Forest & Wood Products Australia

Socio-economic impacts of the forest industry

Tasmania

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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 Tasmania, where the forest industry has experienced rapid change in the last decade, particularly in the native forest sector.

The data analysed for this report was drawn from (i) a survey of forest industry businesses conducted in 2017 to 2018, in which 46% of key businesses completed the survey, while data on the remaining 54% was obtained from industry experts, other businesses, and publicly available information; (ii) using data from businesses surveyed and experts to identify employment and expenditure for a number of businesses not actively surveyed; (iii) the 2006, 2011 and 2016 Australian Bureau of Statistics (ABS) *Census of Population and Housing*; (iv) economic modelling using EconSearch's RISE regional input-output model; and (v) 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

Tasmania's forest industry is diverse, and includes wood and fibre production from native forest, hardwood plantations and softwood plantations grown within the State. 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 on harvest of wood and fibre from native forest and plantations grown in Tasmania. 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, primary wood and fibre products 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 Tasmanian-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.

Tasmania's forest industry produces wood, fibre and paper products from native forest, softwood plantations and hardwood plantations grown in the state. These three sectors have experienced very different types of change in the last decade: the volume harvested from native forests fell substantially during this period, with the volume harvested annually since 2011 less than one-third what was typically harvested each year prior to 2009. The softwood plantation estate has remained relatively stable as have harvest volume from it. The hardwood plantation estate, which after steady

expansion in the 1990s expanded rapidly in the 2000s, with expansion ceasing when Managed Investment Scheme (MIS) companies collapsed during the global financial crisis (GFC), supported around one million cubic metres of roundwood harvest a year up to 2008, followed by a decline to around one-third that level during the GFC; since 2013 harvest has expanded rapidly and reached over two million cubic metres in 2015-16 with harvest volumes increasing annually as more plantations reach maturity.

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. In addition, a limited amount of data on secondary processing is provided, drawing on employment data from the Australian Bureau of Statistics (ABS) *Census of Population and Housing.* 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 Tasmania 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 detail in this report. In this report, forest industry activities in Tasmania are analysed as a whole. Data are also examined for the Cradle Coast, Northern and Southern regions.

Economic value

In 2015-16, the direct value of output generated by the Tasmanian forest industry at the point of sale of primary processed products was $712 million, increasing to $1,277 million when flow-on effects generated in other industries as a result of spending by the forest industry are included. This total included $272 million in the Cradle Coast region, $458 million in the Northern region and $425 million in the Southern region. 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 $314 million to GRP in Tasmania, and a total of $615 million once flow-on effects through the entire economy were included. This total included $146 million from business dependent on native forests, $244 million dependent on softwood plantations and $225 million dependent on hardwood plantations. The contributions to total GRP by region were $151 million in the Cradle Coast, $235 million in the Northern region and $171 million in the Southern region.

Employment

The forest industry in Tasmania generated a total of 2,714 direct jobs up to the point of primary processing as of 2017-18. A further estimated 362 further direct jobs were generated by secondary processing activities as of August 2016. This means a total of 3,076 direct jobs were generated in the Tasmanian forest industry as of 2017-18. The estimated flow-on employment generated by activities up to and including primary processing was an additional 2,651 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 2,714 jobs generated up to the point of primary processing, 1,112 direct jobs were generated by the native forest industry, 903 by softwood plantations, and 699 by hardwood plantations. The number of jobs varied by region. Of the 2,714 direct jobs generated up to and including primary processing, 653 were located in the Cradle Coast region, 1,035 in the Northern region and 1,014 in the Southern region.

When direct jobs up to the point of primary processing are compared, the largest proportion of direct jobs in the industry in Tasmania (41.0%) were generated by native forests, followed by softwood plantation (33.3%) and hardwood plantations (25.7%). There is regional variation as well, with 38.3% of all jobs generated up to and including primary processing being based in the Northern region, 37.5% in the Southern region and 24.2% in the Cradle Coast region. When secondary processing jobs are included, this remains similar, with 37.4% of jobs in the Northern region, 24.0% in the Cradle Coast, and 38.6% in the Southern region.

Many of the jobs generated by the Tasmanian forest industry are located in just a few local government areas (LGAs). The largest number of direct jobs up to and including primary processing were generated in Launceston, with 435 jobs, followed by Dorset (239 jobs), Circular Head (236), Derwent Valley (244) and Hobart (203 jobs). However, not all these LGAs have a high proportion of the labour force employed in the industry, as the size of their workforce varies substantially. For example, in Launceston 1.6% of jobs rely directly on the forest industry.

Across Tasmania, the LGAs with the highest reliance on the forest industry for direct employment were Dorset (9.3% of workers directly employed in the forest industry), Circular Head (6.6% of the workforce), Derwent Valley (6.5%), George Town (6.0%), the Central Highlands (5.4% of a small-sized workforce), Huon Valley (2.7%), and Waratah/Wynyard (2.2%). In all other LGAs, less than two per cent of the workforce were directly employed in the forest industry.

Information is available on how employment has changed in the forest industry since 2006 from two key sources: (i) the ABS Census of Population and Housing (Census), and (ii) surveys of the forest industry up to the point of primary processing (Forest Industry Survey, or FIS). Data from both these sources show an overall decline in forest industry employment over time. Census data show a 55.2% decline in total employment in the forest industry between 2006 and 2016, including a 36.0% decline from 2006 to 2011, and a 30.0% decline between 2011 and 2016. The Forest Industry Survey data series shows a 57.8% decline in employment between 2006 and 2017-18, very similar to the decline shown in the Census data. The more detailed time series of the FIS also shows that job decline predominantly occurred between 2008 and 2011 within the broader time period examined. The FIS data series shows jobs dependent on native forests fell by 73.0% between 2006 and 2017-18, while jobs dependent on hardwood plantations fell 29.4% and those dependent on softwood plantations fell 35.4% during the same period.

Following the steep decline in jobs that occurred between 2008 and 2011, employment in the industry overall stabilised post-2013. However this overall stabilisation was due to two different trends: decline in native forest dependent jobs during this period was offset by growth in jobs in the hardwood plantation sector.

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 Tasmanian forest industry generates more full-time jobs than other parts of the Tasmanian economy, with 82% of those employed in the industry working full-time in 2016, compared to 60% of the broader workforce in Tasmania. 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 earned higher incomes than those in other industries, due to their higher rates of full-time work; when incomes of full-time workers in the forest industry were compared to full-time workers in other industries, income levels were similar.

Workforce diversity and sustainability

To be sustainable over time, every industry needs to successfully recruit and retain workers. In the Tasmanian forest industry, only 18% of workers were female in 2016 (compared to 49% of the broader employed labour force). Four per cent of Tasmanian forest industry workers identified as Aboriginal or Torres Strait Islander in 2016, identical to the broader Tasmanian workforce. The industry's workforce aged at a slightly faster rate between 2006 and 2016 than the rest of the workforce, with a decline in the proportion of younger workers likely related to loss of jobs in the industry and limited recruitment of new workers from 2008 onwards.

When asked how easy or difficult they found it to recruit different types of workers, 75% of forest industry businesses reported finding it difficult to recruit managers and high level professional staff, followed by administration staff (40% finding it difficult to recruit staff) and finance managers/book keepers (40% finding it difficult to recruit staff). Only 25% per cent found it challenging to source transport staff or drivers, and most businesses (60%) found it easy to source heavy machine operators. However, few harvest and haulage contractors responded to these questions, meaning that in this sector greater difficulties may be occurring than reported here.

When asked what factors made it difficult to recruit staff, the investment and time required to build workforce skills was the top issue identified by businesses, with 71% reporting that this was a big issue for them (Figure 6). For 57%, a lack of available workers with the right skills and qualifications, and a lack of suitable workers available in their local community, were significant challenges affecting their ability to recruit staff. Half reported that other businesses being able to offer higher wages was a big issue, and this was a moderate issue for 33%, with few reporting this was not an issue. Forty per cent of businesses felt that lack of certainty about the future of the industry was a big issue that reduced ability to recruit staff – these were predominantly native forest-dependent businesses, with this issue rarely reported by those in the plantation sector.

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 and chainsaw and other hand-held machinery, with 100% of businesses reporting a need for these skills. Other common business requirements included skills that are used across forest types and business types, including compliance training (86%), operation of heavy machinery

(71%), fire-fighting (71%), IT/software training specialised to the industry (71%), marketing and sales (71%) and community relations and engagement (71%).

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 road transport and driver training, forest ecology planning and management, chainsaw and hand-held machinery operation, heavy machinery operation and firefighting; in some cases, this was supplemented by in-house training. RTOs were also the most common methods for training in forest ecology and silviculture and business and financial management, although many businesses also used opted for in-house training by other staff. In-house training was more common than use of a RTO for community relations/engagement, marketing/sales, OHS and compliance training.

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 slower in the forest industry compared to the rest of the workforce. However, forest industry workers were similarly likely to have completed a certificate qualification than those in other parts of the workforce (40% compared to 39% 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 except for forestry support services.

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. Thirty four per cent of businesses described business condition in late 2017 and early 2018 as 'more challenging than usual', 41% as 'the same as usual' and 25% as 'easier than usual'. Just over half of the businesses operating in native forests (53%) felt that business conditions were 'about the same as usual' and only 7% indicated business conditions were 'easier than usual'. Business conditions were more positive for the plantation sector. Just over a third of businesses (38%) operating in the softwood industry indicated business conditions were 'easier than usual', with 31% indicating they were 'about the same as usual', and 31% indicating they were 'more challenging than usual'. Businesses working in hardwood plantations had similar views to those operating in the softwood sector, with 44% of hardwood plantation businesses indicating business conditions were 'easier than usual', 31% indicating they were 'about the same as usual' and 25% indicating business conditions were 'more challenging than usual'.

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. Just over half (55%) felt demand would grow, and the remainder (45%) felt that that demand would remain about the same. No businesses reported feeling that demand for their services or products 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 were a lack of investment in the industry (60%), difficulty obtaining labour (50%), difficulty accessing some markets (33%), and difficulty obtaining finance (20%).

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 Tasmania, including the Cradle Coast, Northern and Southern regions, 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 or likely to rate their community as 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 83% of those who lived in the Northern region LGAs with more than 2% of their workforce directly employed in the forest industry (Dorset and George Town), 76% of those who lived in Cradle Coast LGAs with more than 2% forest industry employment (Circular Head and Waratah-Wynyard), and 67% of those living in Southern LGAs with higher forest industry dependence (Central Highlands, Derwent Valley and Huon Valley).

When asked to assess the effects they felt the forest industry had on their community, the large majority of residents – 79% in the Cradle Coast, 73% in the Northern and 80% in the Southern 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.

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, but that job numbers have stabilised since 2013. This stabilisation of employment is the result of growth in employment in the hardwood plantation sector offsetting some ongoing decline in native forest dependent jobs. 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. There are clear differences in the outlook for the native forest and plantation sectors, with native forest dependent businesses reporting less positive business conditions and having less employment growth and greater challenges, and plantation businesses more likely to report positive business conditions.

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 and changing markets all contributing to evolving skills, training and technology needs (AFPA 2016). 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 Tasmania.

This report examines activity dependent on the harvest of timber from softwood plantation, hardwood plantation and native forests in Tasmania. It examines the following aspects of the Tasmanian 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 Tasmania conducted between February 2017 and April 2018. Of 146 key businesses operating in the industry (including nurseries, plantation management businesses, silvicultural contractors, harvest and haulage contractors, and wood and paper processors), 46% completed the survey, while 54% did not take part. A further 126 smaller contracting businesses were not asked to take part, with information instead obtained via data provided by forest managers who used their services. Of the 46% of the 156 surveyed businesses who completed the survey, 60% of businesses completed every question, including many large businesses operating in the industry, and 40% completed a shorter version over the phone. 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, 2011 and 2016 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.

The survey response rate for this study was lower than that for previous studies of the Tasmanian forest industry (Schirmer 2009, 2010, 2011; Schirmer et al. 2014). While the majority of businesses agreed to participate in the survey, many did not subsequently complete surveys despite multiple reminders, with many citing high business demand and work hours as difficulties reducing their ability to complete a survey. It is also possible that survey fatigue and distrust of researchers in general contributed to low responses, with some businesses surveyed by multiple organisations in recent years, and not all believing that survey data are used in ways that support the forest industry.

Overview of the industry – Tasmania

Tasmania'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. The second part then describes in more detail the industry sectors that are dependent on native forest, softwood plantation and hardwood plantations in Tasmania.

Industry structure

The forest industry in Tasmania, 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. Each stage is described in more detail below.

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 Tasmania. This means that the primary production of logs and primary processing combine to create a strongly inter-linked supply chain within Tasmania (with some logs also exported to undergo primary processing outside Tasmania). This supply chain generates employment and economic activity based on the management and harvesting of Tasmanian-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 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 Tasmanian-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 provides a stylised representation of this structure. This report focuses primarily on understanding the employment and activity generated by the industry up to and including the 'primary processing' stage. 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.

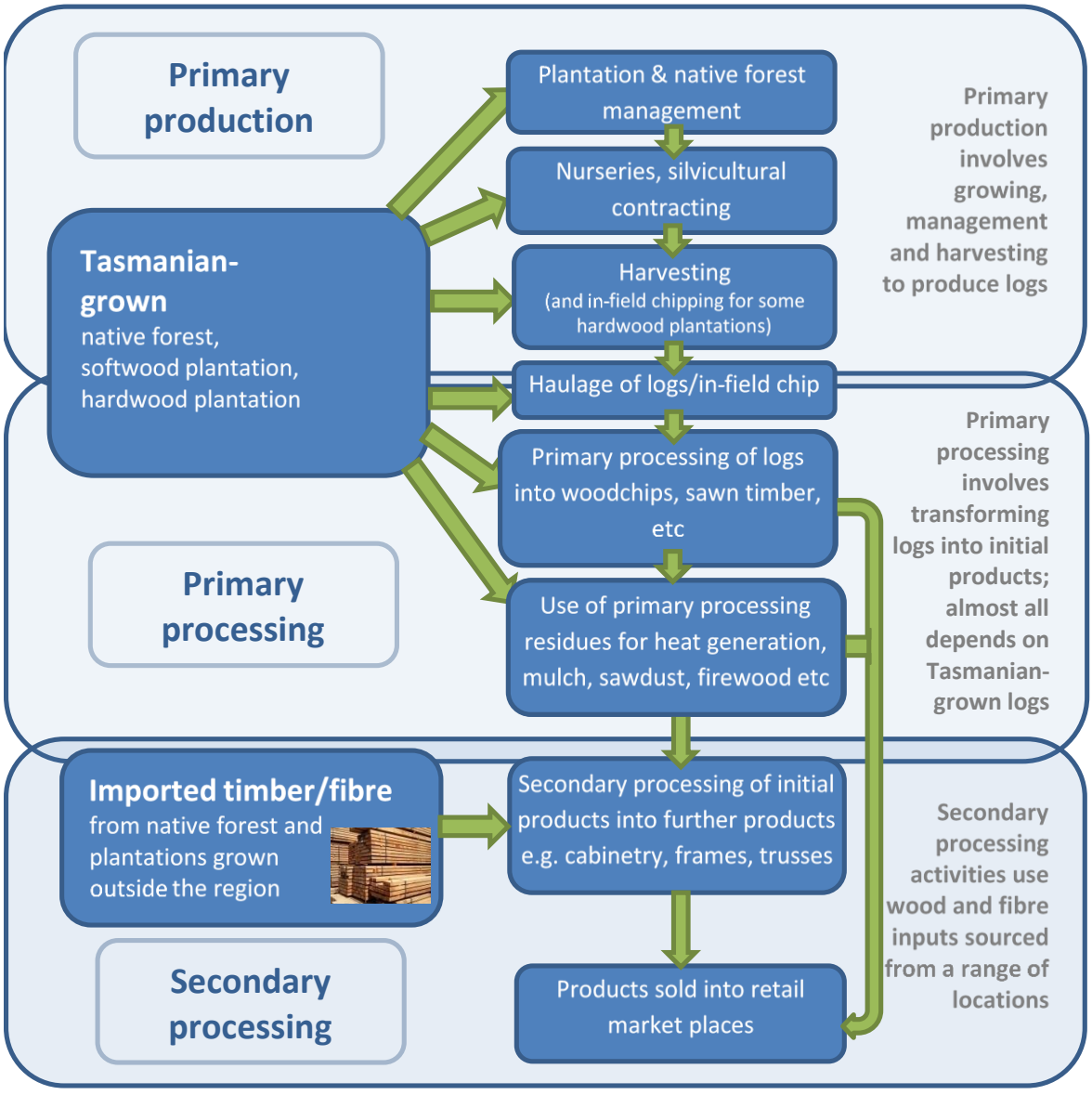


Figure 1 Stylised structure of the forest and wood products industry

In addition to examining the industry up to primary processing, data on employment in 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 Tasmania (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 Tasmania versus in other states or other countries.

