturing	27%	34%	39%	55%	51%	46%	42%	45%	49%	3%	4%	5%
Pulp & paper manufacturing	35%	36%	43%	48%	43%	37%	42%	46%	51%	10%	11%	12%
Forest industry workforce – Central Highlands & Gippsland	30%	36%	41%	54%	50%	44%	39%	41%	46%	7%	8%	10%
Forest industry workforce – North Central	29%	32%	37%	55%	52%	48%	40%	43%	46%	5%	5%	6%
Forest industry workforce – Western	36%	40%	45%	54%	50%	45%	39%	42%	45%	7%	8%	9%
Forest industry workforce – Victoria excluding south west and Melbourne	32%	37%	41%	54%	51%	45%	39%	42%	46%	6%	8%	9%
Employed labour force (all industries) – Victoria excluding south west and Melbourne	45%	50%	55%	48%	42%	36%	35%	38%	41%	17%	19%	22%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016, TableBuilderPro *Place of Usual Residence* database. Workers who did not complete this question on the Census were excluded from the analysis.

Business and market outlook

Businesses were asked about the business and market conditions and challenges they were experiencing, and the extent to which they could cope with difficult business conditions. These questions help identify both areas of strength and areas of challenge being experienced by the industry.

Overall business conditions

Businesses were asked 'how would you describe business conditions for your business at the moment?' Only 16% of businesses in Victoria and Green Triangle reported that conditions were 'easier than usual'; 51% reported they were 'more challenging than usual' and 33% that they were 'about the same as usual'. These results were similar in harvest and haulage businesses and processors, with just over half of all businesses indicating that business conditions were 'more challenging than usual'. Results were, however, different for growers. More growers reported business conditions being 'about the same as usual' (67%) and no growers indicated that business conditions were 'more challenging than usual'.

About half of the businesses operating in softwood plantations (49%) felt that business conditions were 'more challenging than usual' and only 18% indicated business conditions were 'easier than usual'. Results were similar for businesses working in hardwood plantations, with 50% indicating business conditions were 'more challenging than usual' and 20% indicating business conditions were 'easier than usual'. The majority of native forest businesses (71%) reported business conditions being 'more challenging than usual'.

Future business expectations

Businesses were asked how likely or unlikely it was that in the next year they would invest in new business systems or new capital equipment, reduce or increase their workforce, grow their business revenue, or increase business profitability. As shown in Figure 10:

- 43% of all businesses felt they were likely to grow their profitability and only 14% felt this in the next 12 months, with businesses operating in the softwood plantation and native forest sectors reporting similar views. No businesses operating in the hardwood plantation sector felt that their profitability was unlikely to grow.
- A total of 44% of all businesses felt that their revenue would grow, with only 15% feeling their revenue would grow in the next 12 months. These responses were similar for businesses operating in the native forest and plantation sectors.
- Overall, most businesses felt their workforce would remain stable over the next 12 months, although fewer softwood businesses (20%) felt they were likely to increase their workforce compared to hardwood businesses (33%) and native forest businesses (33%).
- Most businesses planned to invest in their business: 59% were planning to invest in new capital equipment and 54% in new business systems. In general, more hardwood plantation sector businesses indicated that they plan to invest in their business, and fewer businesses in the native forest sector.

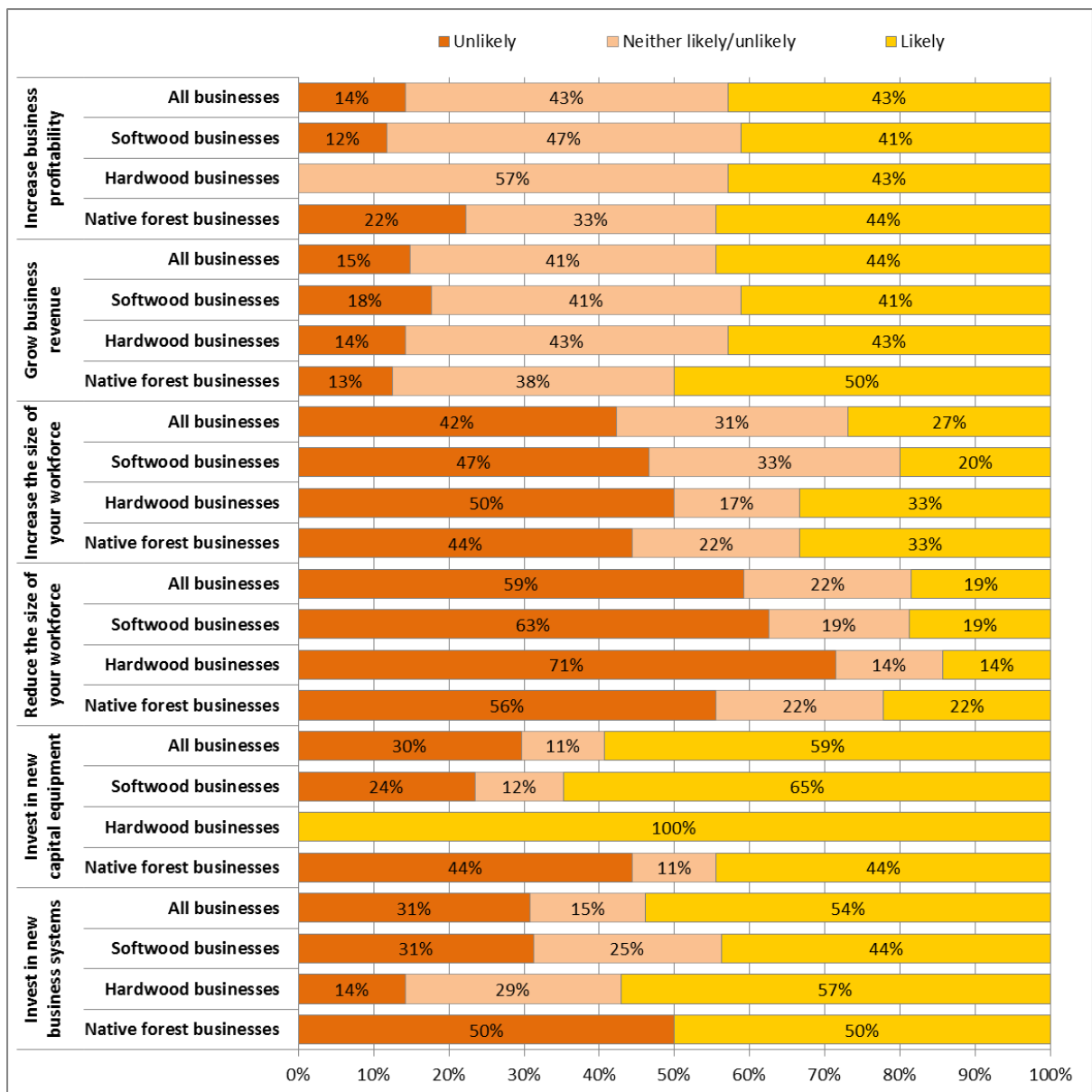


Figure 10 Expectations for business revenue, profitability, workforce size and investment over the next 12 months

Businesses were also asked whether they felt that, over the next 12 months, demand for their services or products were likely to grow, remain about the same, or shrink. About half (51%) felt demand would remain the same, about one third (31%) felt that that demand would grow and few (18%) that demand would reduce. No growers indicated that demand was likely to grow, with 80% of growers feeling like demand is likely to remain about the same. No processors felt that demand was likely to shrink, with 67% indicating demand was likely to remain about the same and 33% that they believed it would grow.

Businesses were asked what factors would enable them to invest more in their business. This question was either completed in the survey, or answered on the phone, with a total of 20 businesses providing their perspectives:

- Growers most commonly reported that having more land, or more affordable land, available for expansion of plantations was a key factor that would enable investment.

- Harvest, haulage and silvicultural contractors most commonly identified having more or longer term contracts, as well as a more secure industry with greater available wood volumes as the factors that have the greatest impact on their ability to invest.
- Processors reported a need for greater resource security, growth in market demand, increase in prices for products, and development of export markets.
- Businesses operating in native forests reported that security (of resource or industry as a whole) was the biggest factor that would enable them to invest more in their business, while businesses working in plantations (both softwood and hardwood) reported a wider mix of factors that were more specific to business type such as growing, harvest and haulage and processing.

Business challenges

Businesses were asked ‘what factors would trigger you to downsize or close your business?’ A total of 23 businesses provided answers to this question. Answers were very consistent and not surprisingly mostly related to demand for products or services, loss of contracts and resource security. Growers reported loss of demand for timber products and contractors non-renewal of contracts as the factors that would trigger downsizing or closure. Processors most commonly reported lack of wood/fibre supply as a factor likely to trigger downsizing.

Businesses were then asked to rate the extent to which different factors had been a challenge or problems for their business in the last three years (Figure 11). Of the businesses who completed these questions, the most common challenges in the last three years were government regulation (61% of businesses reporting this as a big challenge), increasing cost of labour (52%), difficulty obtaining labour (44%), rising input costs (41%) and lack of investment in the industry (39%). These issues varied between sectors: native forest dependent businesses were more likely to report government regulation (89%), rising input costs (63%), lack of investment in the industry (44%), difficulty obtaining certification (22%), and lack of access to telecommunications (33%) than other businesses. Softwood plantation dependent businesses were more likely than others to report that difficulty maintaining competitiveness with other similar businesses (29%), decreasing prices (41%), and lack of demand (24%) were problems. Hardwood plantation dependent businesses were more likely to report difficulty obtaining labour (75%) and lack of investment in the industry (50%) as key issues.