Industry sectors

The native forest, softwood plantation, and hardwood plantation industries in Tasmania are distinct sectors, each of which produces different types of products, and services different markets. Figure 2 shows the change in volume harvested from native forest and plantations between 2005-06 and 2015-16. Each sector is described briefly below, followed by a brief overview of economic activities other than wood and fibre production that also occur in native forest and plantation areas.

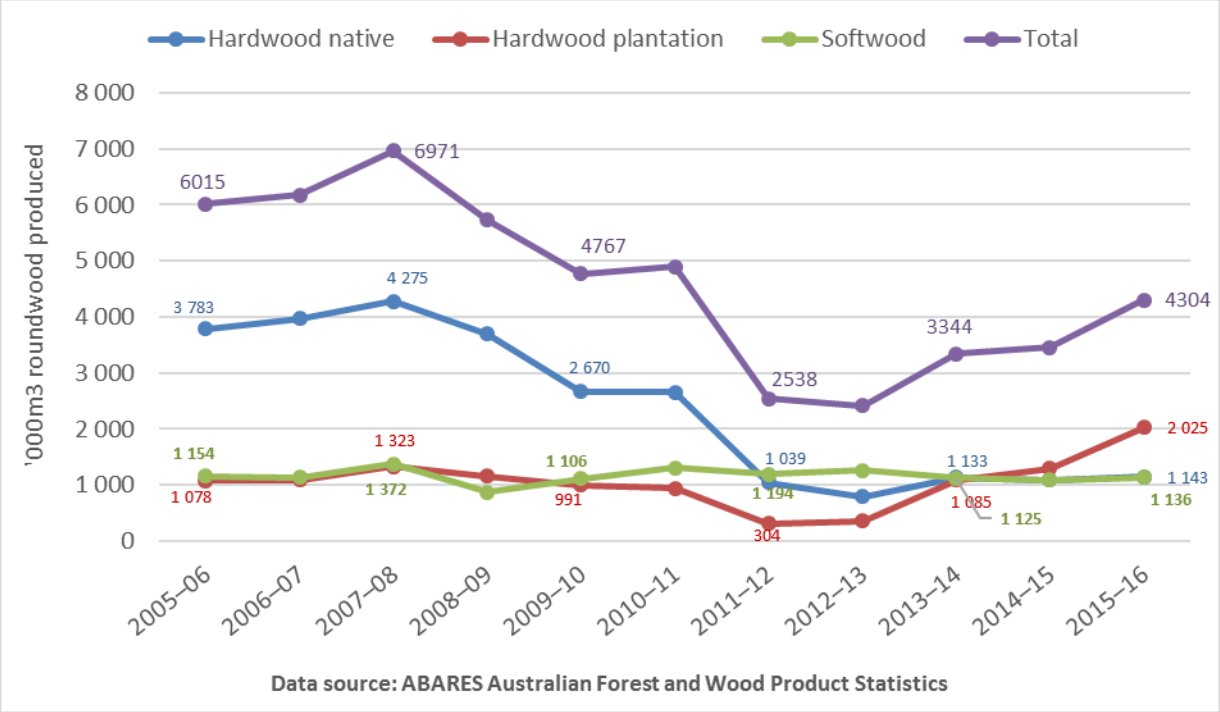


Figure 2 Volume of logs harvested in Tasmania, by forest sector, 2005-06 to 2015-16

Native forest sector

The native forest industry in Tasmania relies largely on timber harvested from publicly owned native forests distributed around the state, with private native forest also harvested. As can be seen in Figure 2, native forest logs represented the majority of timber harvested in Tasmania in the 2000s, but this has changed rapidly over the last decade. Whereas in 2005-06 native forest logs made up 63% of total log harvest in the state, by 2015-16, native forest represented 27% of the logs harvested, with the total amount harvested from native forests having declined from just under 3.8 million m^3 in 2005-06 to just over 1.1 million m^3 in 2015-16. This rapid and large decline in native forest harvest was a result of multiple factors. Major declines in harvest occurred during the global financial crisis, with demand for woodchips and sawntimber declining substantially. The collapse of Gunns Ltd led to major decline, and timber harvesting rights held by Gunns were not subsequently

distributed to other businesses. Instead, the Tasmanian forest peace process negotiations led to areas of native forest being placed in interim reserves from 2011 while a number of stakeholders sought to negotiate an agreement that could address ongoing contention over harvesting in Tasmania's native forests (Schirmer et al. 2016). The Tasmanian forest peace process led to the short-lived Tasmanian Forests Agreement (TFA), implemented through the *Tasmanian Forests Agreement Act 2013* (TFA Act), which was repealed in 2014 by the Tasmanian government. The ACT included an agreement to a long-term lower volume of harvest from public native forests in Australia; while the TFA Act was formally repealed, these lower harvest volumes have remained in place, with harvest volumes from native forest in Tasmania remaining around 1.1 million m^3 annually since 2013.

This history means that Tasmania's native forest industry changed substantially in a short space of time, with closure of multiple sawmills and woodchip processing sites since 2005. As of early 2018, native forest roundwood was processed at 47 processing sites located around the state, including woodchip mills, sawmills, and veneer mills. This figure includes a small number of mobile millers who mostly process small volumes of timber from private property. As some businesses operate multiple processing sites, the number of native forest processing businesses is smaller. After excluding small mobile millers, there were 35 individual businesses processing native forest timber as of early 2018; of these all but five processed native forest only; the other five also processed some plantation timber. Many of these are small businesses employing less than ten people, while 14 were larger employers with greater than 10 employees.

In this report, the native forest industry is not separated into the special species and eucalypt based industries that form two important, and sometimes diverging, supply chains that rely on native forests. This is for two reasons. First, the report captures all employment reliant on harvest, haulage and initial processing of both special species and eucalypts harvested from native forests, but many businesses found it difficult to estimate how much of their business relied on each, particularly some harvest and haulage contractors. Therefore the extent to which jobs in key parts of the industry were dependent on special species versus eucalypt species harvested from native forest was not able to be reliably estimated. Second, the study did not include secondary processing in the scope of the businesses to be surveyed, due to a lack of resources for this type of more extensive survey; many jobs in production of craftwood products, furniture, boats etc that use special species are generated in secondary processing. Instead, this study was designed to provide time series information that could be compared with past studies, which have used the same definitions and covered the same aspects of the industry. It therefore captures employment generated by special species up to the point of primary processing, but does not capture the further employment generated beyond this point in activities such as furniture making.

Softwood plantation sector

Tasmania's softwood plantations are largely located in the north of the state (Figure 3) as well as some central areas. In 2018, the area of softwood plantation estate was 75,900 hectares (Downham and Gavran 2018). This estate is increasing slightly with some areas of hardwood plantation being converted to softwood plantation after harvest, according to plantation managers surveyed for this report; however the area of softwood plantation has remained relatively stable for some time, as has the volume harvested from it (Figure 2). Logs harvested from softwood plantations are predominantly processed at six processing sites, five located in northern parts of Tasmania and one in Derwent Valley, with much smaller volumes processed at another five processing sites. Of these processing sites, four rely solely on softwood plantation logs, while the others process a mix of log types.

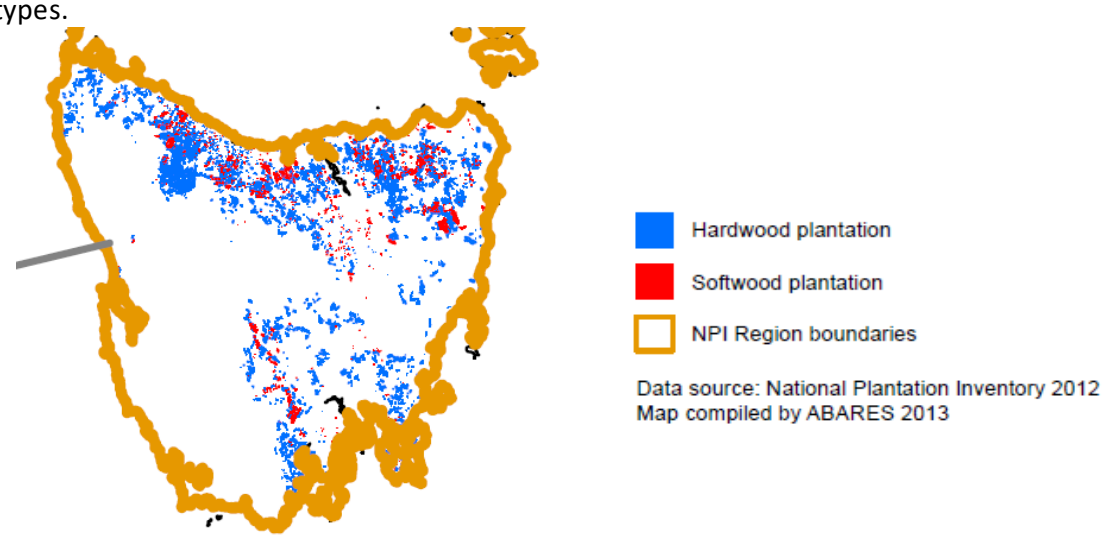


Figure 3 Distribution of softwood and hardwood plantations in Tasmania (Source: Reproduced from MPIGA & NFISC 2013)

Hardwood plantation sector

Tasmania's hardwood plantations estate is established around the state (Figure 3), with the largest areas of plantation distributed in the north of the state and less in the south. In total, there was 233,900 hectares of hardwood plantation as of 2018 (Downham and Gavran 2018).

Tasmania has a long history of establishment of hardwood plantations, with some areas established in the 1980s, and large areas established from the mid-1990s onwards by a number of companies. There was a particularly rapid period of establishment in the 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. Following a decline in harvest during the period in which multiple MIS companies collapsed (the late 2000s), volumes harvested from hardwood plantations increased rapidly: during 2005 to 2009 volumes averaged just over one million m^3 annually, followed by a decline to a low of 304,000 m^3 harvested in 2011-12 following collapse of many companies. After new businesses took over these plantations, and as more plantations reached maturity, harvest volumes increased, reaching over two million m^3 in 2015-16, and have increased rapidly since 2016 based on survey data supplied by plantation managers surveyed for this project.

Most hardwood plantation timber is either woodchipped as part of the harvest process (in-field chipping) and sent to export facilities, or sent to a woodchip mill for woodchipping and export.

Tasmania also has some longer rotation hardwood plantations with some logs used for veneer peeling and other products.

Other activities

In addition to producing fibre to supply the wood and paper processing industry in Tasmania, the plantations and native forest managed for timber production in Tasmania provide a base for other socio-economic activities (as do other forest areas not used for timber production).

Perhaps the best known of these is the establishment of an extensive network of mountain biking trails near Derby, with the Blue Derby mountain bike park established in areas of publicly owned native forest that are also harvested for timber. This mountain biking area has become a key tourism focus for this part of Tasmania and is used for national and international mountain biking events, creating significant economic value.

More broadly, commercial activities other than timber harvest, and a number of recreational activities, occur in many of the native forest and plantation areas used for Tasmania's commercial timber harvest. Managers of native forest and plantations reported the following activities occurring on the native forest and plantation estates they manage:

- **Livestock grazing:** This occurred on several thousand hectares of native forest and plantation land
- **Bee keeping:** Bee keeping occurred on large areas of native forest, as well as some hardwood plantation areas
- **Mountain biking, bushwalking, horse riding, four wheel driving, dirt biking, and camping areas:** These occur on many areas of native forest and some areas of plantation; in addition, recreational fishers have rights to use access roads through some native forest and plantation areas to fish in inland rivers and lakes located within them
- **Hunting:** Recreational hunting occurs in native forest and in some plantation areas.

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 Tasmania are analysed for the region as a whole, and for three regions within the state:

- Cradle Coast: The forest industry in this region relies on native forest, hardwood plantation and softwood plantation, and includes the local government areas of Burnie, Central Coast, Circular Head, Devonport, Kentish, King Island, Latrobe, Waratah/Wynyard and West Coast.
- Northern: The forest industry in this region relies on native forest, hardwood plantation and softwood plantation, and includes the local government areas of Break O'Day, Dorset, Flinders Island, George Town, Launceston, Meander Valley, Northern Midlands and West Tamar.
- Southern: The industry in this region is more reliant on native forest than plantations in most parts, with the exception of the Derwent Valley where there are large numbers of jobs reliant on softwood plantations; this region includes the following local government areas:

Brighton, Central Highlands, Clarence, Derwent Valley, Glamorgan-Spring Bay, Glenorchy, Hobart, Huon Valley, Kingborough, Sorell, Southern Midlands and Tasman.

Economic value

This section examines the economic value generated by the Tasmanian 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. This is 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 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 Tasmania 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 Tasmanian forest industry

In 2015-16, the direct value of output from the Tasmanian forest industry at the point of sale of primary processed products was $712 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 $150 million of sales generated by the native forest industry, $299 million by activities dependent on softwood plantations, $263 million dependent on hardwood plantations, and a small amount dependent on forests outside of Tasmania[1]. 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 Launceston that supports activity in locations outside Tasmania, or cross-border consulting based in Tasmania.

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

Direct expenditure by the Tasmanian 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 mostly occurs some distance from the region in which the business is located.

In total, in 2015-16, the forest industry generated $560 million in direct net expenditure (including $373 million spent within Tasmania) as a whole, up to and including primary processing, including $122 million in the Cradle Coast region, $212 million in the Northern region, and $226 million in the Southern region. A small amount of expenditure could not be allocated to a specific region so is included in the Tasmania column only.

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 Tasmanian forest industry in different region by growing, harvesting and primary processing, 2015-16, by supply chain stage

	Cradle Coast		Northern		Southern		Tasmania	
Supply chain stage	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)
Establishing & growing native forest & plantations	86.4	27.3	140.0	48.6	108.5	32.2	335.3	108.5
Harvest & haulage of logs to processors	58.0	58.0	70.7	70.7	43.4	43.4	172.2	172.2
Primary wood and paper processing	143.9	36.3	250.3	92.4	193.3	150.6	587.4	279.3
TOTAL	**288.3**	**121.6**	**461.0**	**211.7**	**345.1**	**226.2**	**1,095.0**	**560.1**

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 exp ended 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 Tasmanian forest industry by growing, harvesting and primary processing, 2015-16, by supply chain stage

	Native forest dependent industry		Softwood plantation industry		Hardwood plantation industry		Tasmania	
Supply chain stage	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)	Gross expend-iture in 2015-16 ($m)	Net expend-iture exc. transfers to other parts of industry ($m)
Establishing & growing plantations	131.8	34.2	52.8	24.8	150.5	49.4	335.3	108.5
Harvest & haulage of logs to processors	35.3	35.3	42.7	42.7	94.2	94.2	172.2	172.2
Primary wood and paper processing	114.9	64.1	284.1	175.9	188.5	39.3	587.4	279.3
TOTAL	**282.0**	**133.7**	**379.5**	**243.3**	**433.2**	**182.9**	**1,095.0**	**560.1**

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.

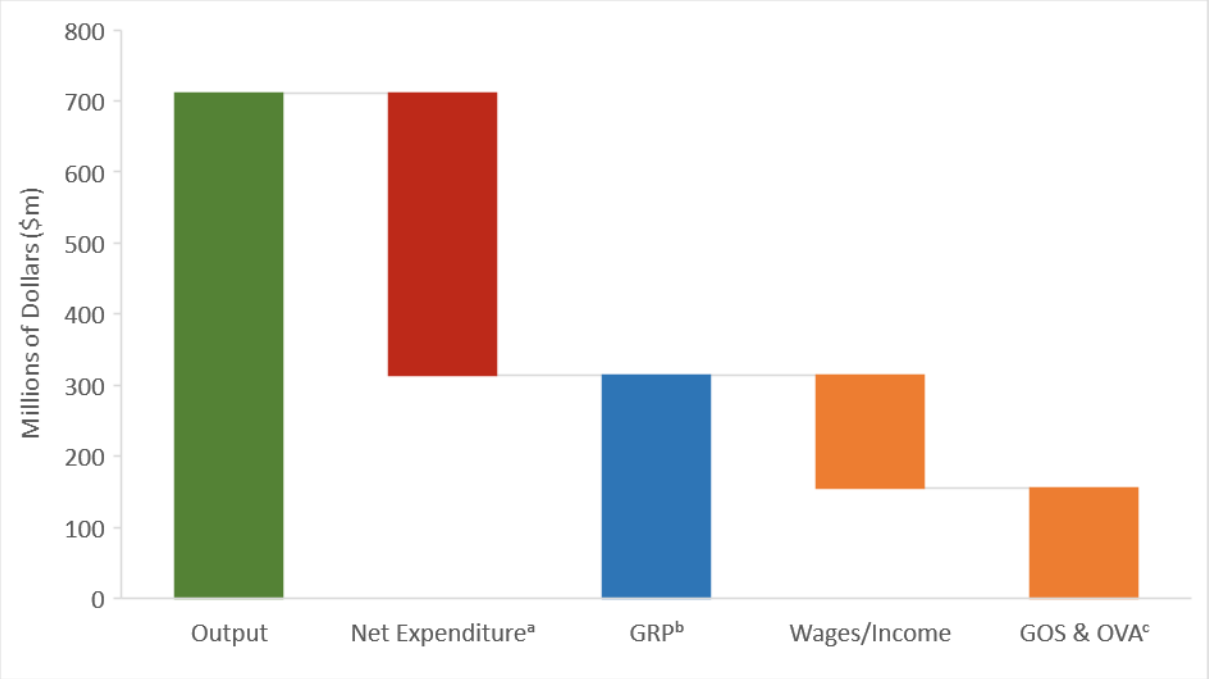
There is limited information on forest industry economic value from past studies: however, some past studies (Schirmer 2011; Schirmer et al. 2014) have estimated net expenditure by the industry up to and including primary processing. These studies estimated net expenditure by the industry was $1.4-1.6 billion in 2005-06, growing slightly to $1.5-1.7 billion in 2007-08, and then declining steeply to $395-452 million in 2012-13 (the ranges given reflect uncertainty in estimates in past studies). The findings of this study suggest there has been some recovery in the industry with growth of between $100 and $150 million in annual expenditure by the industry since 2012-13.

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 Tasmanian-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. Around $1 in every $3.50 of expenditure on wages and salaries (the industry spends a total of $159 million on wages and salaries of workers in Tasmania). Comparing the sectors, the native forest sector spends substantially more on wages in relative terms ($1 out of every $2.60 of expenditure), the hardwood plantation sector spends $1 on wages in every $3.60 of expenditure and the softwood plantation sector $1 in every $4.30. The softwood plantation sector spends the most on wages overall ($57 million), followed by the native forest sector ($52 million) and the hardwood plantation sector ($50 million).

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 Tasmania was $314 million. This included $70 million generated by the native forest industry, $113 million by activities dependent on softwood plantations, $131 million dependent on hardwood plantations. 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 Tasmania. 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 and 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 primary processing.

Figure 4 Calculation and decomposition of direct contribution to GRP, Tasmania – 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 $1,277 million in Tasmania for the industry as a whole, including $272 million in the Cradle Coast region, $458 million in the Northern region and $425 million in the Southern region
- The total contribution to the value of GRP was $615 million in Tasmania for the industry as a whole, including $151 million in the Cradle Coast region, $235 million in the Northern region and $171 million in the Southern region
- The total contribution to the household income component of GRP was $325 million in Tasmania for the industry as a whole, including $66 million in the Cradle Coast region, $115 million in the Northern region and $113 million in the Southern region.

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

	Cradle Coast	Northern	Southern	Tasmania[a]
Output[b] ($m)	**271.8**	**458.2**	**424.7**	**1,276.8**
Direct ($m)	183.3	290.0	237.8	711.8
Production-induced ($m)	49.7	89.8	108.3	317.4
Consumption-induced ($m)	38.8	78.5	78.7	247.6
GRP ($m)	**150.5**	**235.5**	**170.7**	**615.3**
Direct ($m)	101.4	143.3	69.4	314.4
Production-induced ($m)	25.5	45.2	54.4	156.2
Consumption-induced ($m)	23.7	47.0	46.9	144.7
Household Income ($m)	**66.1**	**114.7**	**113.0**	**324.6**
Direct ($m)	38.9	63.6	56.0	158.6
Production-induced ($m)	16.4	29.3	34.7	97.8
Consumption-induced ($m)	10.8	21.8	22.3	68.1
Employment (total)	**1,105**	**1,897**	**1,903**	**5,365**
Direct (total to point of sale of primary processed products)	653	1,035	1,014	2,714
Production-induced (total)	237	433	482	1,397
Consumption-induced (total)	214	428	406	1,254

a - Impacts in Tasmania are each greater than the sum of the three reported regions as 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 $1,277 million in Tasmania for the industry as a whole, including $290 million from the native forest sector, $546 million from the softwood plantation sector and $441 million from the hardwood plantation sector
- The total contribution to the value of GRP was $615 million in Tasmania for the industry as a whole, including $146 million from the native forest sector, $244 million from the softwood plantation sector and $225 million from the hardwood plantation sector
- The total contribution to the household income component of GRP was $325 million in Tasmania for the industry as a whole, including $93 million from the native forest sector, $129 million from the softwood plantation sector and $103 million from the hardwood plantation sector.

Figure 5 shows the derivation of total contribution to GRP by the forest industry in Tasmania, 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 Tasmanian 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).

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, Tasmania – all parts of the industry

Employment

This chapter examines the employment generated in the forest industry in Tasmania. This first section provides a 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 Tasmania generated a total of 2,714 direct jobs up to the point of primary processing as of 2017-18. A further estimated 362 further direct jobs were generated by secondary processing activities as of August 2016, based on data from the ABS Census[2]. This means a total of 3,076 direct jobs were generated in the Tasmanian forest industry as of 2017-18. The estimated flow-on employment generated by activities up to and including primary processing was an additional 2,651 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 2,714 jobs generated up to the point of primary processing, 1,112 direct jobs were generated by the native forest industry, 903 by softwood plantations, and 699 by hardwood plantations. 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 Tasmania or on timber imported from other regions.

The number of jobs varied by region. Of the 2,714 direct jobs generated up to and including primary processing, 653 were located in the Cradle Coast region, 1,035 in the Northern region and 1,014 in the Southern region.

Direct employment

This section examines the employment generated directly in the Tasmanian 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. 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.

[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*.

- 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.

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 allows 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 2,714 direct jobs located in Tasmania during 2017-18, and a total of 3,076 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. Just over half of direct jobs – 54.8% (1,685 of 3,076 jobs) – are generated by the primary and secondary processing of wood and paper products, while 45.2% were generated by the growing and harvest of native forest and plantations. This is different to other regions in Australia, with Tasmania having a higher proportion of jobs in logging, and fewer in processing, than the forest industry in other regions of Australia. This largely reflects the relatively small amount of secondary processing that occurs in Tasmania compared to other states.

When direct jobs up to the point of primary processing are compared, the largest proportion of direct jobs in the industry in Tasmania (41.0%) were generated by native forests, followed by softwood plantation (33.3%) and hardwood plantations (25.7%). There is regional variation as well, with 38.3% of all jobs generated up to and including primary processing being based in the Northern region, 37.5% in the Southern region and 24.2% in the Cradle Coast region. When secondary processing jobs are included, this remains similar, with 37.4% of jobs in the Northern region, 24.0% in the Cradle Coast, and 38.6% in the Southern region.

Table 4 Direct employment generated by the forest industry in Tasmania, 2017-18, by sector (Data source: 2017 industry survey, unless otherwise noted)

Industry sector	Jobs located in Tasmania that depend on…			Total direct forest industry jobs
	Native forest	Softwood plantation	Hardwood plantation	
Growers (forest management companies)			100	284
Nurseries, silvicultural & roading contracting businesses			154	285
Other (including consultants, equipment sales, training)	258	131	27	101
Harvest & haulage contracting businesses (including in-field chipping)	197	231	323	751
Primary wood and paper processing[1]	656	541	95	1,292
Total – excluding secondary processing	**1,112**	**903**	**699**	**2,714**
Secondary wood and paper processing (2011 ABS data)	Unknown	Unknown	Unknown	362
Total – including secondary processing	**Unknown**	**Unknown**	**Unknown**	**3,076**

Table 5 Direct employment generated by the forest industry in Tasmania, 2017-18, by region (Data source: 2017 industry survey, unless otherwise noted)

Industry sector	TOTAL direct employment, 2017			
	Cradle Coast	Northern	Southern	Tasmania[2]
Growers (forest management companies)	56	119		284
Nurseries, silvicultural & roading contracting businesses	106	97		285
Other (including consultants, equipment sales, training)	18	37	227	101
Harvest & haulage contracting businesses	225	304	222	751
Primary wood and paper processing[1]	249	478	565	1,292
Total – excluding secondary processing	**653**	**1,035**	**1,014**	**2,714**
Secondary wood and paper processing (2016 ABS data)	82	112	168	362
TOTAL	**735**	**1,147**	**1,182**	**3,076**

[1]The jobs generated in these sectors includes people involved in wholesaling of products produced by these processors.
[2] The estimate for Tasmania includes 12 jobs unable to be classified by region, so is higher than the sum of the three regions.

Direct employment by local government area

Many of the jobs generated by the Tasmanian 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 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 Launceston, with 435 jobs, followed by Dorset (239 jobs), Circular Head (236), Derwent Valley (244) and Hobart (203 jobs). However, not all these LGAs have a high proportion of the labour force employed in the industry, as the size of their workforce varies substantially. For example, in Launceston 1.6% of jobs rely directly on the forest industry.

Across Tasmania, the LGAs with the highest reliance on the forest industry for direct employment were Dorset (9.3% of workers directly employed in the forest industry), Circular Head (6.6% of the workforce), Derwent Valley (6.5%), George Town (6.0%), the Central Highlands (5.4% of a small-sized workforce), Huon Valley (2.7%), and Waratah/Wynyard (2.2%). In all other LGAs, less than two per cent of the workforce were directly employed in the forest industry.

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

Region	Local government area name	Growing, harvest, haulage, primary processing (2017-18 industry survey)[1]	Secondary processing (2016 ABS Census)	Total forest industry jobs, 2017 (including secondary processing)	Size of employed labour force, all industries, 2016[2]	% employed labour force working in forest industry[2]	Employment by industry sector (excludes secondary processing jobs; data from 2017 industry survey)		
							Native forest	Softwood plantation	Hardwood plantation
Cradle Coast	Burnie	125	**8**	133	7663	1.7%			
	Central Coast	69	**19**	88	8835	1.0%			
	Circular Head	231	**5**	236	3599	6.6%			
	Devonport	63	**21**	84	9649	0.9%			
	Kentish	26	**4**	30	2447	1.2%			
	Latrobe	26	**9**	35	4483	0.8%			
	Waratah/Wynyard	99	**16**	115	5341	2.2%			
	West Coast	16	0	16	1518	1.1%			
	TOTAL (inc. King Isl.)	**653**	**82**	**735**	**44338**	**1.7%**	**297**	**81**	**286**
Northern	Break O'Day	18	**6**	24	1936	1.2%			
	Dorset	234	**5**	239	2563	9.3%			
	George Town	132	0	132	2187	6.0%			
	Launceston	383	**52**	435	27540	1.6%			
	Meander Valley	112	**13**	125	8460	1.5%			
	Northern Midlands	67	**11**	78	5500	1.4%			
	West Tamar	91	**25**	116	9853	1.2%			
	TOTAL (inc. Flinders Isl.)	**1035**	**112**	**1147**	**58465**	**2.0%**	**311**	**434**	**290**
Southern	Brighton	75	**6**	81	6633	1.2%			
	Central Highlands	44	**0**	44	818	5.4%			
	Clarence	93	**22**	115	24578	0.5%			
	Derwent Valley	244	**8**	252	3862	6.5%			
	Glamorgan/Spring Bay	6	**0**	6	1650	0.4%			
	Glenorchy	94	**39**	133	19259	0.7%			
	Hobart	191	**12**	203	24255	0.8%			
	Huon Valley	147	**24**	171	6381	2.7%			
	Kingborough	66	**44**	110	16335	0.7%			
	Sorell & Tasman	27	**9**	36	7110	0.5%			
	Southern Midlands	28	**4**	32	2599	1.2%			
	TOTAL	**1014**	**168**	**1182**	**113480**	**1.0%**	**504**	**388**	**123**
Tasmania		**2714**	**362**	**3076**	**216283**	**1.4%**	**1112**	**903**	**699**

[1] Due to rounding, totals may be slightly differ to numbers for individual LGAs

Flow-on employment

When flow-on impacts are included, a total of 5,365 direct and indirect jobs were generated in the Tasmanian forest industry up to and including primary processing in 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 Tasmania up to the point of primary processing, a total of 2.0 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 cultural & recreational services and public & regulatory services sectors (each around 2.0), greater than the health & community services (1.7) and retail (1.5) sectors, and less than the finance (2.3) and residential building construction (2.8) sectors.

The employment multipliers varied depending on the sector, with a total of 1.6 jobs created for every direct job in native forests, and 2.2 for softwood and hardwood plantations (see Table 7). 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. When examined by region, a total of 1.7 jobs are generated in the Cradle Coast region for every direct job, a total of 1.8 in the Northern region, and 1.9 in the Southern region (see Table 8). Each regional employment multiplier is smaller than the Tasmania multiplier as some indirect expenditure occurs outside of the smaller regions but stays within Tasmania. For example, a proportion of wages earned in each region is spent on consumption goods manufactured elsewhere in Tasmania; this causes economic activity within Tasmania that is captured in the Tasmanian multiplier, but not in the regional multipliers.

Table 7 Employment multipliers: indirect employment generated by the Tasmanian forest industry, by sector

		Native forest		Softwood plantation		Hardwood plantation		Tasmania (all)	
Type of multiplier	Description	Multip-lier	Total jobs	Multip-lier	Total jobs	Multip-lier	Total jobs	Multi p-lier	Total jobs
None	Direct jobs only	1.0	1,112	1.0	902	1.0	697	1.0	2,714
Type I	Direct jobs + production-induced jobs	1.3	1,414	1.7	1,542	1.7	1,151	1.5	4,111
Type II	Direct jobs + production-induced jobs + consumption-induced jobs	1.6	1,786	2.2	2,028	2.2	1,547	2.0	5,365

Table 8 Employment multipliers: indirect employment generated by the Tasmanian forest industry, by region

Type of multiplier	Description	Cradle Coast		Northern		Southern		Tasmania (all)	
		Multip-lier	Total jobs	Multip-lier	Total jobs	Multip-lier	Total jobs	Multip-lier	Total jobs
None	Direct jobs only	1.0	653	1.0	1,035	1.0	1,014	1.0	2,714
Type I	Direct jobs + production-induced jobs	1.4	890	1.4	1,469	1.5	1,496	1.5	4,111
Type II	Direct jobs + production-induced jobs + consumption-induced jobs	1.7	1,105	1.8	1,897	1.9	1,903	2.0	5,365

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 other 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 9 compares estimates of employment generated up to the point of primary processing by our survey (data collected in the second half of 2017 and start of 2018), 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 9 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 Manuf-acturing – primary processing*	Total forest industry jobs (2016)	*Forestry, Logging, Services to Forestry*	*Wood and Paper Product Manuf-acturing – primary processing*	Total forest industry jobs up to primary processing (2017)		
		2016	2016	2016	2017-18	2017-18	2017-18		
Cradle Coast	Burnie	72	8	**80**	94	31	**125**	FIS has higher estimates for all LGAs.	• Employment in harvest and haulage has grown in Tasmania in recent years, including growth in jobs since the Census • Census does not record many haulage jobs leading to underestimate • In Burnie and Circular Head, FIS identified more wood product manufacturing jobs than Census, partly due to some expansion of employment since the Census, and partly due to log export jobs (not well captured in Census but captured in FIS)
	Central Coast	55	7	**62**	57	12	**69**		
	Circular Head	46	93	**139**	77	154	**231**		
	Devonport	23	0	**23**	62	1	**63**		
	Kentish	15	7	**22**	16	10	**26**		
	Latrobe	13	3	**16**	23	3	**26**		
	Waratah/ Wynyard	59	24	**83**	74	25	**99**		
	West Coast	3	4	**7**	3	13	**16**		
	TOTAL (inc. King Isl.)	**286**	**146**	**432**	**405[1]**	**248[1]**	**653[1]**		
Northern	Break O'Day	11	0	**11**	15	3	**18**	FIS has higher estimates for all LGAs.	• Employment in harvest and haulage has grown in Tasmania in recent years, including growth in jobs since the Census • Census does not record many haulage jobs leading to underestimate • In Launceston FIS identified more wood product manufacturing jobs than Census, while in West Tamar lower employment recorded in FIS: some businesses responding to FIS may have reported workers as living in Launceston when they actually live in West Tamar; additionally log export jobs in some places not well captured in Census but captured in FIS
	Dorset	91	73	**164**	143	91	**234**		
	George Town	14	73	**87**	31	101	**132**		
	Launceston	111	117	**228**	198	185	**383**		
	Meander Valley	64	32	**96**	66	46	**112**		
	Northern Midlands	28	5	**33**	39	28	**67**		
	West Tamar	49	40	**89**	67	24	**91**		
	TOTAL (inc. Flinders Isl.)	**368**	**340**	**708**	**558[1]**	**477[1]**	**1035[1]**		
Southern	Central Highlands	19	3	**22**	24	20	**44**	FIS has higher estimates for all LGAs.	• Employment in harvest and haulage has grown in Tasmania in recent years, including growth in jobs since the Census • Census does not record many haulage jobs leading to underestimate
	Derwent Valley	82	120	**202**	95	149	**244**		
	Glamorgan/ Spring Bay	3	0	**3**	6	0	**6**		

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 Manuf-acturing – primary processing*	Total forest industry jobs (2016)	*Forestry, Logging, Services to Forestry*	*Wood and Paper Product Manuf-acturing – primary processing*	Total forest industry jobs up to primary processing (2017)		
	Hobart LGAs (Brigh'n, Clarence, Glen'y, Hobart, Kingb'gh)	145	254	**399**	226	293	**519**		• Jobs in log exports contributed to higher estimates of jobs in FIS compared to Census in areas of Hobart
	Huon Valley	64	53	**117**	61	86	**147**		
	Sorell & Tasman	6	24	**30**	10	17	**27**		
	Southern Midlands	17	27	**44**	28	0	**28**		
	TOTAL	**336**	**481**	**817**	**450[1]**	**564[1]**	**1014[1]**		
Tasmania[1]		**990**	**967**	**1957**	**1425**	**1289**	**2714**		

[1] Rounding of numbers means totals sometimes differ to sum of individual LGAs by a small number. The total for Tasmania also includes 12 people whose place of residence was not identified.