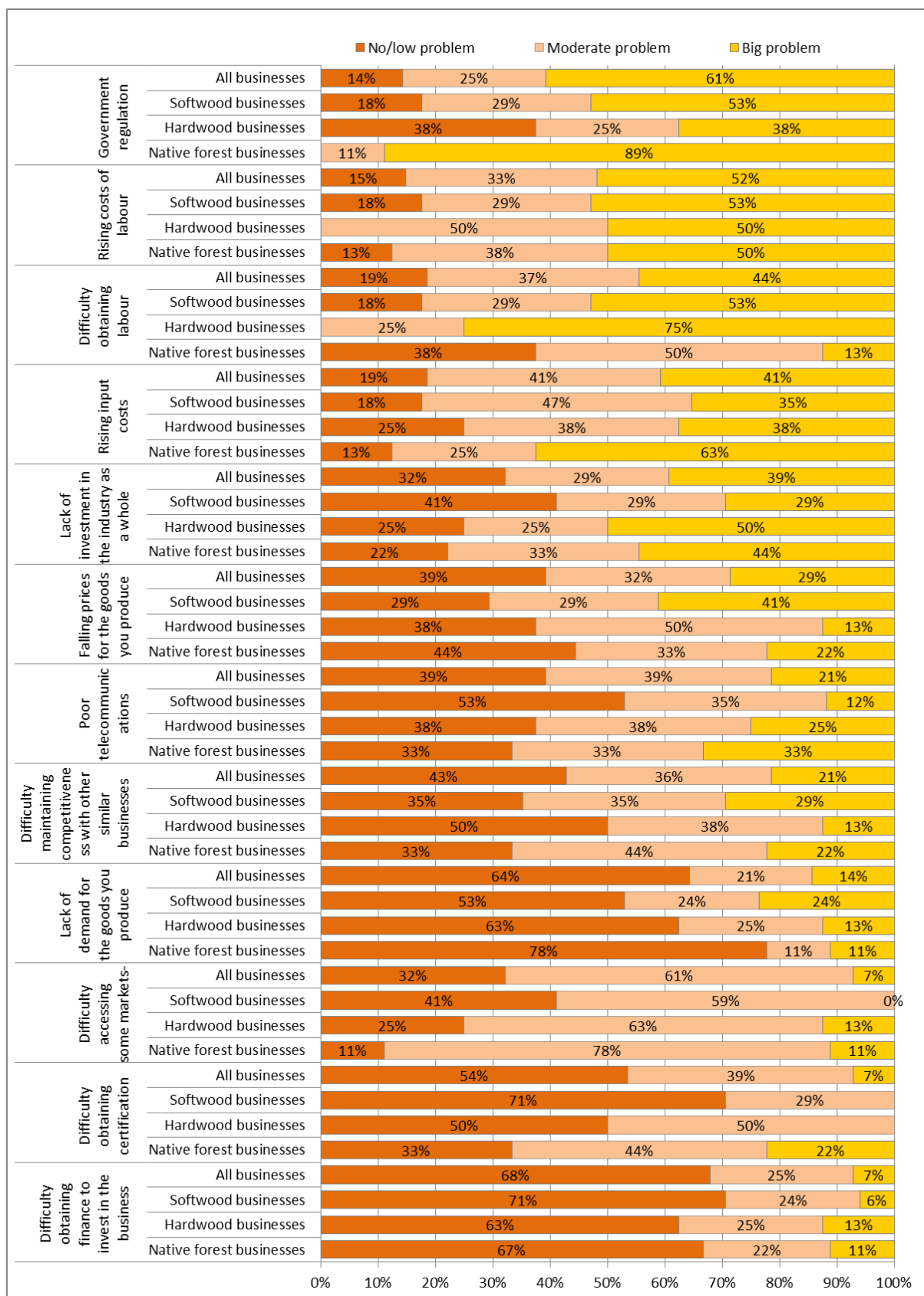


Figure 11 Challenges experienced by Victorian forest industry businesses

Community perceptions of the social, economic, service and infrastructure effects of the forest industry

To further evaluate the socio-economic effects of the forest industry in the communities in which it operates, residents living in communities across Australia, including the Central Highlands and Gippsland region, North Central region and Western region, were asked about (i) their overall views about quality of life and liveability of their community, and (ii) the extent to which they felt the different industries that operated in their region affected different social and economic aspects of their lives.

These questions were asked as part of the 2016 Regional Wellbeing Survey, a large-scale survey of 13,000 people living in rural and regional areas of Australia. Schirmer et al. (2017) provide a detailed description of the survey methods and data collection process.

Quality of life and liveability

Quality of life and liveability of local regions was examined by analysing responses to survey questions which asked residents of these regions how they viewed the overall liveability, economy, roads, friendliness, safety, landscape and environmental health of their local community. To identify whether the forest industry may be contributing to differences in these experiences, the following groups were compared:

- Rural and regional Victoria: a total of around 3,630 people from rural and regional Victoria participated in the survey, including Melbourne residents living on the urban fringe of the city (for example, in parts of the Yarra Ranges local government area and Mornington Peninsula that are on the fringe of the suburban area)⁷
- High forest industry dependence: people living in local government areas (LGAs) in which more than 2% of employment was directly dependent on the forest industry, or in which there were large areas of plantations or harvesting of native forests. This was examined by region:
 - Central Highlands and Gippsland: residents of the four LGAs of East Gippsland, Latrobe, Murrindindi and Wellington, as well as those living in rural parts of the Yarra Ranges⁸, had high forest industry dependence. A total of around 670 residents from these five LGAs participated in the survey.
 - North Central: residents of the three LGAs of Alpine, Benalla and Wangaratta had high forest industry dependence (in Wangaratta 1.5% of workers worked directly in the industry, slightly fewer than in most others considered to have 'high' forest industry dependence). A total of around 200 residents from these LGAs participated in the survey.
 - Western: one LGA, Colac-Otway, had high forest industry dependence, with a total of around 70 survey respondents from this LGA.

⁷ not all answered every question, and as such the 'n' changes slightly for different results presented below

⁸ While only 0.9% of the workforce of the Yarra Ranges works in the forest industry, many of these are located in rural parts of this LGA, where >2% work in the industry.

- Low forest industry dependence: people living in LGAs with less than 2% of jobs directly dependent on the forest industry, or with relatively smaller amounts of plantation of forest harvesting:
 - Central Highlands and Gippsland: residents of Bass Coast, Baw Baw, Mansfield, Mitchell, Mornington Peninsula, Nillumbik and South Gippsland, with a total of around 300 survey respondents.
 - North Central: residents of Campaspe, Gannawarra, Greater Shepparton, Indigo, Mildura, Moira, Strathbogie, Swan Hill, Towong, Wodonga and Yarriambiack, with a total of around 1,055 survey respondents.
 - Western: residents of Ararat, Ballarat, Central Goldfields, Corangamite, Golden Plains, Greater Bendigo, Greater Geelong, Hepburn, Macedon Ranges, Moorabool, Mount Alexander, Northern Grampians, Pyrenees, Queenscliffe and Surf Coast, with around 690 survey respondents.

The analysis below compares experiences of those living in Victoria as a whole, and those living in communities with high versus low forest industry dependence in the Central Highlands and Gippsland, North Central and the Western regions. This gives a useful indication of whether residents of forest industry dependent communities report substantially different experiences of liveability compared to those in other communities. However, where there are differences they may be driven by a range of factors, only one of which is the presence of the forest industry. For example, the mix of industries operating in different regions varies substantially across Victoria, from areas with high dependence on irrigated agriculture in parts of the North Central region and central Gippsland, to regions that have substantial tourism and fishing industries in East Gippsland. Some of the differences between these communities are therefore likely to be due more to differences in factors such as the changes in other industries or total size of population (to name just two examples), rather than to the presence of the forest industry.

Figure 12 shows overall views of residents about the liveability of their community. The error bars show 95% confidence intervals; where error bars do not overlap, this indicates there is a significant difference between regions at the '5%' significance level. People living in regions with higher dependence on the forest industry were more likely (and in the case of the Western region, significantly more likely) to rate their community as a good place to live, however would not necessarily be more likely to recommend their community to others as a good place to live. Those living in high forestry dependent LGAs in the North Central region were significantly less likely to feel there were plenty of jobs available locally, compared to those living in LGAs with lower forestry dependence within any of the regions, or Victoria as a whole. Respondents living in the LGA of Colac-Otway in the Western region (with high forest industry dependence) were significantly less likely to indicate having good quality roads in their local region, compared to all other regions and Victoria as a whole.

Overall, the results suggest that those living in regions with higher dependence on the forest industry are just as or slightly more likely to rate their community as highly liveable as those living in nearby communities with less dependence on the forest industry.

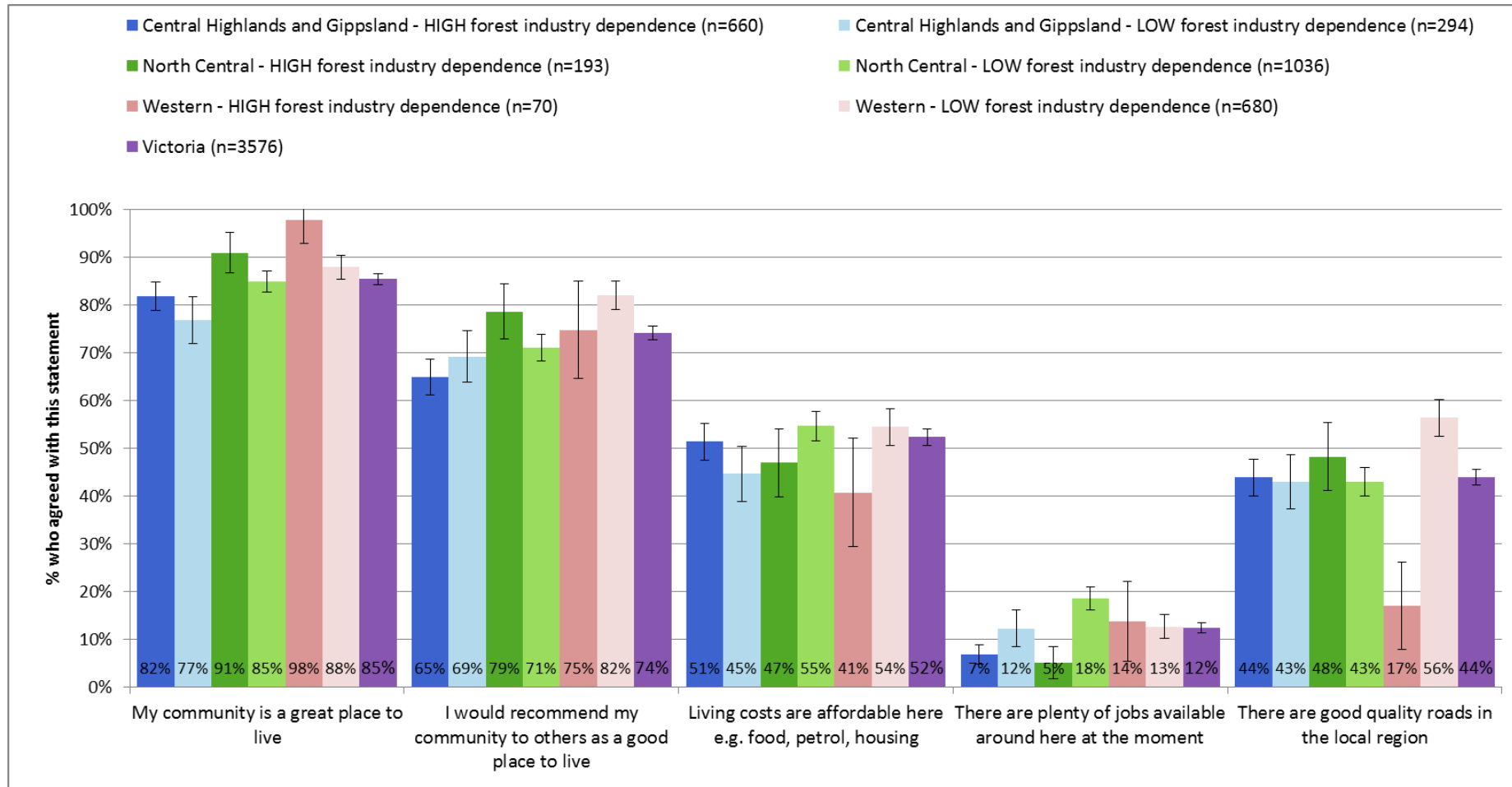


Figure 12 Perceptions of overall liveability and economy of local region – Regional Wellbeing Survey 2016