The 2016 Census recorded fewer forest industry workers in most parts of Tasmania compared to the survey of businesses conducted for this report. This is predominantly because (i) 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; and (ii) there was growth in the industry between the time Census data were collected (August 2016) and the time data were collected for this project (mid 2017 to early 2018). This growth in employment was particularly in the hardwood plantation industry, where many of the jobs generated were in harvest and haulage, meaning these two issues combine to result in a substantial underestimate of forest industry employment in the Census compared to the forest industry survey.

Further adding to this challenge, when conducting the survey it was common to identify more wood manufacturing jobs than were identified in the Census, even in locations where a mill had been operating at the time of the Census. Several mills reported having expanded employment in the last two years due to high demand for product.

Direct employment over time

There is often little information on how employment is changing in the forest industry over time. Differences in definitions and methods used means the figures published in past studies are not always comparable.

In Tasmania, 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 2006, 2008, 2010, 2011, 2013 and for this report (Forest Industry Survey).

Census data (Table 10) show a 55.2% decline in total employment in the forest industry between 2006 and 2016, including a 36.0% decline from 2006 to 2011, and a 30.0% decline between 2011 and 2016. This overall trend masks some differing trends within different industry sectors: in particular, decline in employment in the 'forestry, logging and services to forestry' group of jobs – those that fall into the category of primary production – was higher in 2006-11 and lower in the following five years, with employment falling by just over one-third between 2006 and 2011, but by less (13.4%) in the five years to 2016. Employment in wood and paper product manufacturing (primary and secondary processing) fell by a similar amount in each period, with a 36.7% decline between 2006 and 2011, and a further 38.8% decline between 2011 and 2016.

The rate of decline also differed between regions: decline in wood and paper product manufacturing was highest in the Cradle Coast, largely due to closure of Tasmanian Paper, and somewhat lower in other regions. Employment in primary production (forestry, logging, services to forestry) changed only slightly between 2011 and 2016 in the Cradle Coast and Northern regions (4.4% growth in Cradle Coast and 3.7% decline in the Northern region) while it fell more in the Southern region (a decline of 31.0% in the same period). This largely reflects growth in hardwood plantation related employment in the Cradle Coast and Northern regions between 2011 and 2016, growth that has continued since the time of the 2016 Census.

Forest Industry Surveys (FIS) undertaken in Tasmania in 2006, 2008, 2010, 2011 and 2013 captured detailed data on employment generated up to the point of primary processing, but did not capture employment in secondary processing (see reference list for a full list of reports from these surveys).

Table 11 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. This data series shows a 57.8% decline in employment between 2006 and 2017-18, very similar to the decline shown in the Census data. However, the proportion of jobs lost in different periods is different: the FIS series shows a decline of 46.0% in numbers of jobs between 2006 and 2011 (compared to 36.7% in the Census), and a smaller decline of 21.9% between 2011 and 2017-18 compared to 38.8% recorded in the Census. The more detailed time series of the FIS also suggests that job decline predominantly occurred between 2008 and 2011 within the broader time period examined.

The FIS data series is unique in that it identifies how the number of jobs dependent on native forests, softwood plantations and hardwood plantations has changed over time in Tasmania (Table 12), something that is not possible using Census data. This highlights the changing nature of the industry, with jobs dependent on native forests falling by 73.0% between 2006 and 2017-18, while jobs dependent on hardwood plantations fell 29.4% and those dependent on softwood plantations fell 35.4%.

These findings are expected, with rapid decline in native forest harvest volumes identified as resulting in a rapid loss of employment in past studies (Schirmer et al. 2011, Schirmer et al. 2014). The findings do show that the relative stabilisation of employment levels since 2013 is a result of two trends: ongoing decline in native forest-dependent employment (as well as a smaller decline in softwood plantation sector jobs) has been offset by growth in employment in the hardwood plantation sector.

Table 10 Forest industry employment recorded in the ABS Census of Population and Housing over time

		Jobs in *Forestry, Logging, Services to Forestry*					Jobs in *Wood and Paper Product Manufacturing (primary & secondary)*					Total forest industry dependent jobs recorded in Census (includes wholesaling)				
Region	**Local government area**	**2006**	**2011**	**2016**	**Change, 2006-11[1]**	**Change, 2011-16[1]**	**2006**	**2011**	**2016**	**Change, 2006-11[1]**	**Change, 2011-16[1]**	**2006**	**2011**	**2016**	**Change, 2006-11[1]**	**Change, 2011-16[1]**
Cradle Coast	Burnie	85	52	72	-38.8%	38.5%	226	40	16	-82.3%	-60.0%	311	92	88	-70.4%	-4.3%
	Central Coast	84	55	55	-34.5%	0.0%	161	53	26	-67.1%	-50.9%	245	108	81	-55.9%	-25.0%
	Circular Head	112	58	46	-48.2%	-20.7%	157	173	98	10.2%	-43.4%	269	231	144	-14.1%	-37.7%
	Devonport	25	29	23	16.0%	-20.7%	215	89	21	-58.6%	-76.4%	240	118	44	-50.8%	-62.7%
	Kentish	27	15	15	-44.4%	0.0%	49	15	11	-69.4%	-26.7%	76	30	26	-60.5%	-13.3%
	Latrobe	25	12	13	-52.0%	8.3%	119	31	12	-73.9%	-61.3%	144	43	25	-70.1%	-41.9%
	Waratah/Wynyard	66	46	59	-30.3%	28.3%	159	53	40	-66.7%	-24.5%	225	99	99	-56.0%	0.0%
	West Coast	3	7	3			3	12	4			6	19	7		
	TOTAL (inc. K.I)	427	274	286	-35.8%	4.4%	1089	466	228	-57.2%	-51.1%	1516	740	514	-51.2%	-30.5%
Northern	Break O'Day	83	39	11	-53.0%	-71.8%	16	18	6	12.5%	-66.7%	99	57	17	-42.4%	-70.2%
	Dorset	150	108	91	-28.0%	-15.7%	294	109	78	-62.9%	-28.4%	444	217	169	-51.1%	-22.1%
	George Town	11	10	14	-9.1%	40.0%	52	54	73	3.8%	35.2%	63	64	87	1.6%	35.9%
	Launceston	215	106	111	-50.7%	4.7%	474	363	169	-23.4%	-53.4%	689	469	280	-31.9%	-40.3%
	Meander Valley	129	68	64	-47.3%	-5.9%	115	99	45	-13.9%	-54.5%	244	167	109	-31.6%	-34.7%
	Nthn Midlands	60	27	28	-55.0%	3.7%	83	49	16	-41.0%	-67.3%	143	76	44	-46.9%	-42.1%
	West Tamar	42	24	49	-42.9%	104.2%	128	88	65	-31.3%	-26.1%	170	112	114	-34.1%	1.8%
	TOTAL (inc. F. Isl.)	690	382	368	-44.6%	-3.7%	1162	780	452	-32.9%	-42.1%	1852	1162	820	-37.3%	-29.4%
Southern	Brighton	18	23	26	27.8%	13.0%	110	78	60	-29.1%	-23.1%	128	101	86	-21.1%	-14.9%
	Central Highlands	35	27	19	-22.9%	-29.6%	13	3	3	-76.9%	0.0%	48	30	22	-37.5%	-26.7%
	Clarence	43	30	32	-30.2%	6.7%	158	117	61	-25.9%	-47.9%	201	147	93	-26.9%	-36.7%
	Derwent Valley	95	92	82	-3.2%	-10.9%	249	156	128	-37.3%	-17.9%	344	248	210	-27.9%	-15.3%
	Gla'n/ Spring Bay	60	25	3	-58.3%	-88.0%	50	6	0	-88.0%	-100.0%	110	31	3	-71.8%	-90.3%
	Glenorchy	41	36	17	-12.2%	-52.8%	210	178	124	-15.2%	-30.3%	251	214	141	-14.7%	-34.1%
	Hobart	80	67	40	-16.3%	-40.3%	112	96	53	-14.3%	-44.8%	192	163	93	-15.1%	-42.9%
	Huon Valley	138	109	64	-21.0%	-41.3%	68	121	77	77.9%	-36.4%	206	230	141	11.7%	-38.7%
	Kingborough	69	49	30	-29.0%	-38.8%	96	85	79	-11.5%	-7.1%	165	134	109	-18.8%	-18.7%
	Sorell & Tasman	26	13	6	-50.0%	-53.8%	64	53	33	-17.2%	-37.7%	90	66	39	-26.7%	-40.9%
	S'thern Midlands	25	16	17	-36.0%	6.3%	44	32	31	-27.3%	-3.1%	69	48	48	-30.4%	0.0%
	TOTAL	630	487	336	-22.7%	-31.0%	1174	925	649	-21.2%	-29.8%	1804	1412	985	-21.7%	-30.2%
Tasmania		1747	1143	990	-34.6%	-13.4%	3428	2171	1329	-36.7%	-38.8%	5175	3314	2319	-36.0%	-30.0%

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

Table 11 Forest industry employment recorded over time in Tasmanian Forest Industry Surveys – by region

	Local government area	Total number of forest industry workers living in local government area						Change, 2006 to 2011	Change, 2011 to 2017-18
		2006 (Aug)	2008 (Aug)	2010 (Sep)	2011 (May)	2013 (Nov)	2017-18 (Jun-Mar)		
Cradle Coast	**Burnie**	455	461	206	124	139	125	-72.7%	0.8%
	Central Coast	249	271	248	64	54	69	-74.3%	7.8%
	Circular Head	270	282	256	223	194	231	-17.4%	3.6%
	Devonport	273	300	240	160	54	63	-41.4%	-60.6%
	Kentish	112	139	87	63	10	26	-43.8%	-58.7%
	Latrobe	135	135	10	6	7	26	-95.6%	333.3%
	Waratah-Wynyard	309	321	193	135	55	99	-56.3%	-26.7%
	West Coast	21	25	22	17	14	16	-19.0%	-5.9%
	TOTAL	1824	1934	1262	792	527	**653**	-56.6%	-17.6%
Northern	**Break O'Day**	51	61	54	35	39	18	-31.4%	-48.6%
	Dorset	584	599	357	215	234	234	-63.2%	8.8%
	George Town	116	86	82	71	29	132	-38.8%	85.9%
	Launceston	919	945	642	466	461	383	-49.3%	-17.8%
	Meander Valley	386	449	266	196	138	112	-49.2%	-42.9%
	Northern Midlands	150	152	118	100	57	67	-33.3%	-33.0%
	West Tamar	270	367	173	125	52	91	-53.7%	-27.2%
	TOTAL	2476	2659	1692	1208	1010	**1035**	-51.2%	-14.3%
Southern	**Central Highlands**	222	133	101	86	61	69	-61.3%	-19.8%
	Derwent Valley	325	329	203	188	184	219	-42.2%	16.5%
	Glamorgan-Spring Bay	184	193	123	60	7	6	-67.4%	-90.0%
	Hobart suburbs	825	856	613	576	543	519	-30.2%	-9.9%
	Huon Valley	237	316	262	212	177	147	-10.5%	-30.7%
	Sorell & Tasman	232	260	203	111	31	27	-52.2%	-75.7%
	Southern Midlands	128	207	95	84	4	28	-34.4%	-66.7%
	TOTAL	2978	3150	2213	1893	1550	**1014**	-36.4%	-46.4%
	Tasmania	**6409**	**6963**	**4649**	**3460**	**2751**	**2702**	-46.0%	-21.9%

Note: In surveys conducted prior to 2017, a small number of jobs could not be allocated to a specific local government area (typically around 140-170 jobs in total). Thus the total for all LGAs is slightly smaller than the total estimated employment in the forest industry.

Table 12 Forest industry employment recorded over time in Tasmanian Forest Industry Surveys – by native forest, softwood plantation and hardwood plantation

	Local government area	Total number of forest industry workers living in local government area						Change, 2006 to 2011	Change, 2011 to 2017-18
		2006 (Aug)	2008 (Aug)	2010 (Sep)	2011 (May)	2013 (Nov)	2017-18 (Jun-Mar)		
Type of forest/ plantation	**Native forest**	4120	3837	2571	1957	1241	1112	-52.5%	-43.2%
	Hardwood plantation	990	1437	867	558	521	699	-43.7%	25.4%
	Softwood plantation	1398	1690	1210	945	953	903	-32.4%	-4.4%
Tasmania		**6409**	**6963**	**4649**	**3460**	**2751**	**2702**	-46.0%	-21.9%

Note: Prior to 2017, estimates of industry employment included some jobs that could not be classified into different sectors. This included 1044 jobs in 2006, 1207 in 2008, 972 in 2010, 494 in 2011 and 188 in 2013. To enable comparison over time, the figures in this table include these 'other' jobs, based on the assumption that the jobs that could not be classified had the same ratios as those jobs where the sector could be identified. For example, if in a given year 1/3 of jobs that could be classified by forest sector were dependent on native forests, 1/3 on hardwood plantations and 1/3 on softwood plantations, the jobs that couldn't be classified into sectors were assumed to be 1/3 dependent on each sector.

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 Tasmania. 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 of these factors – working hours and income - can be examined readily based on data from businesses in the industry, and the ABS Census.

Note that in the following pages, most data are presented for the whole forest industry in Tasmania, and are not typically broken into industry sectors or different regions. This is due to limitations of available data, with ABS Census data unable to be separated based on industry sector (e.g. jobs dependent on native forests versus those depends on plantations), and forest industry survey data are 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 89% of workers employed in forest and plantation management businesses (growers), 60% of harvest and haulage contractors (in addition to this, all casual workers were also recorded as working full-time hours) and 95% of wood and paper processing workers (Table 13). Overall, 83% of industry workers had full-time jobs, 8% worked part-time and 9% were casual workers (many of whom worked full-time hours)[3]. 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, 82% of forest industry workers were employed full-time, compared to 60% of the broader workforce in Tasmania. The proportion of workers employed part-time versus full-time has remained relatively stable over time, with a small increase in the proportion of part-time workers between 2006 and 2016 (rising from 14% to 18% of the forest industry workforce; a similar increase occurred in the broader workforce where part-time workers grew from 35% of workers in 2006 to 40% in 2016).

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

	Full-time	Part-time	Casual
Growers	89%	10%	1%
Harvest and haulage contractors	60%	2%	38%
Processors	95%	1%	4%
Whole industry	**83%**	**8%**	**9%**

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

[3] The whole industry numbers include a small number of workers who were subcontracted rather than directly employed: 64% of these subcontractors were reported as working full-time hours and included in the full-time figures, and 36% were reported as working part-time hours and included in the part-time figures.