There were similar findings when resident's perceptions of the overall friendliness and safety of their community were examined (Figure 13). The large majority of people living in rural and regional areas of Victoria, and in the Central Highlands and Gippsland, North Central and the Western regions, reported feeling welcome in and part of their communities, and felt their community was a safe place to live, with no significant differences between regions overall, or between areas with high forestry dependence or low forestry dependence. There was more variation in response between regions, and between areas of high and low forestry dependence, when respondents were asked if there was a high crime rate in their community. In the Central Highlands and Gippsland region, 47% of people living in areas with high dependence on the forest industry felt there was a high crime rate in their community, compared to 36% of people living in areas with less dependence on the forest industry. In the North Central and Western regions, the pattern was reversed, with fewer residents living in areas with high dependence on the forest industry reporting high crime rates in their community (37% in the North Central and 20% in the Western region) compared to those in areas with less forest industry dependence (50% in the North Central and 37% in the Western region). This variance suggests that factors other than presence of the forest industry are influencing views about crime and safety.

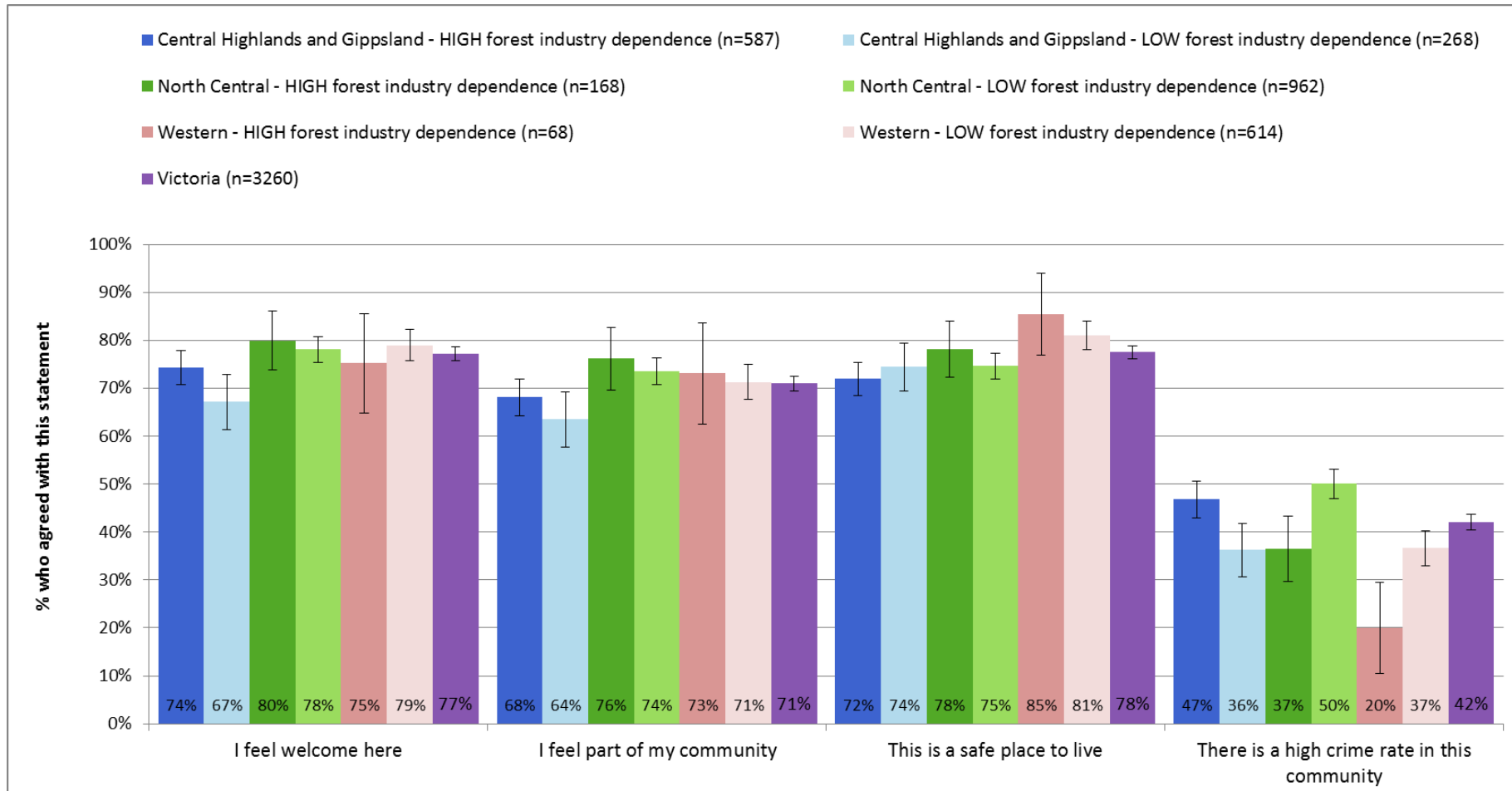


Figure 13 Perceptions of friendliness, safety and crime

When perceptions of local landscape aesthetics and environmental health were examined (Figure 14), responses were positive overall, with few significant differences between communities with higher versus lower dependence on the forest industry. Where there were differences, they were not consistently different, suggesting that they are not necessarily influenced by the presence of the forest industry: for example, those living in forest industry-dependent communities in the Central Highlands and Gippsland region were more likely to report there were attractive building and homes in their communities, but not those living in forest industry-dependent communities in other regions. People living in forest industry dependent communities in the North Central region felt more positive about their local landscape aesthetics compared to those living in other communities, but the same result was not present for other regions. Overall, this suggests that people living in communities with higher and lower dependence on the forest industry have relatively similar views about landscape aesthetics and environmental health, with some differences observed that are likely to be influenced by other factors than the presence of the forest industry.

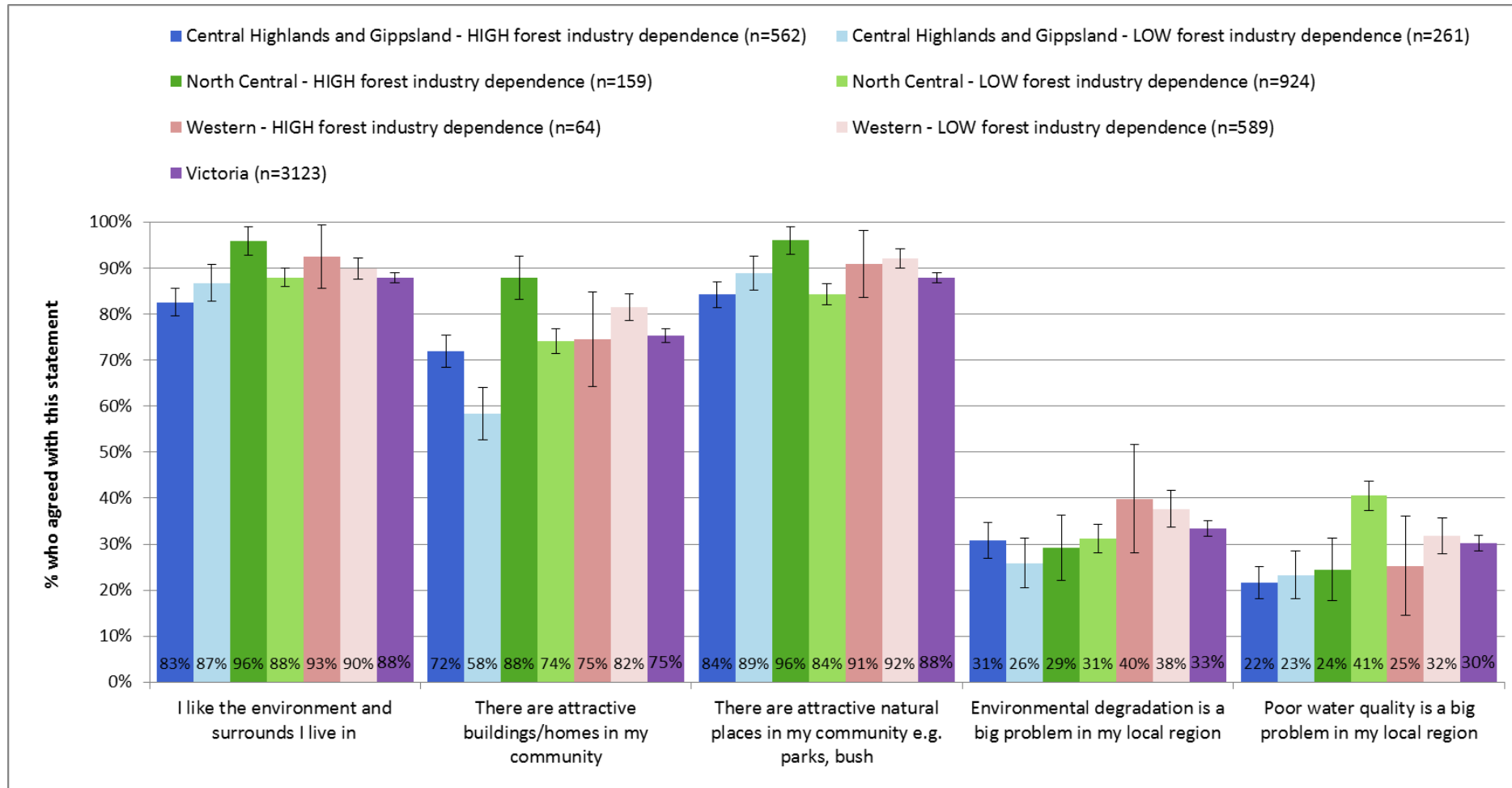


Figure 14 Perceptions of landscape aesthetics and environmental health

Perceptions of regional industries

After asking their overall perceptions of the liveability of their communities, residents were asked their views about how different local industries contribute to that liveability. In total, 2,849 residents living in Victoria answered questions about the socio-economic effects of different industries. This included 850 living in the Central Highlands and Gippsland region, 852 living in the North Central region and 627 living in the Western region. Of these, a total of 798 lived in local government areas or towns with high dependence on the forest industry for employment.

Survey participants were asked to identify whether a number of industries were important to their community, with two of those asked about being defined as (i) forestry (logging of native forests or plantations) and (ii) wood or paper product manufacturing. As shown in Figure 15, those who lived in LGAs with high forest industry dependence were much more likely to identify the forest industry as an important industry in their local community than those who lived in regions with little forest industry activity:

- Central Highlands and Gippsland: 60% of those who lived in East Gippsland, Latrobe, Murrindindi, Wellington and Yarra Ranges (with higher dependence on the forest industry) felt the forest industry was important to their local community, compared to only 17% of those living in other parts of the region where there is little forest industry activity. Fewer felt that wood and paper processing were important (33% in East Gippsland, Latrobe, Murrindindi, Wellington and Yarra Ranges and 9% in other parts of the region).
- North Central: 47% of those living in LGAs with higher dependence on the forest industry (Alpine, Benalla and Wangaratta) indicated that the forest industry was important to their community, compared to 11% of those living in other parts of the North Central region. Wood product manufacturing was considered an important industry by 40% in high forest industry dependent communities, and only 4% in other parts of this region.
- Western: 58% of those who lived in Colac-Otway (with higher forest industry dependence) felt the forest industry was important to their local community, compared to 13% of those living in other parts of the region. Wood product manufacturing was considered an important industry by 28% in Colac-Otway, and only 2% in other parts of the Western region.

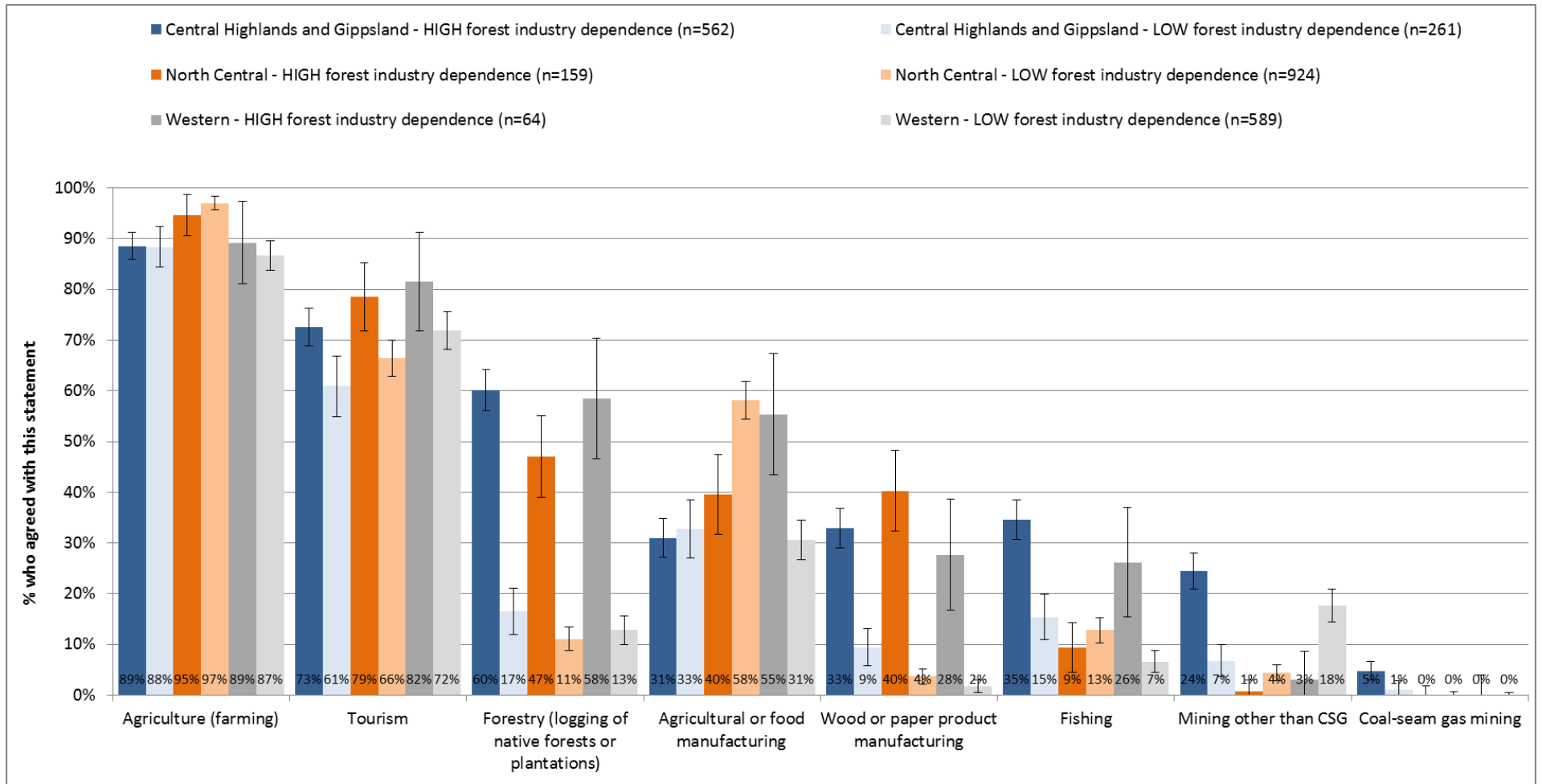


Figure 15 Proportion of residents who views the forest industry as an 'important industry' in their local community

Those who identified that each industry was important were then asked to rate whether they felt the industry had a negative impact, positive impact, or no impact, on the following in their local community:

- Local employment
- Cost of living (food, rent)
- Friendliness of the local community
- Health of local residents
- Traffic on local roads
- Quality of local roads
- Attractiveness of the local landscape
- Local water quality
- Health of local environment
- Bushfire risk
- Land prices.

When asked to assess this for the forest industry, survey participants were asked to assess forestry, wood and paper manufacturing together.

This section examines the views of those living in the (i) Central Highlands and Gippsland region, (ii) North Central region and (iii) Western region. The views of these residents about the forestry industry are compared to their views about the two other industries most commonly considered important by residents of these regions: agriculture and tourism.

Residents of the Central Highlands and Gippsland, North Central and Western regions generally perceived the forest industry as having fewer positive effects than the farming and tourism industries, and more negative effects (Figures 16 to 21). This was particularly the case for those who lived in communities with greater dependence on the forest industry, and less so for those living in communities in which fewer jobs depended on the industry (see Appendix 1).

The large majority of residents – 79% in the Central Highlands and Gippsland region, 77% in the North Central region and 64% in the Western region - felt the forest industry had positive impacts on local employment. Fewer than 40% felt the industry had positive impacts on other aspects of community liveability including cost of living, friendliness of the local community, health of local residents, safety and quality of roads, bushfire risk, landscape attractiveness, water quality, land prices or health of the local environment. When views about negative impacts were examined, the most common concerns reported about the forest industry were related to road impacts and landscape aesthetics:

- 60% in the Central Highlands and Gippsland, 57% in the North Central region and 68% in the Western region felt the industry had a negative impact on the quality of local roads
- 54% in the Central Highlands and Gippsland, 50% in the North Central region and 52% in the Western region felt the industry had a negative impact on the traffic on local roads
- 48% in the Central Highlands and Gippsland, 46% in the North Central region and 58% in the Western region felt the forest industry had a negative impact on the attractiveness of the local landscape.

The results suggest that the forest industry is not viewed as either being as important an industry as agriculture and tourism, or as having as many positive outcomes for community life beyond generation of employment. In particular, the results suggest a lack of connection by many residents with the industry, with fewer feeling the industry contributes to friendliness of the local community compared to the agriculture and tourism industries, despite most recognising the positive contributions the industry makes to jobs. Working to address concerns about traffic, road quality, and landscape aesthetics, as well as to increase positive experiences of friendliness, can help address the less positive perception of the forest industry compared to agriculture and tourism in these regions.

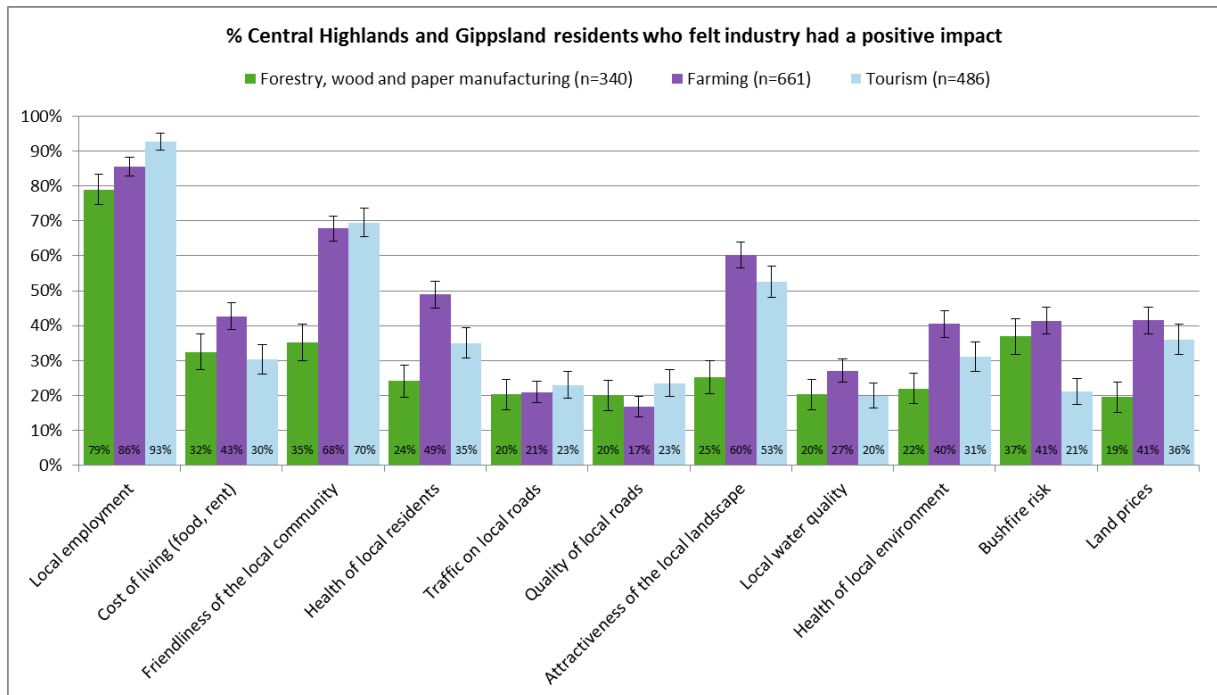


Figure 16 Proportion of Central Highlands and Gippsland residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