Table 14 Proportion of Tasmanian workforce employed full-time and part-time, 2006-2016 – ABS Census of Population and Housing

		Forestry	Logging	Forestry Support Services	Wood product manufacturing	Pulp and paper manufacturing	Forest industry workforce	Employed labour force (all industries)
% full-time - Tasmania	**2006**	83%	88%	75%	89%	88%	**86%**	65%
	2011	77%	84%	77%	84%	87%	**82%**	62%
	2016	82%	87%	72%	84%	87%	**82%**	60%
% part-time – Tasmania	**2006**	17%	12%	25%	11%	12%	**14%**	35%
	2011	23%	16%	23%	16%	13%	**18%**	38%
	2016	18%	13%	28%	16%	13%	**18%**	40%
% full-time- Cradle Coast	**2006**	87%	93%	75%	90%	92%	**90%**	66%
	2011	86%	88%	80%	85%	63%	**85%**	64%
	2016	88%	89%	59%	85%	67%	**84%**	64%
% full-time- Northern	**2006**	79%	86%	73%	89%	77%	**84%**	65%
	2011	83%	85%	71%	85%	90%	**83%**	62%
	2016	81%	89%	78%	86%	87%	**83%**	62%
% full-time- Southern	**2006**	83%	86%	80%	86%	86%	**84%**	65%
	2011	72%	83%	71%	79%	60%	**76%**	62%
	2016	72%	83%	72%	78%	91%	**81%**	60%

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.

Census data were also analysed to identify the extent to which 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 Tasmania, 13% of workers reported working 49 or more hours a week in 2016 (Table 15). In the forest industry, 21% 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 (11% 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	14%	16%	10%	19%	13%	24%
Logging	11%	14%	7%	47%	38%	52%
Forestry Support Services	21%	18%	18%	29%	31%	27%
Wood product manufacturing	11%	14%	10%	18%	13%	14%
Pulp and paper manufacturing	15%	14%	11%	8%	7%	13%
Forest industry workforce – Tasmania	**14%**	**15%**	**11%**	**19%**	**15%**	**21%**
Employed labour force (all industries) – Tasmania	27%	29%	29%	15%	13%	13%

Data source: ABS Census of Population and Housing, 2006, 2011, 2016 TableBuilderPro *Place of Usual Residence* database. Data are reported for all Tasmanian 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.

Income

ABS Census data shows that forest industry workers in Tasmania generally earned higher incomes than the average for the region (Table 16): in 2016, 19% of forest industry workers earned less than $649 per week, compared to 55% of all Tasmanians, and 33% earned $1,250 or more per week, compared to only 18% of the Tasmanian employed labour force. 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 who earned lower and higher incomes was compared (Table 17). Differences were smaller when comparing only full-time workers. Forest industry workers were earning almost the same levels of income; 10% of full-time forestry workers earned less than $649 per week in 2016 compared to 11% of full-time workers in the broader workforce. Full-time forestry workers were slightly less likely to earn $1,250 or more a week (38%) compared to the broader employed labour force (42%).

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	25%	16%	13%	12%	24%	43%
Logging	26%	17%	13%	7%	18%	34%
Forestry Support Services	41%	19%	23%	6%	23%	43%
Wood product manufacturing	42%	26%	23%	8%	11%	19%
Pulp and paper manufacturing	11%	11%	9%	36%	62%	66%
Forest industry workforce – Tasmania	**32%**	**22%**	**19%**	**14%**	**21%**	**33%**
Employed labour force (all industries) – Tasmania	**46%**	**29%**	**55%**	**11%**	**64%**	**18%**

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.

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 ($600/wk)	**2011** ($600/wk)	**2016** ($649/wk)	**2006** ($1299/ wk)	**2011** ($1250/ wk)	**2016** ($1250/ wk)
Forestry	17%	7%	7%	14%	29%	48%
Logging	20%	11%	9%	7%	21%	35%
Forestry Support Services	34%	14%	9%	9%	26%	51%
Wood product manufacturing	37%	18%	14%	8%	13%	23%
Pulp and paper manufacturing	6%	3%	3%	41%	68%	73%
Forest industry workforce – Tasmania	**26%**	**14%**	**10%**	**15%**	**24%**	**38%**
Employed labour force (all industries) – Tasmania	**28%**	**11%**	**11%**	**15%**	**47%**	**42%**

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 27% of workers were female. Only 11% of harvest and haulage contractors were female, and 11% of those employed in wood and paper processing were female (Table 18). This suggests that, similar to the industry in other regions, the Tasmanian 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 over time (Table 19). As of 2016, 49% of the overall employed labour force in Tasmania was female, a slight increase from 47% in 2006. In the forest industry workforce, however, female representation in the workforce was 18% in 2016, having grown from 14% in 2006.

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	73%	27%	79%	21%	19%	81%
Harvest and haulage contractors	89%	11%	85%	15%	94%	6%
Processors	89%	11%	92%	8%	43%	57%
Whole industry	84%	16%	87%	13%	67%	33%

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

	% male			% female		
Industry sector (ABS classification)	**2006**	**2011**	**2016**	**2006**	**2011**	**2016**
Forestry	82%	82%	82%	18%	18%	18%
Logging	89%	90%	91%	11%	10%	9%
Forestry Support Services	85%	89%	79%	15%	11%	21%
Wood product manufacturing	89%	88%	87%	11%	12%	13%
Pulp and paper manufacturing	88%	88%	86%	12%	12%	14%
Forest industry – Cradle Coast	**89%**	**87%**	**88%**	**11%**	**13%**	**12%**
Forest industry – Northern	**73%**	**71%**	**76%**	**27%**	**29%**	**24%**
Forest industry – Southern	**75%**	**75%**	**76%**	**25%**	**25%**	**24%**
Forest industry workforce – Tasmania	**86%**	**85%**	**82%**	**14%**	**15%**	**18%**
Employed labour force (all industries) – Tasmania	53%	52%	51%	47%	48%	49%

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 Tasmania, although the

number of younger workers declined from 35% of the forest industry workers in 2006 to 27% in 2016, compared to a shift from 34% to 32% in the broader workforce over the same period (Table 20). The age structure varies in different regions: forest industry workers were older on average in the Southern region compared to the Northern and Cradle Coast regions in 2016. 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

	% aged < 35 years			% aged 55 and older		
Industry sector (ABS classification)	**2006**	**2011**	**2016**	**2006**	**2011**	**2016**
Forestry	42%	27%	24%	9%	17%	17%
Logging	39%	29%	33%	14%	14%	24%
Forestry Support Services	42%	36%	25%	7%	15%	19%
Wood product manufacturing	38%	35%	31%	13%	17%	20%
Pulp and paper manufacturing	27%	16%	16%	10%	14%	31%
Forest industry workforce – Cradle Coast	**33%**	**28%**	**33%**	**14%**	**17%**	**18%**
Forest industry workforce – Northern	**39%**	**32%**	**29%**	**12%**	**15%**	**19%**
Forest industry workforce – Southern	**36%**	**30%**	**23%**	**13%**	**16%**	**26%**
Forest industry workforce – Tasmania	**35%**	**31%**	**27%**	**13%**	**16%**	**22%**
Employed labour force (all industries) – Tasmania	34%	30%	32%	16%	16%	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.

Aboriginal and Torres Strait Islanders

Employment of Aboriginal and Torres Strait Islander peoples was similar in the forest industry to the overall workforce in Tasmania during 2006 to 2016. Between 2006 and 2016, the proportion of workers identifying as being Aboriginal or Torres Strait Islander increased from 3% to 4% in both the forest industry and the employed labour force overall (Table 21). This suggests the forest industry is achieving a similar rate of participation of Aboriginal and Torres Strait Islander people in the industry's workforce as other industries in Tasmania.

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

	% workforce identifying as Aboriginal or Torres Strait Islander		
Industry sector (ABS classification)	**2006**	**2011**	**2016**
Forestry	3%	5%	3%
Logging	5%	3%	4%
Forestry Support Services	6%	6%	2%
Wood product manufacturing	3%	4%	6%
Pulp and paper manufacturing	2%	2%	1%
Forest industry workforce – Cradle Coast	**3%**	**8%**	**9%**
Forest industry workforce – Northern	**2%**	**3%**	**3%**
Forest industry workforce – Southern	**2%**	**3%**	**2%**
Forest industry workforce – Tasmania	**3%**	**4%**	**4%**
Employed labour force (all industries) – Tasmania	3%	3%	4%

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.

The types of staff that were most challenging to recruit were managers and high level professional staff (Table 22), with 75% of businesses reporting difficulty recruiting these types of workers. This was followed by administration staff (40% finding it difficult to recruit staff) and finance managers/book keepers (40% finding it difficult to recruit staff). Only 25% per cent found it challenging to source transport staff or drivers, and most businesses (60%) found it easy to source heavy machine operators. However, few harvest and haulage contractors responded to these questions, and therefore in this sector greater difficulties may be occurring than reported here.

Table 22 Level of difficulty involved in recruiting different types of workers, as rated by Tasmanian forest industry businesses

	% who reported difficulty recruiting these types of staff	% Neither difficult or easy	% who reported recruiting these types of staff is easy
Managers/high level professional staff	75%	0%	25%
Administration staff	40%	0%	60%
Finance manager/book keepers	40%	0%	60%
Transport/drivers e.g. log haulage	25%	50%	25%
Heavy machine operators	20%	20%	60%

When native forest and plantation managers were asked about accessing skilled contractors, a small majority reported finding it easy to source skilled contractors in the areas of roading and earthmoving (57%). Fewer businesses reported finding it easy to source seedlings/seed from nurseries (50%), skilled contractors in the areas of harvesting (33%), haulage (33%), coppicing and pruning (33%), site preparation and planting (25%) and spraying and fertilising (25%). This suggests there is a shortage of contractors to meet increasing demand as activity increases in the primary production sector after the downturn experienced in the late 2000's and early 2010's.

When asked what factors made it difficult to recruit staff, the investment and time required to build workforce skills was the top issue identified by businesses, with 71% reporting that this was a significant issue for them (Figure 6). For 57%, a lack of available workers with the right skills and qualifications, and a lack of suitable workers available in their local community, were significant challenges affecting their ability to recruit staff. Half reported that other businesses being able to offer higher wages was a big issue, and this was a moderate issue for 33%, with few reporting this was not an issue. Forty per cent of businesses felt that lack of certainty about the future of the industry was a big issue that reduced ability to recruit staff – these were predominantly native forest-dependent businesses, with this issue rarely reported by those in the plantation sector.

One third of businesses reported that a key challenge was workers not wishing to shift to the community in which they were located, 29% reported that skills from other industries did not transfer easily to the needs of their business, and 20% felt that negative perceptions of the industry were a big problem. Lack of jobs for partners/spouses of workers, better working conditions in other industries and lack of affordable housing or accommodation were not reported as big issues by any businesses, although they were moderate problems for some.

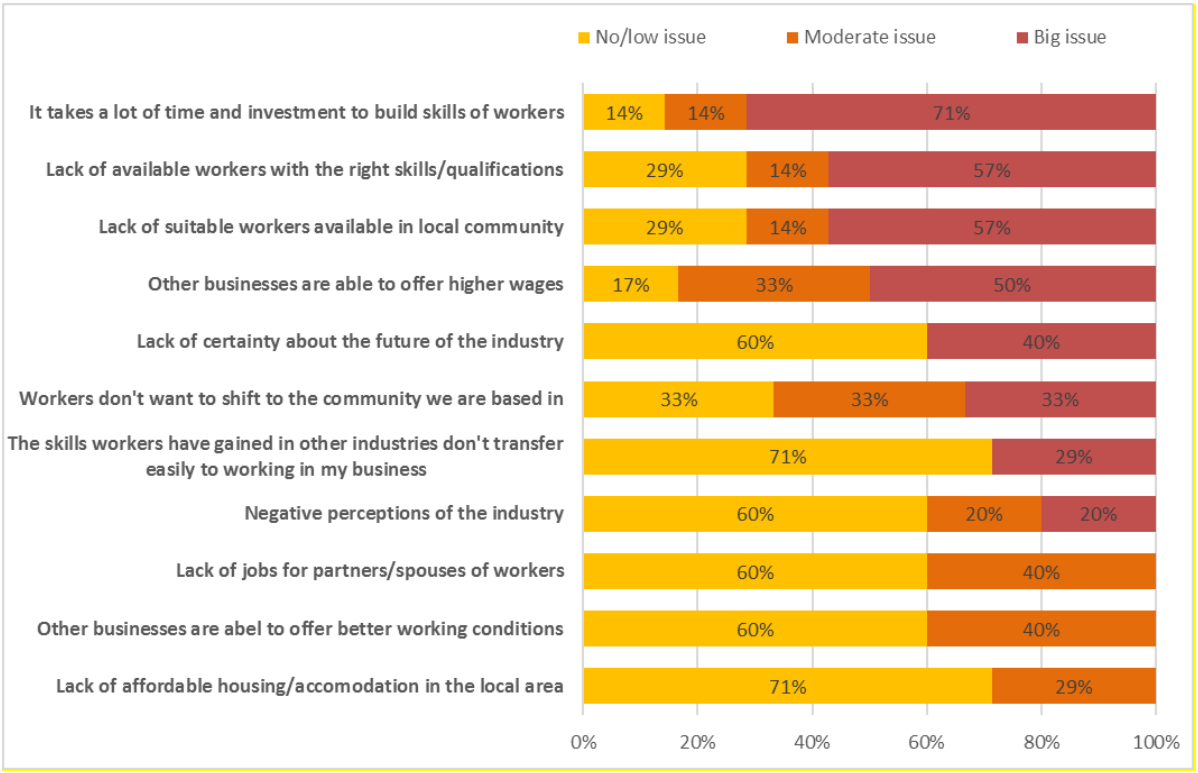


Figure 6 Key issues preventing recruitment of skilled workers into the Tasmanian forest industry

Industry skills and training needs

This section examines the skills and training needs of the forest industry in Tasmania. 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 23 shows the proportion of businesses reporting that some or all of their workers required skills in each of twelve competency areas, and of those businesses who required each skill, the proportion who required formal accreditation of their workers in that skill.

Businesses most commonly reported needing workers with skills in occupational health and safety training and chainsaw and other hand-held machinery, with 100% of businesses reporting a need for these skills. However, only 50% reported requiring accreditation in OHS training and 71% required formal accreditation in using a chainsaw or other hand-held machinery.

Other common business requirements included skills that are used across forest types and business types, including compliance training (86%), operation of heavy machinery (71%), fire-fighting (71%), IT/software training specialised to the industry (71%), marketing and sales (71%) and community relations and engagement (71%).

Table 23 Skills and accreditation needs reported by all businesses in Tasmania

	Need skills	Require accreditation[1]
Occupational health and safety training	100%	50%
Chainsaw and other hand-held machinery	100%	71%
Compliance training	86%	67%
Heavy machinery operation	71%	60%
Fire fighting	71%	80%
IT/ software training specialised to the industry	71%	0%
Marketing/sales	71%	50%
Community relations/ engagement	71%	20%
Business and financial management	57%	50%
Forest operations planning and management	57%	50%
Forest ecology and silviculture	57%	50%
Road transport/driver training for haulage drivers	29%	50%

[1] Of the businesses who need these skills, this % of businesses require accreditation

Businesses were asked to identify how they delivered training in the competency areas needed in their workplace: whether they delivered skills training via in-house training by other staff, in-house training by an expert, or training via a registered training organisation (RTO). Businesses were able to select more than one of these (Table 24). RTOs were most commonly used to provide training in road transport and driver training, forest ecology planning and management, chainsaw and hand-held machinery operation, heavy machinery operation and firefighting; in some cases, this was supplemented by in-house training. RTOs were also the most common methods for training in forest ecology and silviculture and business and financial management, although many businesses also used opted for in-house training by other staff. In-house training was more common than use of a RTO for community relations/engagement, marketing/sales, OHS and compliance training.

Table 24 Types of training used by forest industry businesses in Tasmania

	Registered training organisation	**In-house training by expert**	**In-house training by other staff**
Road transport/driver training for haulage drivers	100%	50%	50%
Forest operations planning and management	100%	75%	75%
Chainsaw and other hand-held machinery (eg brushcutter, pruning)	86%	14%	29%
Heavy machinery operation	80%	40%	40%
Fire fighting	80%	80%	40%
Forest ecology and silviculture including plant identification	75%	50%	75%
Business and financial management	75%	50%	50%
Compliance training e.g. training in compliance needed for regulatory or certification bodies	50%	67%	67%
IT/ software training specialised to the industry e.g. for plant operation, in-field survey	40%	80%	40%
Occupational health and safety training.	29%	57%	57%
Marketing/sales	20%	20%	60%
Community relations/community engagement	20%	20%	80%

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 25), and the rate of growth in high school attainment rates between 2011 and 2016 was slower in the forest industry compared to the rest of the workforce. However, forest industry workers were similarly likely to have completed a certificate qualification than those in other parts of the workforce (40% compared to 39% 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 except for forestry support services.