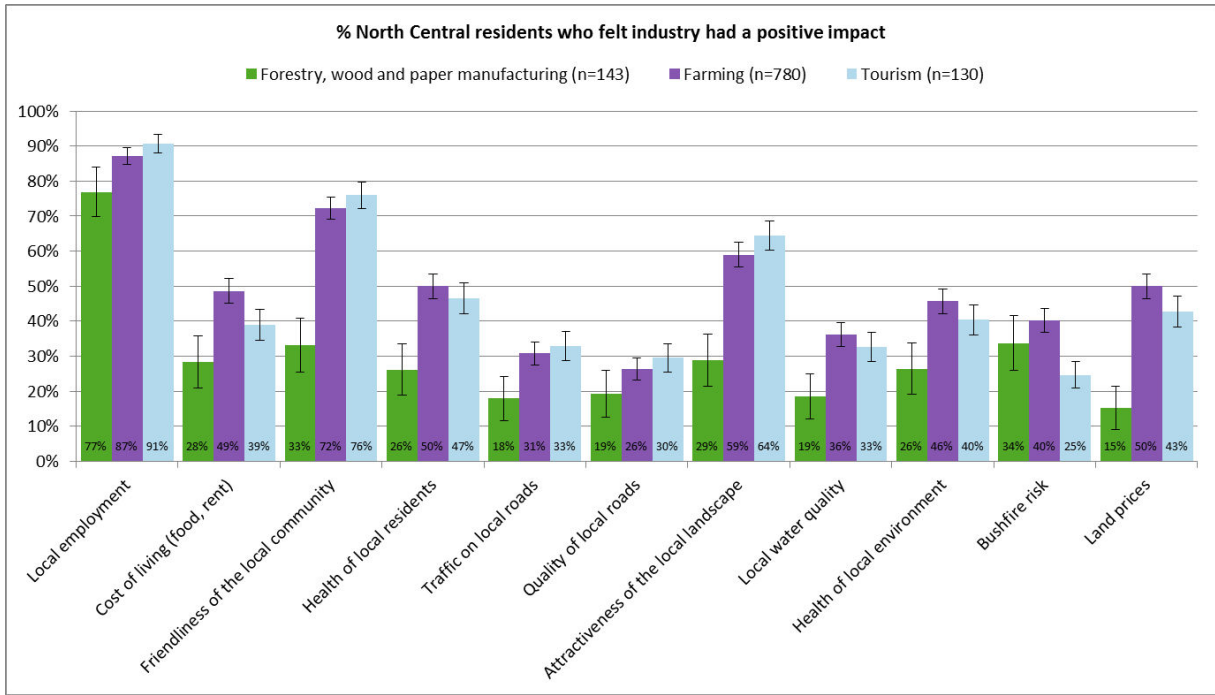


Figure 17 Proportion of North Central residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

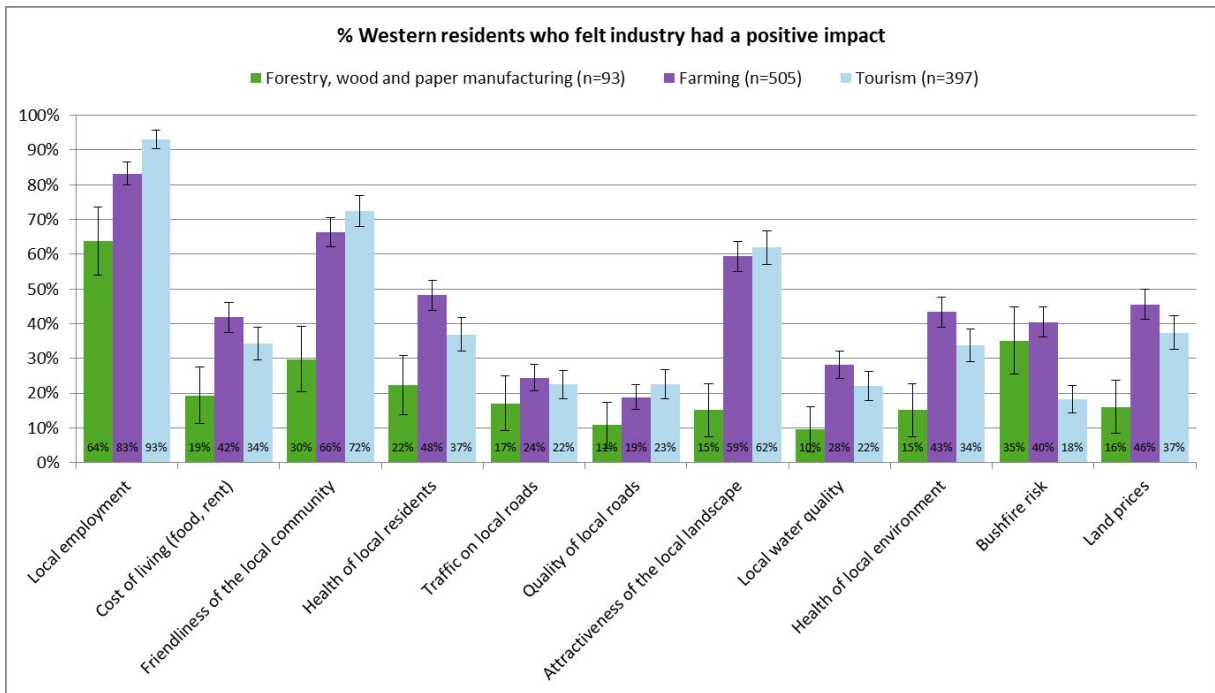


Figure 18 Proportion of Western residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

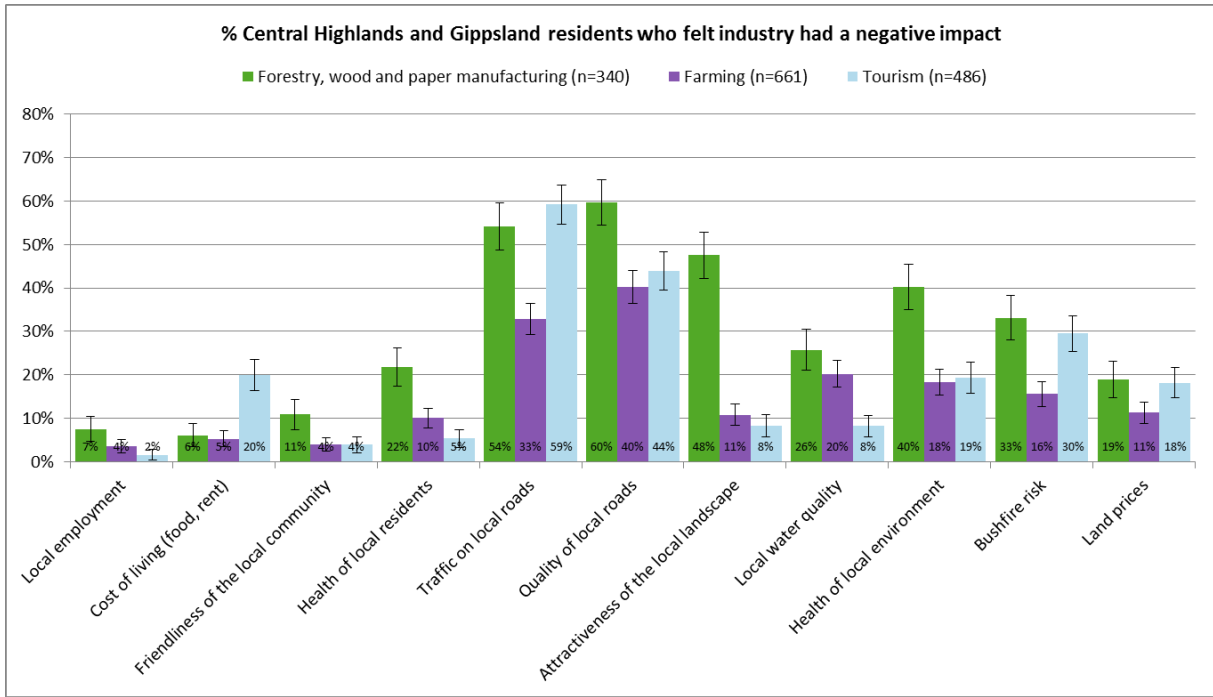


Figure 19 Proportion of Central Highlands and Gippsland residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

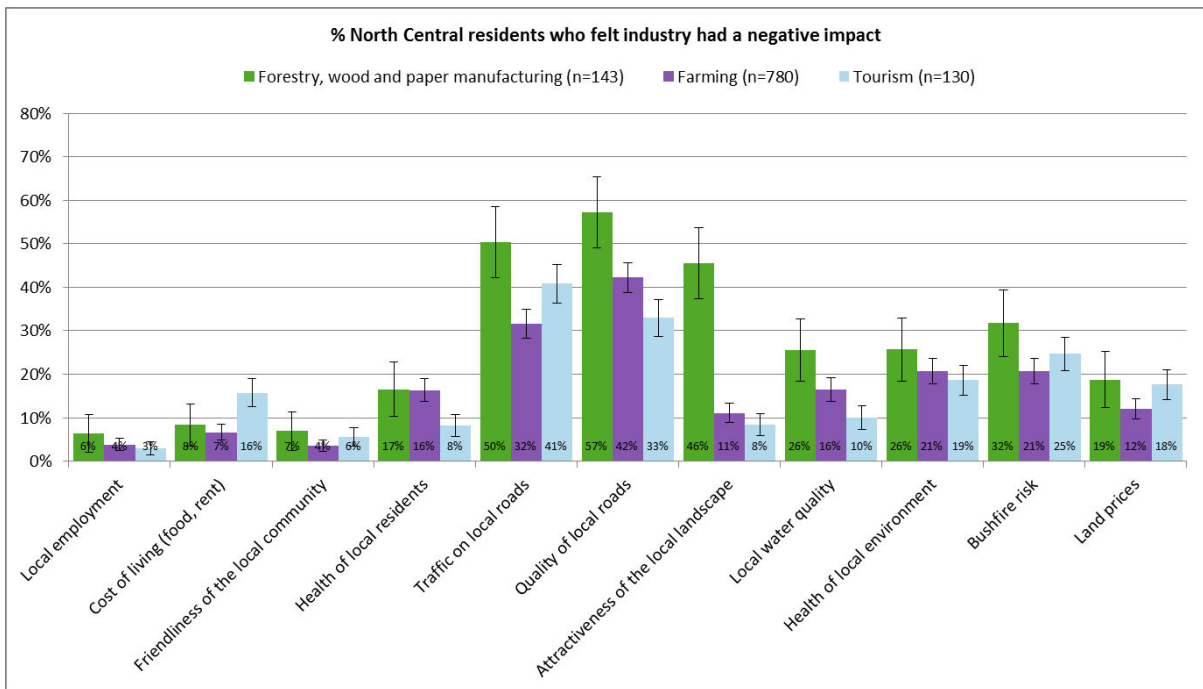


Figure 20 Proportion of North Central residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

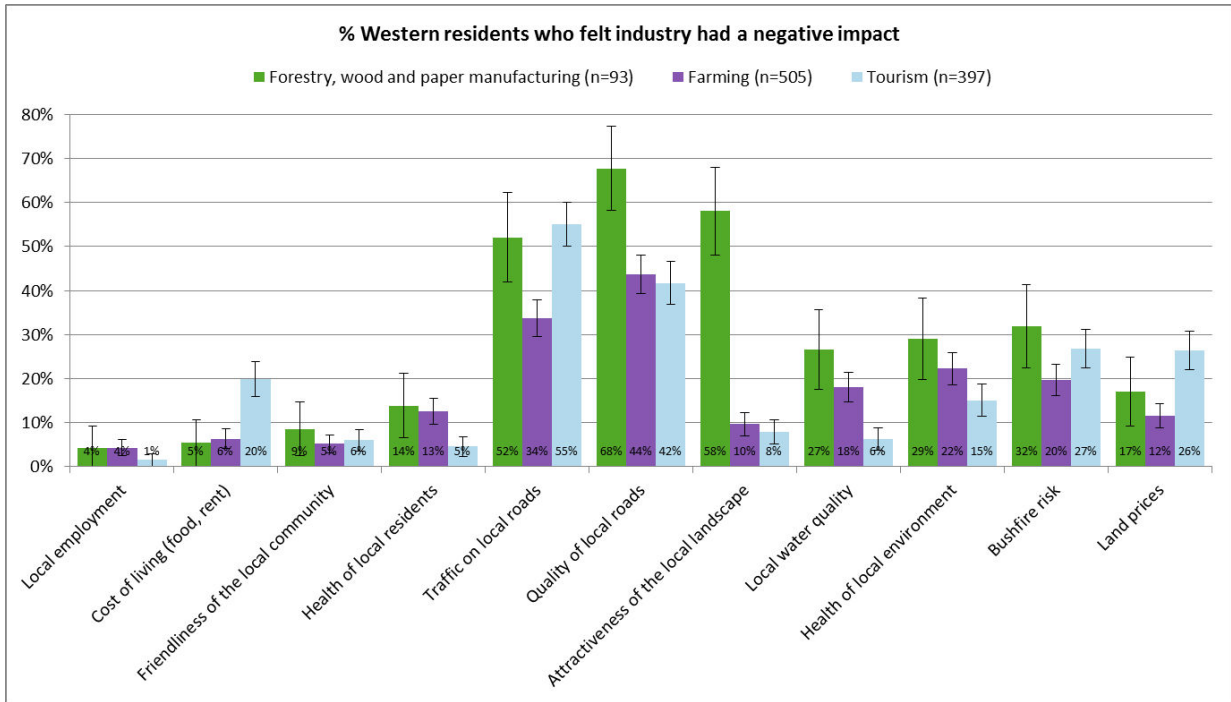


Figure 21 Proportion of Western residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

Conclusions

This report quantified the employment and economic activity generated by the forest industry in Victoria (excluding plantations in the Green Triangle region of south west Victoria), and identified the communities in which the industry generates a significant proportion of local jobs. While in most communities the industry generates a relatively small proportion of jobs, there are several in which it is a larger contributor to the local economy, particularly in the LGAs of Alpine, Latrobe, Benalla, Colac-Otway and Wellington. In these LGAs the presence of the industry provides diversification in the local economy, which can help maintain local economic activity during periods of lower activity in other key local industries such as agriculture and tourism.

The analysis shows that the industry has declined significantly in size over time, although employment generated by hardwood plantations has grown since 2012. Much of the 28.4% decline in jobs in the industry occurring between 2006 and 2016 was a result of reduced employment in the processing of wood and paper products. The majority of jobs generated by the industry are generated by the processing sector, as is the majority of the flow-on economic impact of the industry. This highlights the importance of local processing of wood and fibre for generation of jobs from the industry; far fewer jobs are created if logs are harvested and exported with no or little processing.

People living in regions with higher dependence on the forest industry for employment generally view their communities as being just as liveable, friendly, safe and pleasant to live in as those who live in other nearby communities with less forest industry activity. They do not, however, view the forest industry as positively as they view other industries operating in their local community: while recognising the employment contribution made by the industry, few perceive the industry as having positive impacts on other aspects of community life, and a significant proportion report concerns about effects of the industry on roads and local landscapes.

While relatively few businesses feel demand will decline for their products, half report business conditions as being more challenging than usual, and many find it difficult to recruit some types of workers. Increasing labour and input costs and lack of investment in the industry are concerns for many businesses. These challenges suggest that the current trend of ongoing decline in employment – particularly in processing of wood and fibre products - is likely to continue unless there is significant new opportunity for investment in the industry.

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Appendix 1 Data tables

Table A1.1 Expenditure by the forest industry, 2015-16, by region

Type of expenditure	Central Highlands & Gippsland		North Central		Western		Victoria exc. south west	
	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)
Wages/Salaries	206.0	26%	67.3	30%	50.5	27%	378.8	27%
Manufacturing	71.9	9%	18.6	8%	15.5	8%	159.6	12%
Other Services	77.6	10%	20.7	9%	16.8	9%	135.6	10%
Retail and Wholesale Trade	67.6	8%	18.5	8%	15.7	9%	112.8	8%
Electricity, Gas, Water and Waste Services	36.5	5%	6.2	3%	6.1	3%	87.0	6%
Transport, Postal and Warehousing	36.7	5%	9.6	4%	8.3	4%	60.8	4%
Mining	31.3	4%	6.4	3%	5.7	3%	48.9	4%
Communication	11.9	1%	3.3	1%	2.9	2%	31.2	2%
Professional, Scientific and Technical Services	17.1	2%	5.2	2%	3.8	2%	30.6	2%
Other	13.1	2%	2.6	1%	2.4	1%	20.8	2%
Construction	12.3	2%	3.4	1%	2.5	1%	20.0	1%
Annuities and donations	0.0	0%	0.0	0%	0.0	0%	21.6	2%
Agriculture	7.4	1%	3.4	2%	2.0	1%	14.5	1%
Accommodation and Food Services	4.4	1%	1.1	1%	0.9	0%	7.4	1%
Education and Training	1.4	0%	0.3	0%	0.3	0%	2.3	0%
Sub-total	595.2	74%	166.7	74%	133.4	72%	1,131.9	82%
Expenditure outside the respective region	207.3	26%	58.5	26%	51.4	28%	247.1	18%
Total	802.5	100%	225.2	100%	184.8	100%	1,379.0	100%

Table A1.2 Expenditure by the forest industry, 2015-16, by industry sector

Type of expenditure	Native forest		Softwood plantation		Hardwood plantation		Forests outside of Victoria		Victoria exc. south west	
	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)	Value (\$m)	Proportion of total (%)
Wages/Salaries	126.6	30%	169.5	25%	34.5	20%	48.3	40%	378.8	27%
Manufacturing	45.2	11%	81.7	12%	22.1	13%	10.5	9%	159.6	12%
Other Services	38.0	9%	67.9	10%	19.2	11%	10.4	9%	135.6	10%
Retail and Wholesale Trade	32.6	8%	56.9	9%	15.9	9%	7.4	6%	112.8	8%
Electricity, Gas, Water and Waste Services	29.2	7%	38.9	6%	13.3	8%	5.7	5%	87.0	6%
Transport, Postal and Warehousing	17.8	4%	30.2	5%	8.7	5%	4.1	3%	60.8	4%
Mining	14.7	4%	23.5	4%	7.5	4%	3.3	3%	48.9	4%
Communication	11.5	3%	13.5	2%	3.2	2%	3.0	2%	31.2	2%
Professional, Scientific and Technical Services	6.7	2%	16.0	2%	4.8	3%	3.0	3%	30.6	2%
Other	6.4	2%	9.8	1%	3.1	2%	1.6	1%	20.8	2%
Construction	5.2	1%	10.6	2%	3.0	2%	1.2	1%	20.0	1%
Annuities and donations	7.4	2%	9.8	1%	2.4	1%	1.9	2%	21.6	2%
Agriculture	2.1	1%	8.8	1%	2.3	1%	1.3	1%	14.5	1%
Accommodation and Food Services	1.9	0%	3.7	1%	1.1	1%	0.6	0%	7.4	1%
Education and Training	0.6	0%	1.1	0%	0.4	0%	0.2	0%	2.3	0%
Sub-total	345.9	83%	542.0	81%	141.6	80%	102.5	86%	1,131.9	82%
Expenditure outside the respective region	71.1	17%	124.4	19%	34.4	20%	17.1	14%	247.1	18%
Total	417.0	100%	666.4	100%	176.0	100%	119.6	100%	1,379.0	100%

Table A1.3 Economic impacts of the Victorian forest industry, by sector, on the Central Highlands and Gippsland region

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	189.1	1,446.2	433.8	3.2	54.7	1,836.1
Direct (\$m)	166.2	758.7	217.0	1.5	27.7	880.2
Production-induced (\$m)	8.1	448.6	107.2	1.0	14.2	579.0
Consumption-induced (\$m)	14.8	238.9	109.5	0.8	12.8	376.8
GRP (\$m)	58.1	467.0	190.2	1.5	23.7	740.5
Direct (\$m)	46.3	149.1	84.4	0.6	10.5	290.9
Production-induced (\$m)	3.6	186.5	45.4	0.4	6.2	242.1
Consumption-induced (\$m)	8.2	131.5	60.3	0.4	7.0	207.4
Household Income (\$m)	18.6	299.2	137.1	1.0	16.0	471.9
Direct (\$m)	11.9	113.0	72.8	0.5	7.8	206.0
Production-induced (\$m)	2.6	119.9	33.9	0.3	4.7	161.4
Consumption-induced (\$m)	4.1	66.3	30.4	0.2	3.5	104.6
Employment (total)	201	4,154	1,868	21	374	6,618
Direct (total)	99	1,564	903	13	251	2,830
Production-induced (total)	35	1,507	468	5	65	2,079
Consumption-induced (total)	67	1,084	497	4	58	1,710

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.4 Economic impacts of the Victorian forest industry, by sector, on the North Central region

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	70.2	352.4	169.3	1.2	21.6	513.5
Direct (\$m)	64.5	210.2	85.3	0.6	11.3	270.6
Production-induced (\$m)	1.9	83.9	47.8	0.4	5.6	139.4
Consumption-induced (\$m)	3.9	58.4	36.2	0.3	4.8	103.5
GRP (\$m)	23.4	130.0	67.9	0.5	9.3	231.1
Direct (\$m)	20.4	62.5	27.7	0.2	4.3	115.1
Production-induced (\$m)	0.8	35.1	20.0	0.2	2.4	58.5
Consumption-induced (\$m)	2.2	32.5	20.2	0.1	2.7	57.6
Household Income (\$m)	5.1	76.3	47.3	0.3	6.2	135.3
Direct (\$m)	3.4	37.7	22.9	0.1	3.2	67.3
Production-induced (\$m)	0.6	22.4	14.4	0.1	1.8	39.3
Consumption-induced (\$m)	1.1	16.1	10.0	0.1	1.3	28.6
Employment (total)	50	1,128	716	8	151	2,052
Direct (total)	24	544	327	5	102	1,002
Production-induced (total)	8	304	215	2	26	554
Consumption-induced (total)	19	280	173	1	23	496