Completion of high school was particularly lower for logging workers, with only 10% of those recorded in the 2016 Census as having completed high school, compared to 30% of the forest industry workforce as a whole, and 50% of employed Tasmanians. Just under one in four wood product manufacturing workers had completed high school, and 32% of those employment in pulp and paper manufacturing. In general, Tasmanian forest industry workers have lower levels of formal education than forest industry workers in other parts of Australia, with studies in other regions identifying higher rates of high school completion and completion of Certificate qualifications, including in Victoria, Western Australia, the Green Triangle, South West Slopes of New South Wales, and Queensland (Schirmer et al. 2017a,b; 2018a,b,c).

Table 25 Formal educational attainment: rates of attainment of high school and post-school qualifications in the Tasmanian forest industry, 2006 to 2016

	% completed high school (Year 12 or equivalent)			% with no post-school qualification			% with Certificate qualification			% with Bachelor or postgraduate degree		
Industry sector (ABS classification)	**2006**	**2011**	**2016**	**2006**	**2011**	**2016**	**2006**	**2011**	**2016**	**2006**	**2011**	**2016**
Forestry	35%	44%	44%	55%	43%	40%	26%	34%	38%	19%	22%	22%
Logging	6%	8%	10%	81%	74%	65%	18%	25%	34%	1%	1%	1%
Forestry Support Services	28%	31%	40%	72%	55%	41%	21%	30%	32%	7%	15%	28%
Wood product manufacturing	18%	23%	24%	60%	68%	54%	36%	27%	43%	4%	5%	4%
Pulp & paper manufacturing	23%	34%	32%	50%	43%	40%	42%	43%	50%	8%	13%	10%
Forest industry workforce – Cradle Coast	13%	17%	22%	61%	61%	52%	34%	36%	36%	5%	3%	12%
Forest industry workforce – Northern	22%	24%	26%	63%	58%	56%	31%	37%	40%	6%	6%	4%
Forest industry workforce – Southern	27%	36%	38%	57%	49%	47%	34%	38%	40%	10%	12%	12%
Forest industry workforce – Tasmania	**23%**	**28%**	**30%**	**61%**	**57%**	**51%**	**32%**	**32%**	**40%**	**7%**	**11%**	**9%**
Employed labour force (all industries) – Tasmania	**41%**	**45%**	**50%**	**48%**	**43%**	**38%**	**33%**	**36%**	**39%**	**18%**	**21%**	**23%**

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 25% of businesses in Tasmania reported that conditions were 'easier than usual'; 34% reported they were 'more challenging than usual' and 41% that they were 'about the same as usual'. These results were similar for growers and in harvest and haulage businesses, with a third of businesses indicating that business conditions were 'easier than usual'. However, no growers indicated that business conditions were 'more challenging than usual', whereas 22% of harvest and haulage businesses indicated that business conditions were 'more challenging than usual'. Results were, however, different for processors. Only 9% of processors indicated that business conditions were 'easier than usual', with 45% indicating conditions were 'about the same as usual' and 46% indicating business conditions were 'more challenging than usual'.

Just over half of the businesses operating in native forests (53%) felt that business conditions were 'about the same as usual' and only 7% indicated business conditions were 'easier than usual'. Business conditions were more positive for the plantation sector. Just over a third of businesses (38%) operating in the softwood industry indicated business conditions were 'easier than usual', with 31% indicating they were 'about the same as usual', and 31% indicating they were 'more challenging than usual'. Businesses working in hardwood plantations had similar views to those operating in the softwood sector, with 44% of hardwood plantation businesses indicating business conditions were 'easier than usual', 31% indicating they were 'about the same as usual' and 25% indicating business conditions were '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 (Figure 7). The majority of businesses indicated it was likely that they would increase business profitability (80%), invest in new capital equipment (67%), invest in new business systems (67%) and grow business revenue (60%). However only 17% felt that it was likely they would increase the size of their workforce. No businesses indicated they were likely to reduce the size of their workforce.

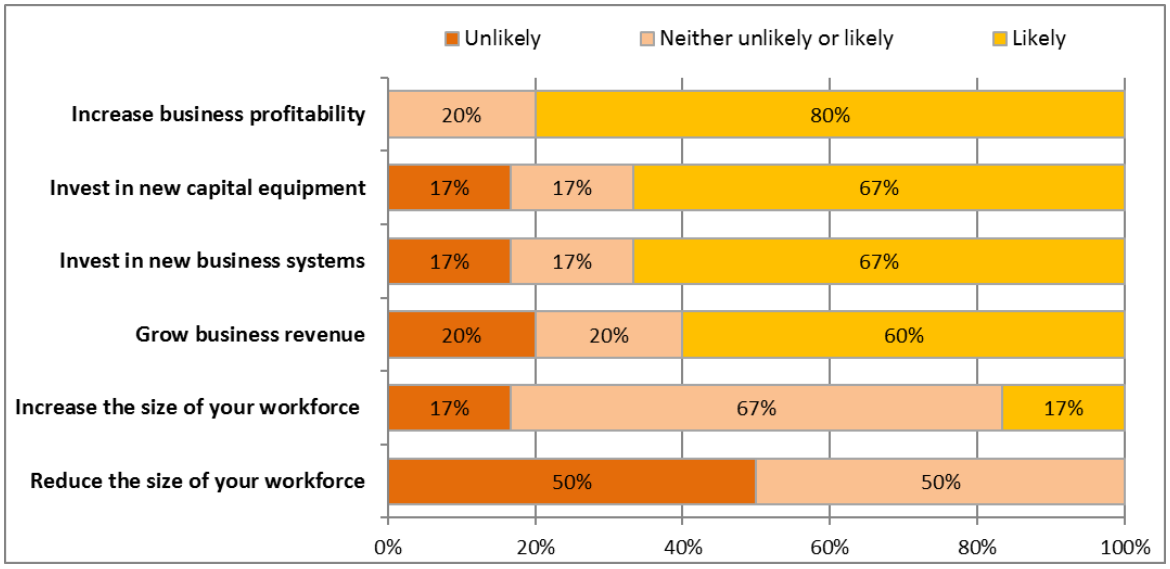


Figure 7 Expectations for business revenue, profitability, workforce size and investment over the next 12 months

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. Just over half (55%) felt demand would grow, and the remainder (45%) felt that that demand would remain about the same. No businesses reported feeling that demand for their services or products would reduce. Most growers (75%) indicated that demand was likely to grow, while 25% felt demand would remain stable and none felt demand would decline in the next 12 months. The majority of processors felt that demand would likely remain the same (87%), and 13% felt it was likely to grow. Most harvest and haulage businesses (67%) felt demand was likely to remain stable over the next 12 months, and 33% felt that demand 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, and was answered by a relatively small number of businesses (eight):

- Growers indicated that sustained higher prices for wood resources, obtaining new contracts, an increase in volume of wood resources available, innovation in processing of low quality forest products and a change in Government policy would enable them to invest more in their business.
- Processors indicated that increased finances, greater innovation, diversification and exploring new possibilities for products and the use of waste products and more confidence from the Government in Australia's ability to produce and manufacture locally to rely less on other countries would enable them to invest more in their business.
- Harvest and haulage contractors indicated that increased volumes of wood resource and increased demand for services would enable them to invest more in their business.

Business challenges

Businesses were asked 'what factors would trigger you to downsize or close your business?' Responses from the small number of businesses who answered this question (eight) were very consistent and, not surprisingly, mostly related to demand for products or services, loss of contracts and resource security; this was similar to responses of forest industry businesses in other regions (Schirmer et al. 2017 a,b; 2018a,b,c). Growers reported that loss of demand and reduced prices for wood and paper products, events such as fires, and change in government policy, would trigger downsizing or closure. Processors reported that a fall in market demand, growth in operational and capital costs, and reduction in availability of financing would trigger downsizing or closure. Harvest and haulage contractors would be triggered to downsize or close by reduction in harvest volumes.

Businesses were then asked to rate the extent to which different factors had been a challenge or problem when operating their business in the last three years (Figure 8). Of the businesses who completed these questions, the most common challenges experienced in the last three years were a lack of investment in the industry (60%), difficulty obtaining labour (50%), difficulty accessing some markets (33%), and difficulty obtaining finance (20%). Government regulation was not a big problem for any businesses, but a moderate problem for most (83%). No businesses reported difficulty in obtaining certification as a challenge, although some reported this issue to researchers in the process of discussions about this study: while for some it was difficult to obtain some forms of certification, they could continue business operations despite this.

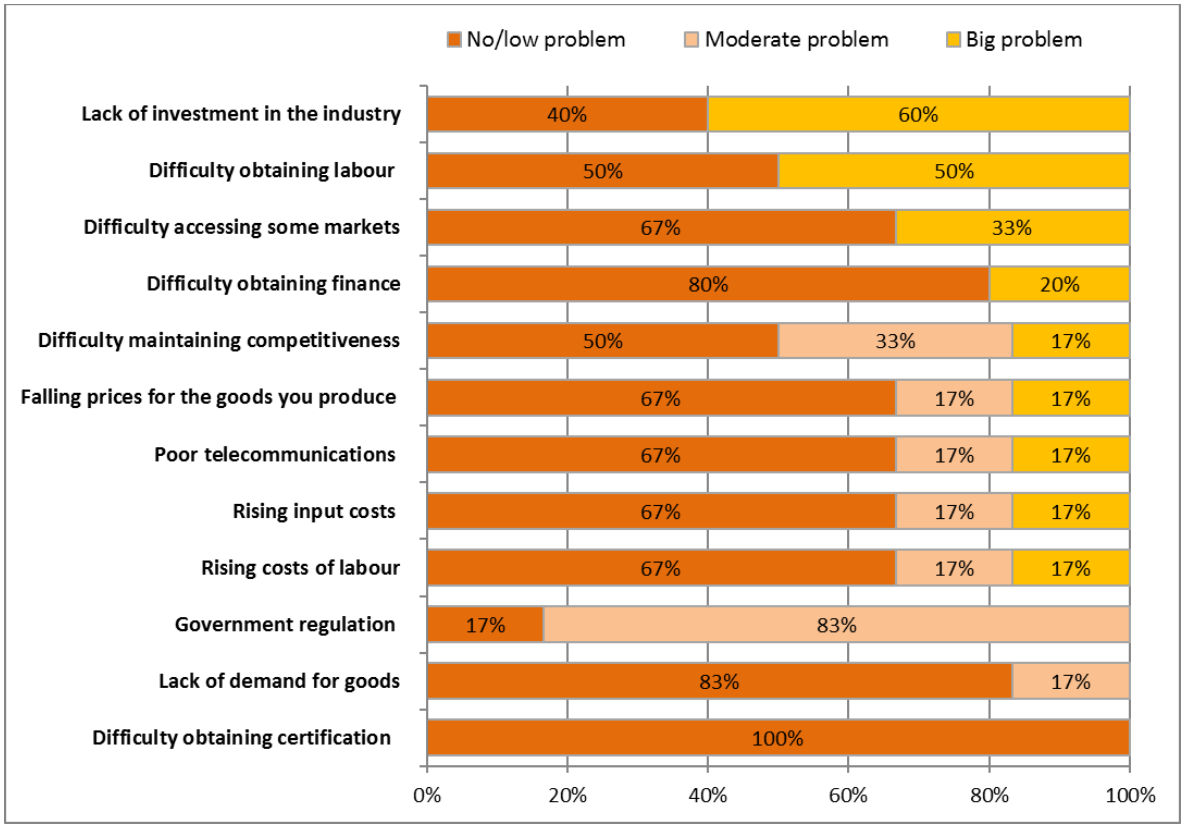


Figure 8 Challenges experienced by Tasmanian forest industry businesses

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 Tasmania, including the Cradle Coast, Northern and Southern regions, 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 (see www.regionalwellbeing.org.au for more information).

Quality of life and liveability

Quality of life and liveability of local regions was examined by analysing responses to survey questions which asked residents 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:

- Tasmania: a total of around 980 people from rural and regional Tasmania participated in the survey, including a small number of Hobart residents and those living in other cities of Tasmania[4]
- 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. This was examined by region:
    - Cradle Coast: The two LGAs of Circular Head and Waratah-Wynyard had high forest industry dependence. In total, 91 residents participated in the survey.
    - Northern: The two LGAs of Dorset and George Town had high forest industry dependence. A total of 61 residents participated in the survey.
    - Southern: The three LGAs of Central Highlands, Derwent Valley and Huon Valley had high forest industry dependence; 111 residents participated in the survey.
- 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 or native forest harvesting:
    - Cradle Coast: The LGAs of Burnie, Central Coast, Devonport, Kentish, King Island, Latrobe and West Tamar had low forest industry dependence; 170 residents participated in the survey.
    - Northern: Break O'Day, Flinders, Launceston, Meander Valley and Northern Midlands had low forest industry dependence; 254 residents participated in the survey.
    - Southern: Brighton, Clarence, Glamorgan-Spring Bay, Glenorchy, Hobart, Kingborough, Sorell, Southern Midlands and Tasman had low forest industry dependence; 293 residents participated in the survey.

[4] Not all respondents answered every question, and as such the 'n' changes slightly for different results presented in this section.

The analysis below compares experiences of those living in Tasmania as a whole, and those living in communities with high versus low forest industry dependence in the Cradle Coast, Northern and Southern 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, changes in liveability in Hobart LGAs may relate more to issues such as housing affordability and availability than to the presence or absence of the forest industry.

This appears to be the case with differences identified between 'high forest industry dependence' and 'low forest industry dependence' regions of Tasmania. While there are sometimes differences in the liveability of these LGAs, the differences are not consistent, suggesting they are driven by factors other than the presence of the forest industry.

Figure 9 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. When examining the three regions:

- People living in Cradle Coast LGAs with higher dependence on the forest industry were just as likely to rate their community as a good place to live as those living in LGAs with lower dependence on the forest industry, but were significantly more likely to recommend their community to others as a good place to live
- People living in Southern region LGAs with high forestry dependence were significantly less likely to rate their community as a good place to live or to recommend their community to others as a good place to live compared to those living in Southern LGAs with low forest industry dependence. This may reflect other differences: most of the LGAs with low dependence were in the greater city of Hobart (e.g. Clarence, Glenorchy, Kingborough) and those with high dependence were in less populated rural areas.
- Those living in Northern region LGAs with high forest industry dependence were just as likely as those living in other LGAs to rate their community as a good place to live and to recommend it to others.

There were no significant differences in responses between those living in different regions, or between residents living in LGAs with higher and lower dependence on the forest industry, when responding about whether they feel there were plenty of jobs available locally, or whether living costs were affordable. Residents living in the Southern region in LGAs with low forest industry dependence were significantly less likely to indicate having good quality roads in their local region. There were similar findings when resident's perceptions of the overall friendliness and safety of their community were examined (Figure 10). Those living in the Cradle Coast region in LGAs with high forestry dependence were significantly more likely to feel welcome in their community, compared to those living in LGAs with low forestry dependence. However, those living in Northern and Southern regions in LGAs with high forest industry dependence were significantly less likely to feel part of their community compared to those living in LGAs with low forestry dependence, and those living in the Southern region in LGAs highly dependent on forestry were less likely to feel safe in their community, and more likely to feel there is a high crime rate in their community, compared to those living in LGAs with low forestry dependence.

When perceptions of local landscape aesthetics and environmental health were examined (Figure 11), responses were positive overall. There were some significant differences between communities with higher versus lower dependence on the forest industry. Those living in the Cradle Coast region in LGAs with higher dependence on the forest industry were significantly more likely to like the environment and surrounds they live, and significantly less likely to feel that environmental degradation was a big issue in their region, compared to those living in LGAs with lower dependence on the forest industry. Those living in the Northern region in LGAs with higher dependence on the forest industry were significantly more likely to like the environment and surrounds they live, and feel there were attractive natural places in their community, compared to those living in LGAs with lower dependence on the forest industry. Those living in the Southern region in LGAs with higher dependence on the forest industry were significantly less likely to feel there were attractive buildings in their community.

The differences identified between communities with higher versus lower dependence on the forest industry in Figures 12 to 14 were not consistently different between regions, suggesting that they are not necessarily influenced by the presence of the forest industry: significant results for some regions were 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 primarily by factors other than the presence of the forest industry.

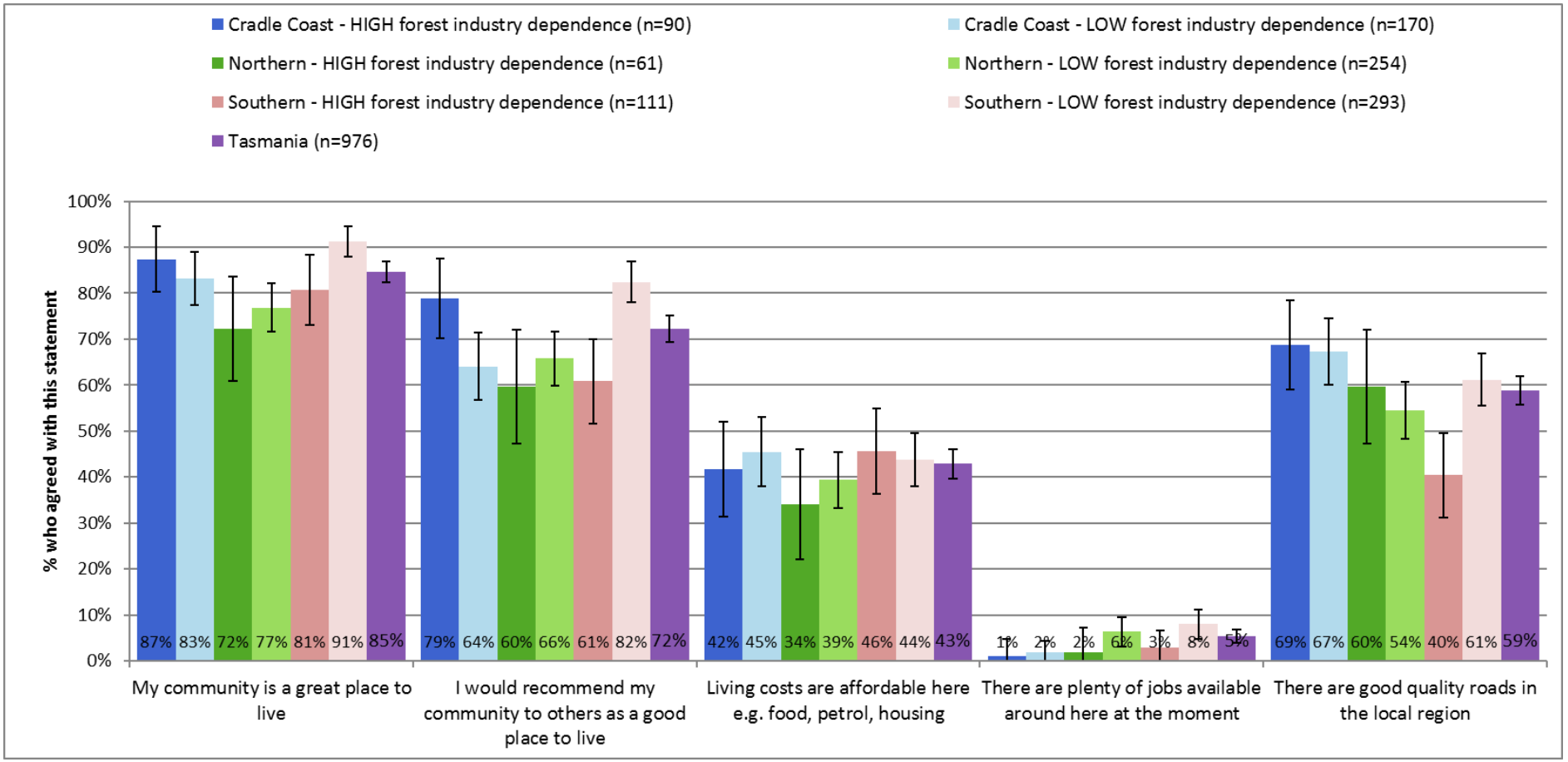


Figure 9 Perceptions of overall liveability and economy of local region – Regional Wellbeing Survey 2016

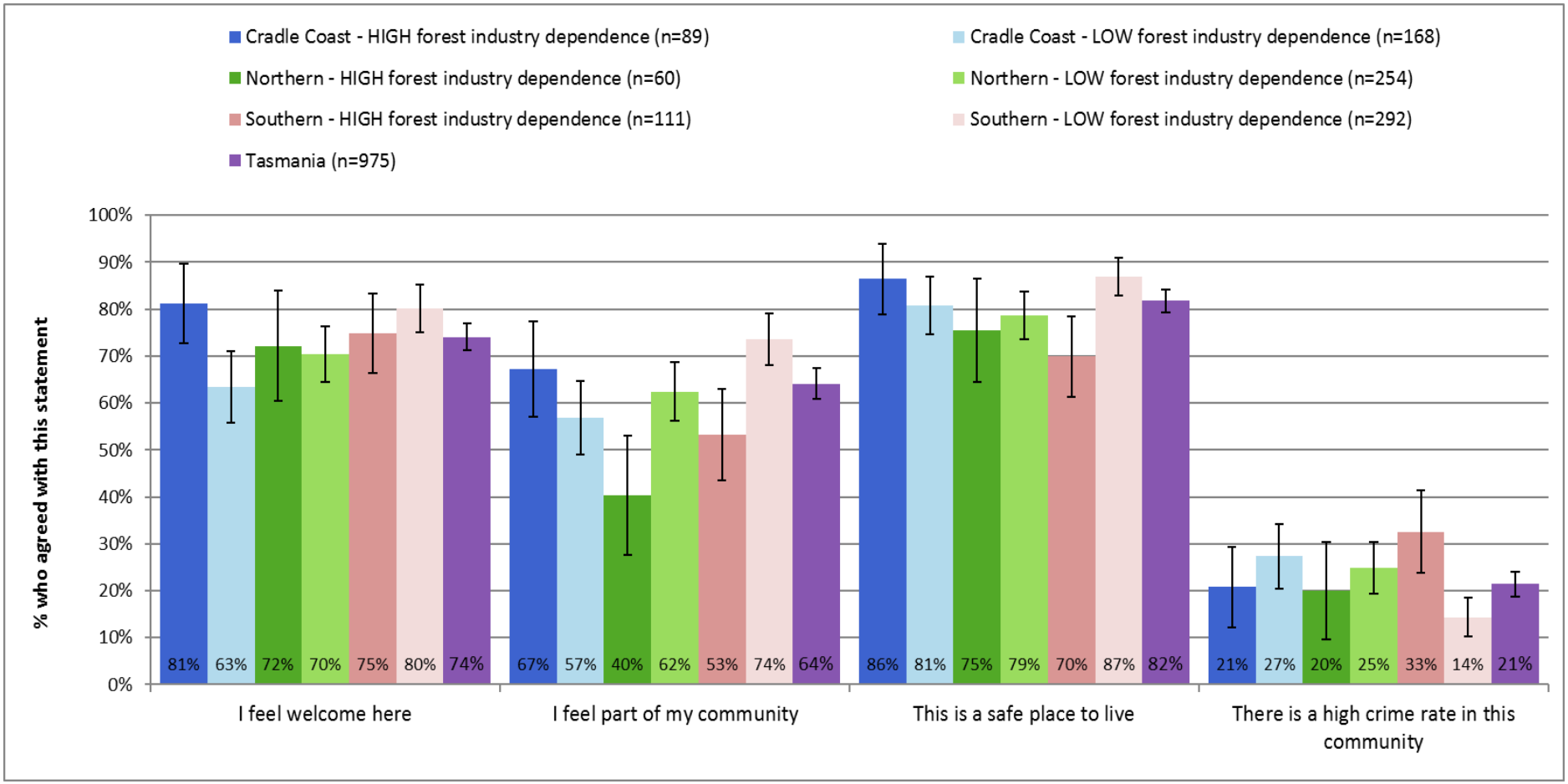


Figure 10 Perceptions of friendliness, safety and crime

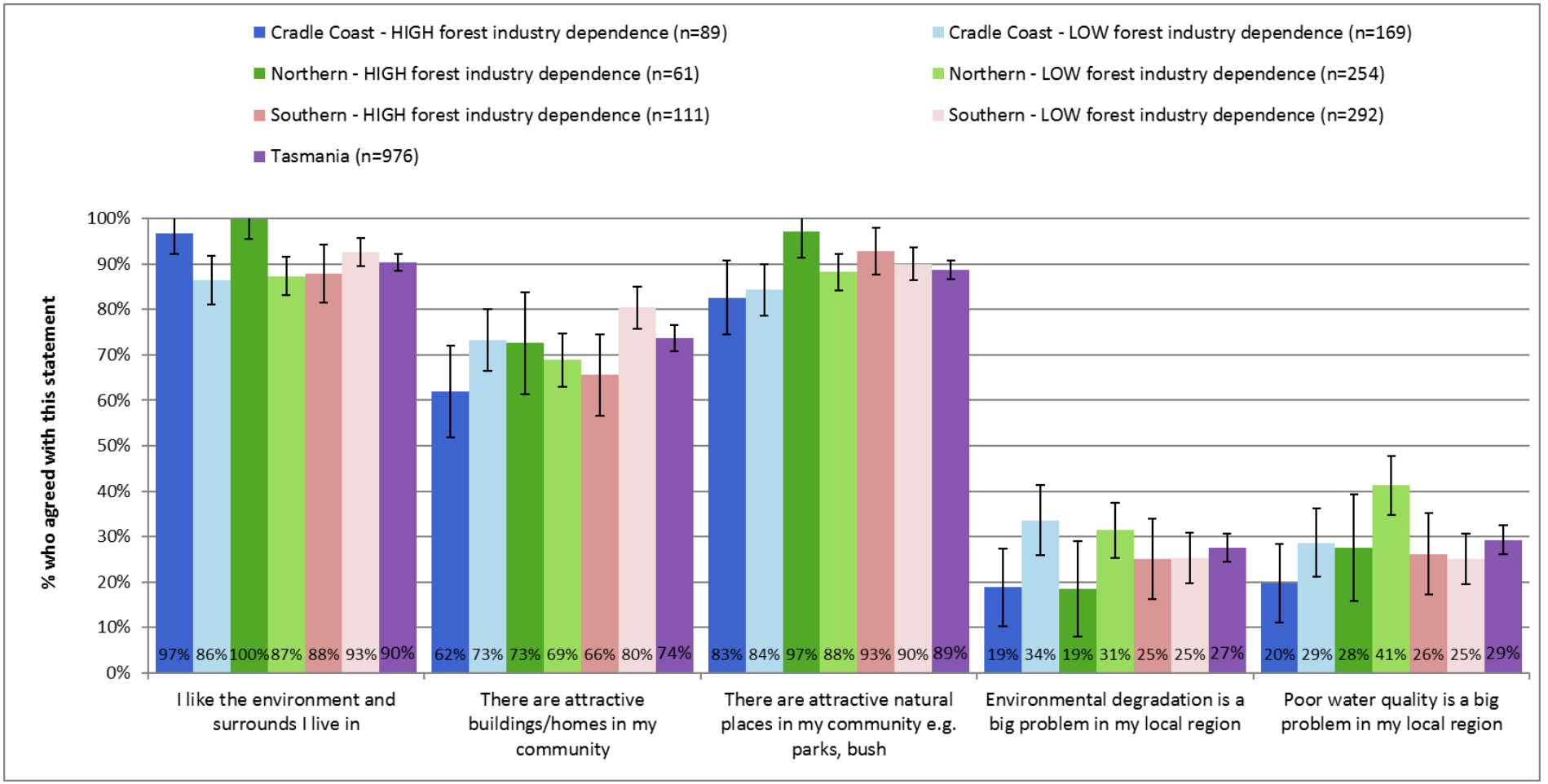


Figure 11 Perceptions of landscape aesthetics and environmental health

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.

First, residents were asked to identify whether they felt any of a number of industries were important to their community. Asking this helps identify whether local residents living in regions with higher dependence on the forest industry for employment are aware of the presence of the industry, or feel it is an important contributor to their community.

Residents were asked whether agriculture, tourism, mining, fishing, or forest-related industries were important industries in their local region, and could select more than one important industry. Two forest industry-related industries were asked about: (i) forestry (logging of native forests or plantations) and (ii) wood or paper product manufacturing. In total, 881 residents living in Tasmania answered questions about the socio-economic effects of different industries. This included 243 living in the Cradle Coast, 291 living in the Northern region and 345 living in the Southern region. Of the 881, a total of 244 lived in local government areas or towns with high dependence on the forest industry for employment.

As shown in Figure 12, 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 LGAs where a smaller proportion of employment relies on the industry.

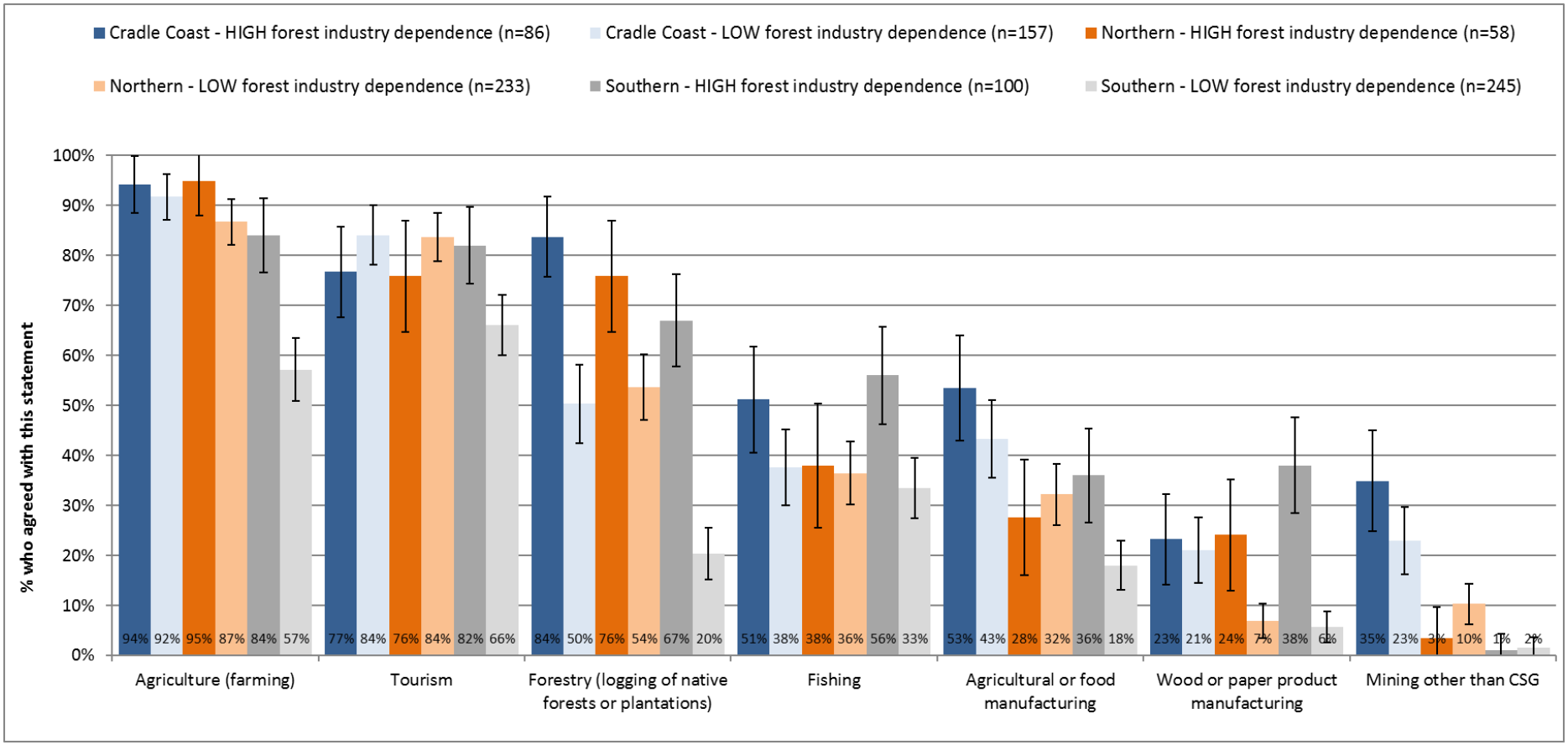


Figure 12 Proportion of residents who views the forest industry as an 'important industry' in their local community

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 Cradle Coast region, Northern region and Southern 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.

In general, Tasmanians perceive the forest industry as having fewer positive effects than the farming and tourism industries, and more negative effects (Figures 13 to 18), with only one significant exception: Cradle Coast and Northern residents felt more positive about the impacts of the forest industry on bushfire risk compared to tourism (but not significantly so compared to agriculture). This result applies to both communities with greater and lesser dependence on the forest industry (see Appendix 1).

The large majority of residents – 79% in the Cradle Coast, 73% in the Northern and 80% in the Southern region - felt the forest industry had positive impacts on local employment. However, in each region more felt that farming and tourism were positive contributors to employment. Fewer than 50% 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:

- 58% in the Cradle Coast region, 60% in the Northern region and 69% in the Southern region felt the industry had a negative impact on the traffic on local roads
- 52% in the Cradle Coast region, 57% in the Northern region and 72% in the Southern region felt the industry had a negative impact on the quality of local roads
- 52% in the Cradle Coast region, 50% in the Northern region and 62% in the Southern 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.