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.5 Economic impacts of the Victorian native forest industry, by sector

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	169.3	1,222.6	299.1	3.1	10.5	1,444.1
Direct (\$m)	115.4	506.1	96.9	0.9	3.3	462.2
Production-induced (\$m)	13.7	350.4	66.9	0.8	3.0	434.9
Consumption-induced (\$m)	40.1	366.1	135.3	1.4	4.1	547.0
GRP (\$m)	54.0	439.6	144.6	1.5	4.7	644.4
Direct (\$m)	27.1	104.2	46.2	0.4	1.3	179.2
Production-induced (\$m)	6.1	146.0	28.3	0.4	1.3	182.1
Consumption-induced (\$m)	20.8	189.4	70.0	0.7	2.1	283.1
Household Income (\$m)	28.5	259.6	95.9	1.0	2.9	387.9
Direct (\$m)	13.6	71.6	40.2	0.3	0.9	126.6
Production-induced (\$m)	3.8	86.7	18.3	0.3	0.9	109.9
Consumption-induced (\$m)	11.1	101.3	37.4	0.4	1.1	151.4
Employment (total)	318	3,273	1,131	16	55	4,792
Direct (total)	131	1,034	436	8	30	1,639
Production-induced (total)	42	919	207	3	10	1,180
Consumption-induced (total)	145	1,320	488	5	15	1,973

n.p. - not published in order to preserve respondent confidentiality.

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.6 Economic impacts of the Victorian softwood plantation industry, by sector

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	301.7	1,570.2	669.0	6.3	126.9	2,358.1
Direct (\$m)	251.5	591.6	208.8	1.9	40.0	777.9
Production-induced (\$m)	12.6	489.7	199.3	1.8	36.8	740.2
Consumption-induced (\$m)	37.5	488.9	260.9	2.6	50.1	840.0
GRP (\$m)	106.4	584.2	287.2	2.9	56.7	1,037.4
Direct (\$m)	81.4	125.5	68.0	0.8	15.1	290.8
Production-induced (\$m)	5.6	205.8	84.2	0.8	15.7	312.0
Consumption-induced (\$m)	19.4	253.0	135.0	1.4	25.9	434.7
Household Income (\$m)	26.6	346.6	185.0	1.9	35.5	595.6
Direct (\$m)	12.8	87.8	57.1	0.6	11.2	169.5
Production-induced (\$m)	3.5	123.6	55.7	0.6	10.5	193.7
Consumption-induced (\$m)	10.4	135.3	72.2	0.7	13.9	232.4
Employment (total)	257	4,234	2,390	32	663	7,577
Direct (total)	84	1,163	811	17	362	2,437
Production-induced (total)	37	1,308	638	6	121	2,110
Consumption-induced (total)	135	1,763	941	9	181	3,030

n.p. - not published in order to preserve respondent confidentiality.

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.7 Economic impacts of the Victorian hardwood plantation industry, by sector

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	69.1	479.6	135.9	3.8	24.5	609.3
Direct (\$m)	49.3	189.9	42.3	1.1	7.7	186.7
Production-induced (\$m)	8.0	157.6	40.9	0.9	7.1	214.6
Consumption-induced (\$m)	11.8	132.1	52.7	1.7	9.7	208.0
GRP (\$m)	21.8	152.7	58.0	1.8	10.9	245.3
Direct (\$m)	12.2	18.5	13.4	0.5	2.9	47.7
Production-induced (\$m)	3.5	65.8	17.3	0.4	3.0	90.0
Consumption-induced (\$m)	6.1	68.4	27.3	0.9	5.0	107.6
Household Income (\$m)	8.3	93.7	37.4	1.2	6.9	147.5
Direct (\$m)	2.7	17.8	11.4	0.4	2.2	34.5
Production-induced (\$m)	2.4	39.3	11.4	0.3	2.0	55.4
Consumption-induced (\$m)	3.3	36.6	14.6	0.5	2.7	57.5
Employment (total)	89	1,087	484	19	129	1,808
Direct (total)	21	193	162	10	71	457
Production-induced (total)	26	417	131	3	23	600
Consumption-induced (total)	42	477	190	6	35	750

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.8 Economic impacts of Victorian forest industry activity not dependent on Victorian forests, by sector

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Output^a (\$m)	70.7	407.1	20.0	6.3	2.7	432.2
Direct (\$m)	38.4	175.8	6.8	1.9	0.8	149.2
Production-induced (\$m)	14.1	84.3	5.7	1.5	0.8	106.3
Consumption-induced (\$m)	18.2	147.0	7.4	2.9	1.1	176.6
GRP (\$m)	30.2	172.9	9.1	3.2	1.2	216.6
Direct (\$m)	14.6	61.1	2.8	1.0	0.3	79.8
Production-induced (\$m)	6.2	35.7	2.4	0.7	0.3	45.3
Consumption-induced (\$m)	9.4	76.1	3.9	1.5	0.5	91.4
Household Income (\$m)	12.9	104.3	5.3	2.1	0.7	125.2
Direct (\$m)	3.6	42.0	1.6	0.8	0.2	48.3
Production-induced (\$m)	4.2	21.6	1.6	0.5	0.2	28.1
Consumption-induced (\$m)	5.0	40.7	2.1	0.8	0.3	48.9
Employment (total)	148	1,254	68	32	16	1,518
Direct (total)	36	495	23	17	10	581
Production-induced (total)	47	229	18	5	3	301
Consumption-induced (total)	66	530	27	10	4	637

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.9 Economic impacts of the Victorian forest industry, by sector – all of Victoria (excluding the south west), all parts of the industry

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole industry (excludes transfers)
Output^a (\$m)	610.7	3,679.5	1,124.0	19.5	164.5	4,843.6
Direct (\$m)	454.6	1,463.4	354.8	5.9	51.9	1,576.1
Production-induced (\$m)	48.5	1,082.0	312.8	5.0	47.7	1,496.0
Consumption-induced (\$m)	107.6	1,134.1	456.4	8.6	64.9	1,771.6
GRP (\$m)	212.5	1,349.4	498.8	9.4	73.5	2,143.7
Direct (\$m)	135.4	309.3	130.4	2.7	19.6	597.5
Production-induced (\$m)	21.4	453.2	132.2	2.3	20.3	629.4
Consumption-induced (\$m)	55.7	586.9	236.2	4.4	33.6	916.8
Household Income (\$m)	76.3	804.2	323.6	6.1	46.0	1,256.2
Direct (\$m)	32.7	219.2	110.3	2.1	14.5	378.8
Production-induced (\$m)	13.8	271.2	87.1	1.6	13.6	387.2
Consumption-induced (\$m)	29.8	313.8	126.3	2.4	18.0	490.2
Employment (total)	812	9,848	4,073	99	864	15,696
Direct (total)	272	2,885	1,432	52	473	5,115
Production-induced (total)	152	2,872	995	16	156	4,191
Consumption-induced (total)	388	4,090	1,646	31	234	6,389

a - Total output for combined sectors may be lower than the sum of output for individual sectors as it excludes transfers between sectors to prevent double counting.

Table A1.10 Proportion of Central Highlands and Gippsland residents who reported the forest, farming and tourism industries had a NEGATIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=340)	Forestry, wood & paper manufacturing (n=308)	Forestry, wood & paper manufacturing (n=30)	Farming (n=661)	Farming (n=451)	Farming (n=210)	Tourism (n=486)	Tourism (n=357)	Tourism (n=129)
Local employment	7%	8%	6%	4%	3%	5%	2%	2%	1%
Cost of living (food, rent)	6%	6%	9%	5%	4%	8%	20%	18%	25%
Friendliness of the local community	11%	11%	10%	4%	4%	5%	4%	3%	5%
Health of local residents	22%	22%	22%	10%	10%	10%	5%	6%	4%
Traffic on local roads	54%	52%	72%	33%	32%	35%	59%	58%	62%
Quality of local roads	60%	59%	69%	40%	36%	49%	44%	42%	49%
Attractiveness of the local landscape	48%	47%	56%	11%	12%	9%	8%	7%	12%
Local water quality	26%	26%	25%	20%	21%	18%	8%	8%	9%
Health of local environment	40%	40%	41%	18%	19%	17%	19%	19%	22%
Bushfire risk	33%	32%	47%	16%	16%	15%	30%	28%	35%
Land prices	19%	19%	16%	11%	11%	12%	18%	18%	20%

Table A1.11 Proportion of North Central region residents who reported the forest, farming and tourism industries had a NEGATIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=143)	Forestry, wood & paper manufacturing (n=71)	Forestry, wood & paper manufacturing (n=72)	Farming (n=780)	Farming (n=127)	Farming (n=651)	Tourism (n=500)	Tourism (n=97)	Tourism (n=402)
Local employment	6%	1%	11%	4%	3%	4%	3%	0%	4%
Cost of living (food, rent)	8%	4%	12%	7%	2%	7%	16%	10%	17%
Friendliness of the local community	7%	3%	11%	4%	1%	4%	6%	3%	6%
Health of local residents	17%	14%	19%	16%	8%	18%	8%	4%	9%
Traffic on local roads	50%	50%	51%	32%	21%	34%	41%	32%	43%
Quality of local roads	57%	54%	60%	42%	32%	44%	33%	16%	37%
Attractiveness of the local landscape	46%	46%	45%	11%	7%	12%	8%	6%	9%
Local water quality	26%	22%	29%	16%	15%	17%	10%	10%	10%
Health of local environment	26%	20%	32%	21%	15%	22%	19%	16%	19%
Bushfire risk	32%	32%	32%	21%	20%	21%	25%	19%	26%
Land prices	19%	14%	23%	12%	9%	13%	18%	12%	19%

Table A1.12 Proportion of Western Victoria residents who reported the forest, farming and tourism industries had a NEGATIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=93)	Forestry, wood & paper manufacturing (n=33)	Forestry, wood & paper manufacturing (n=60)	Farming (n=505)	Farming (n=51)	Farming (n=453)	Tourism (n=397)	Tourism (n=44)	Tourism (n=353)
Local employment	4%	0%	7%	4%	9%	4%	1%	0%	2%
Cost of living (food, rent)	5%	6%	5%	6%	10%	6%	20%	36%	18%
Friendliness of the local community	9%	9%	8%	5%	6%	5%	6%	11%	5%
Health of local residents	14%	21%	10%	13%	17%	12%	5%	7%	4%
Traffic on local roads	52%	48%	54%	34%	33%	34%	55%	68%	54%
Quality of local roads	68%	76%	63%	44%	46%	43%	42%	57%	40%
Attractiveness of the local landscape	58%	58%	58%	10%	6%	10%	8%	11%	8%
Local water quality	27%	30%	25%	18%	20%	18%	6%	7%	6%
Health of local environment	29%	36%	25%	22%	21%	22%	15%	11%	16%
Bushfire risk	32%	27%	34%	20%	27%	19%	27%	36%	26%
Land prices	17%	15%	18%	12%	21%	10%	26%	30%	26%

Table A1.13 Proportion of Central Highlands and Gippsland residents who reported the forest, farming and tourism industries had a POSITIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=340)	Forestry, wood & paper manufacturing (n=308)	Forestry, wood & paper manufacturing (n=30)	Farming (n=661)	Farming (n=451)	Farming (n=210)	Tourism (n=486)	Tourism (n=357)	Tourism (n=129)
Local employment	79%	81%	63%	86%	85%	87%	93%	94%	90%
Cost of living (food, rent)	32%	34%	19%	43%	43%	41%	30%	31%	28%
Friendliness of the local community	35%	37%	13%	68%	68%	67%	70%	72%	63%
Health of local residents	24%	25%	13%	49%	48%	50%	35%	37%	30%
Traffic on local roads	20%	22%	6%	21%	19%	24%	23%	23%	23%
Quality of local roads	20%	22%	3%	17%	17%	16%	23%	25%	19%
Attractiveness of the local landscape	25%	26%	19%	60%	58%	64%	53%	54%	50%
Local water quality	20%	21%	16%	27%	26%	29%	20%	22%	15%
Health of local environment	22%	23%	16%	40%	41%	40%	31%	33%	27%
Bushfire risk	37%	37%	31%	41%	39%	47%	21%	21%	21%
Land prices	19%	20%	13%	41%	39%	47%	36%	35%	40%

Table A1.14 Proportion of North Central region residents who reported the forest, farming and tourism industries had a POSITIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=143)	Forestry, wood & paper manufacturing (n=71)	Forestry, wood & paper manufacturing (n=72)	Farming (n=780)	Farming (n=127)	Farming (n=651)	Tourism (n=500)	Tourism (n=97)	Tourism (n=402)
Local employment	77%	89%	65%	87%	81%	88%	91%	91%	91%
Cost of living (food, rent)	28%	31%	26%	49%	40%	50%	39%	40%	39%
Friendliness of the local community	33%	32%	34%	72%	69%	73%	76%	73%	77%
Health of local residents	26%	26%	26%	50%	53%	49%	47%	42%	48%
Traffic on local roads	18%	21%	15%	31%	27%	32%	33%	31%	33%
Quality of local roads	19%	25%	14%	26%	23%	27%	30%	35%	28%
Attractiveness of the local landscape	29%	29%	29%	59%	60%	59%	64%	58%	66%
Local water quality	19%	17%	21%	36%	36%	36%	33%	29%	34%
Health of local environment	26%	27%	26%	46%	41%	47%	40%	34%	42%
Bushfire risk	34%	33%	34%	40%	45%	39%	25%	21%	25%
Land prices	15%	18%	12%	50%	47%	51%	43%	39%	44%

Table A1.15 Proportion of Western Victoria residents who reported the forest, farming and tourism industries had a POSITIVE impact on different aspects of community life

	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence	All residents	LGAs/towns with HIGH forest industry dependence	LGAs/towns with LOW forest industry dependence
	Forestry, wood & paper manufacturing (n=93)	Forestry, wood & paper manufacturing (n=33)	Forestry, wood & paper manufacturing (n=60)	Farming (n=505)	Farming (n=51)	Farming (n=453)	Tourism (n=397)	Tourism (n=44)	Tourism (n=353)
Local employment	64%	91%	49%	83%	89%	82%	93%	98%	92%
Cost of living (food, rent)	19%	30%	13%	42%	58%	40%	34%	30%	35%
Friendliness of the local community	30%	42%	23%	66%	75%	65%	72%	70%	73%
Health of local residents	22%	33%	16%	48%	54%	47%	37%	39%	37%
Traffic on local roads	17%	21%	15%	24%	25%	24%	22%	18%	23%
Quality of local roads	11%	12%	10%	19%	19%	19%	23%	16%	23%
Attractiveness of the local landscape	15%	9%	18%	59%	64%	59%	62%	48%	64%
Local water quality	10%	6%	11%	28%	27%	28%	22%	25%	22%
Health of local environment	15%	12%	17%	43%	52%	42%	34%	41%	33%
Bushfire risk	35%	42%	31%	40%	38%	41%	18%	23%	18%
Land prices	16%	18%	15%	46%	60%	44%	37%	48%	36%

Appendix 2 Using ABS Census data to identify employment in secondary processing

Data from the ABS Census were used to estimate the number of jobs generated in 'secondary processing', defined as processing in which already processed wood and paper products are further processed. As described in the main body of this report, primary processing was defined as the jobs generated at processing plants which take in roundwood products and transform roundwood into initial wood and paper products. In some cases, sites that take in roundwood further process initial wood and fibre products into secondary processed products. For simplicity, all the employment at these sites was counted as 'primary processing'.

Our definition of primary processing employment is therefore that it is the employment generated at sites that process wood and fibre products from roundwood. Secondary processing occurs at sites that take in already processed wood and fibre products and further process these.

When using ABS Census data, a two-step process was used to identify employment in primary processing versus secondary processing. First, jobs were classified into 'primary' and 'secondary' processing based on the industry categories defined in ANZ-SNZ (2016), as follows:

- Primary processing: The following four digit ANZSIC categories were considered to be predominantly composed of primary processing activities:
 - Log Sawmilling and Timber Dressing, not further defined
 - Log Sawmilling
 - Wood Chipping
 - Timber Resawing and Dressing
 - Other Wood Product Manufacturing, not further defined
 - Reconstituted Wood Product Manufacturing
 - Veneer and Plywood Manufacturing
 - Pulp, Paper and Converted Paper Product Manufacturing, not further defined
 - Pulp, Paper and Paperboard Manufacturing.
- Secondary processing: The following four digit ANZSIC categories were considered to be predominantly composed of secondary processing activities:
 - Wood Product Manufacturing, not further defined.
 - Prefabricated Wooden Building Manufacturing
 - Wood Structural Fitting and Component Manufacturing
 - Other Wood Product Manufacturing not elsewhere classified
 - Converted Paper Product Manufacturing, not further defined
 - Corrugated Paperboard and Paperboard Container Manufacturing
 - Paper Bag Manufacturing
 - Paper Stationery Manufacturing
 - Sanitary Paper Product Manufacturing
 - Other Converted Paper Product Manufacturing.

However, there are cases in which either (i) Census data are mis-classified, with workers at a given facility classified into an incorrect industry category, or in which (ii) while correctly classified

according to the industry definitions used by the ABS, a wood or paper processing facility classified as primary processing does not utilise roundwood as an input and is in fact a secondary processor.

Therefore, the second step in analysis was to compare known data from our industry survey to ABS data, and identify areas in which data did not match. Where there was a mismatch, the businesses involved were then identified and contacted to confirm whether or not they were a primary processor or secondary processor. For example, the ABS Census records a number of jobs in reconstituted wood product manufacturing in Ballarat. However, the survey conducted for this project did not identify a reconstituted wood product manufacturer that took in roundwood operating in the region. However, four businesses were identified that further processed MDF and plywood into further products, using processes such as applying special coatings and joinery. Given this, the jobs classified by the ABS were re-classified as being in 'secondary processing'.

Based on this process, the following adjustments were made when classifying 'primary' versus 'secondary' processing employment in different local government areas using ABS Census data. Note that none of these adjustments involved any change in the total amount of employment generated in the region from wood and paper product manufacturing; it simply changed the number of jobs classified as being dependent on primary versus secondary processing.

- **Mitchell:** In this local government area, 51 jobs were reclassified from primary processing to secondary processing, including 22 jobs the ABS Census classified in log sawmilling; 9 in pulp, paper and converted paper product manufacturing not further defined; 17 in pulp, paper and paperboard manufacturing; and 3 in other wood product manufacturing not further defined. This reclassification was made based on phone calls with relevant local businesses that identified they engaged in secondary processing only (note that most workers in pulp and paper manufacturing worked at facilities in other local government areas that engaged in secondary paper processing)
- **Yarra Ranges:** In this local government area, 46 jobs were reclassified from primary processing to secondary processing, including 12 people the ABS Census classified in other wood product manufacturing not further defined; 20 in pulp, paper and converted paper product manufacturing not further defined; and 14 in pulp, paper and paperboard manufacturing. This was based on phone calls with relevant local businesses, and identification of workers employed in secondary processing of paper products in the region.
- **Wangaratta:** : In this local government area, 86 jobs were reclassified from primary processing to secondary processing, including 46 originally classified in Wood Chipping, and 40 jobs spread across log sawmilling and timber dressing, and veneer and plywood manufacturing. This was based on phone discussions with local businesses regarding their business activities.
- **Ballarat, Geelong, and nearby local government areas:** In these local government areas, 237 jobs were reclassified from primary to secondary processing, including 115 jobs in reconstituted wood product manufacturing; 47 in wood product manufacturing not further defined; 40 jobs in log sawmilling; 27 jobs in log sawmilling and timber dressing not further defined; 25 in pulp, paper and converted paper product manufacturing not further defined; and 23 in pulp, paper and paperboard manufacturing. This was based on phone calls with relevant local businesses, and identification of workers employed in secondary processing of paper products in the region.

- **Greater Melbourne (including all local government areas within the city and suburbs of Melbourne, except the Yarra Ranges):** A total of 1265 jobs were reclassified from primary to secondary processing, including 400 or 468 jobs in pulp, paper and paperboard manufacturing; 401 in pulp, paper and converted paper product manufacturing not further defined; 186 in wood product manufacturing not further defined; 50 in veneer and plywood manufacturing; and 228 in reconstituted wood product manufacturing. This was done after identifying that workers in these areas were most likely to work in local processing facilities that engaged in secondary processing only, as identified in phone discussions with those businesses.

These changes enabled a more robust assessment of primary and secondary processing employment, and the extent to which employment depends on availability of roundwood versus availability of primary processed products as inputs.

ABS Census data used in this report have been randomised. This means that numbers have been randomly adjusted by small amounts when produced by the ABS TableBuilderPro product. Because of this randomisation, the ABS Census data we present will vary by small amounts (usually less than 20-30 workers in any given region) from other analyses.