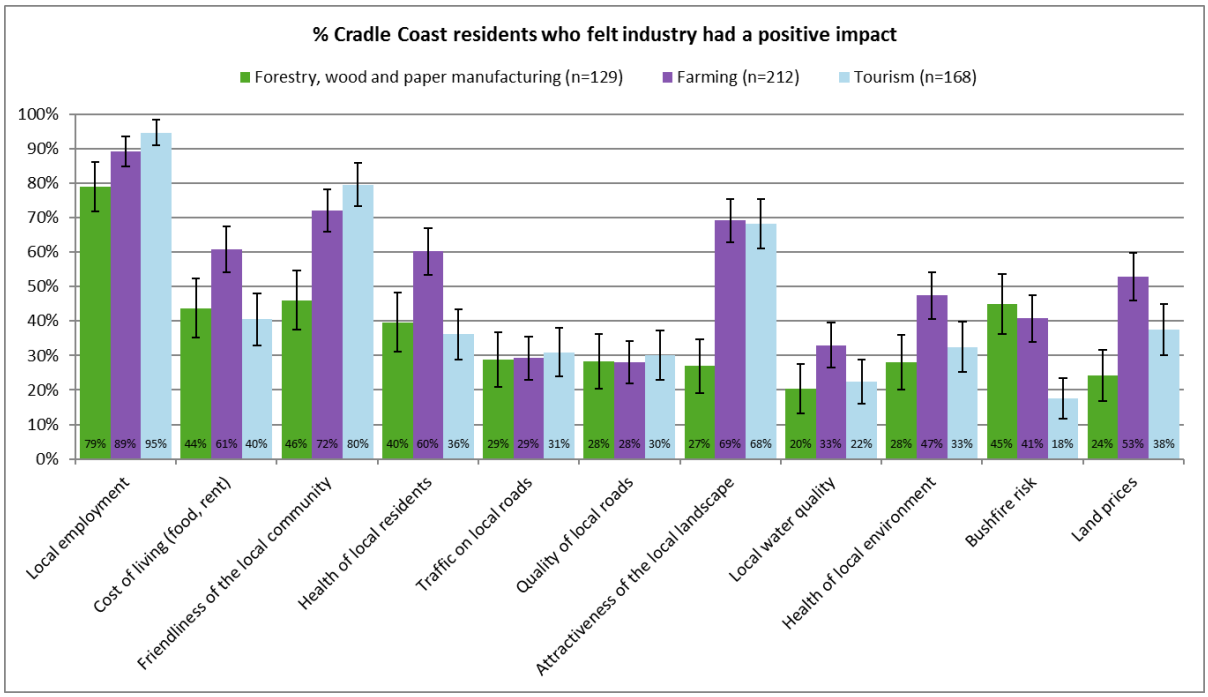


Figure 13 Proportion of Cradle Coast region residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

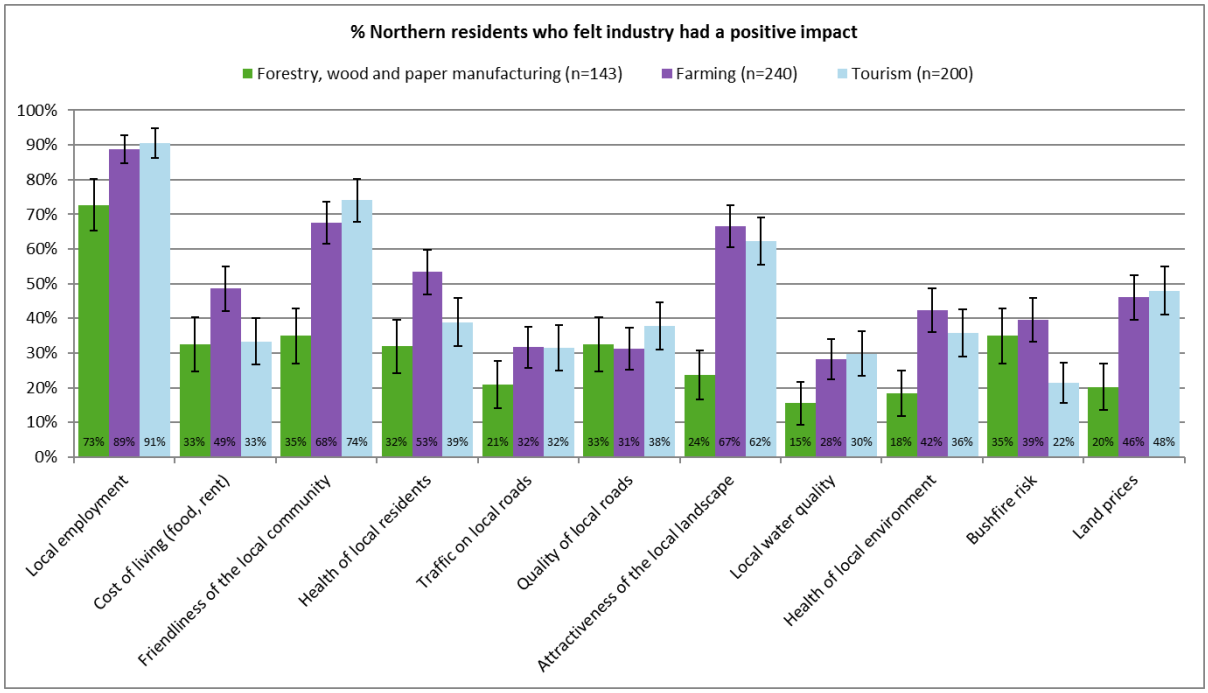


Figure 14 Proportion of Northern region residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

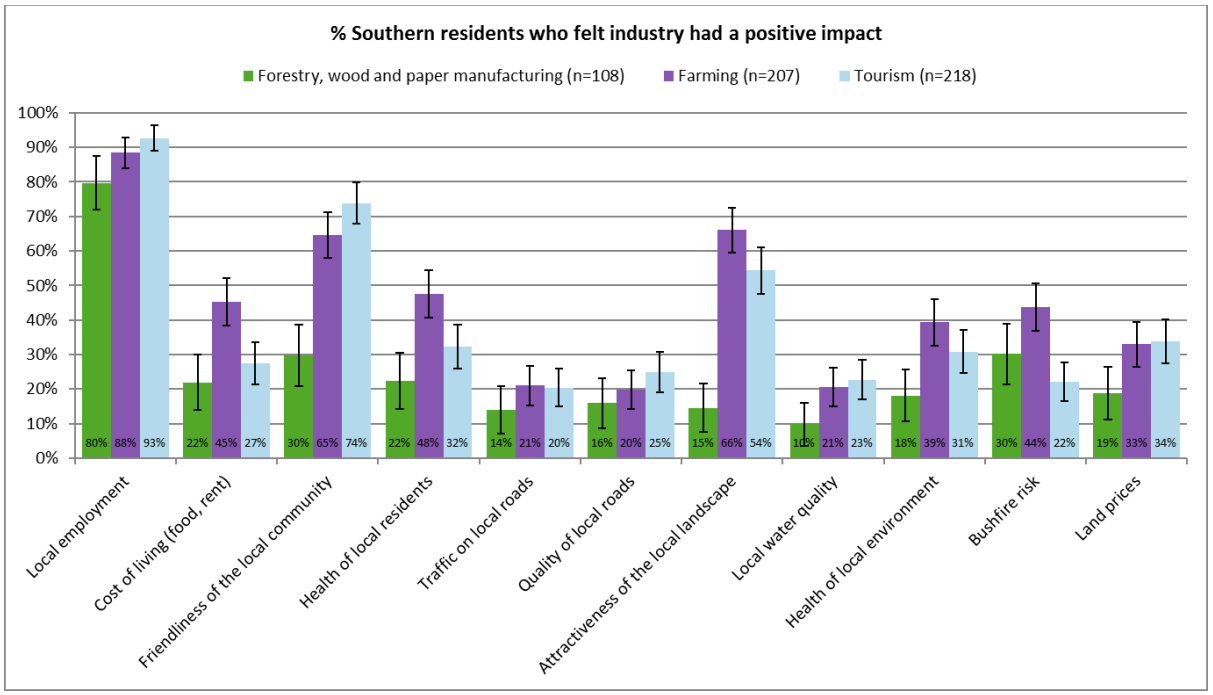


Figure 15 Proportion of Southern region residents who felt the forestry, farming and tourism industries had a positive impact on different aspects of their local community

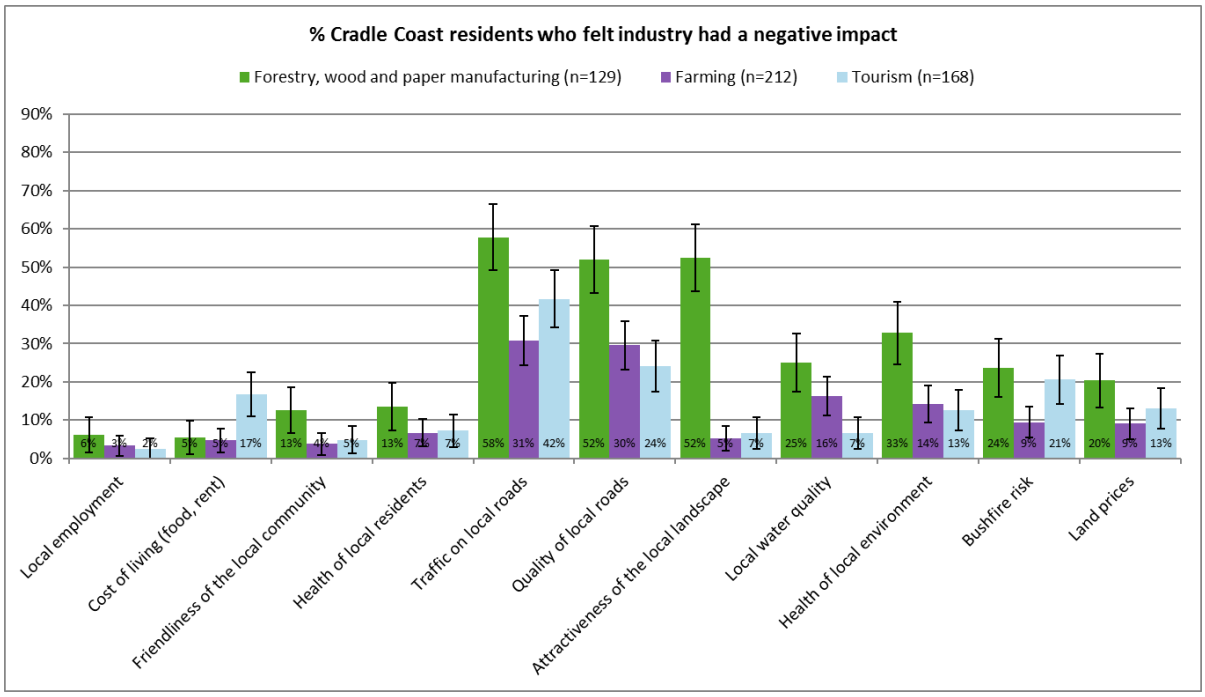


Figure 16 Proportion of Cradle Coast region residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

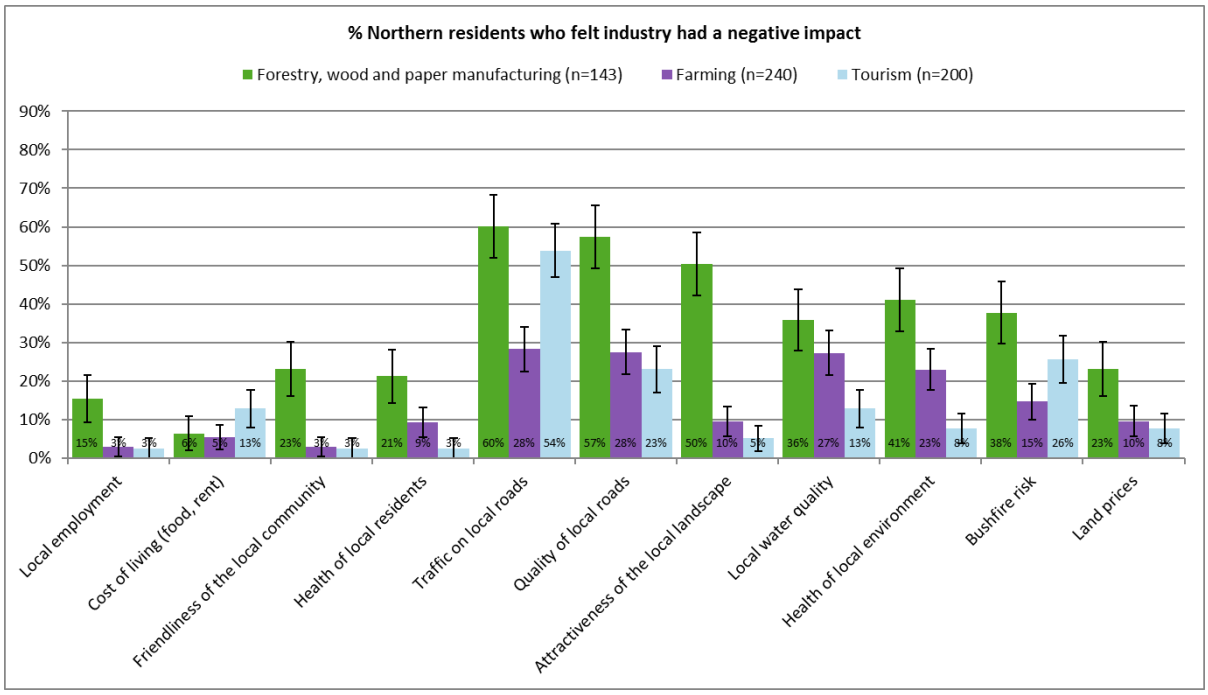


Figure 17 Proportion of Northern region residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

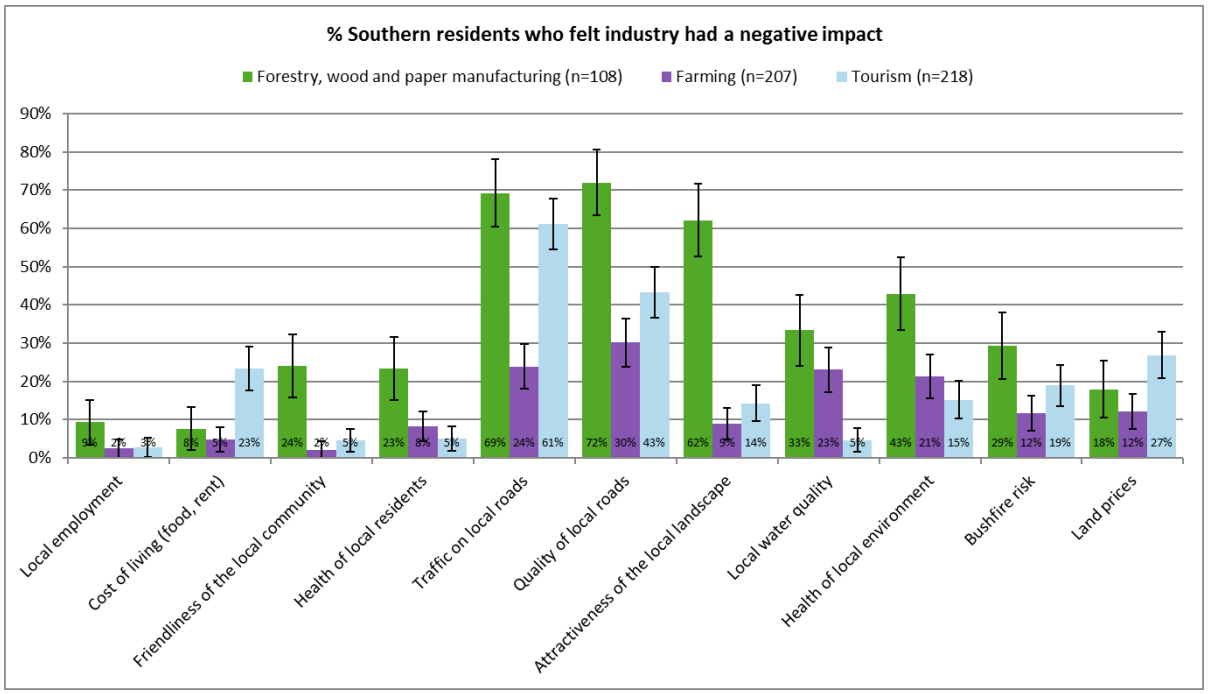


Figure 18 Proportion of Southern region residents who felt the forestry, farming and tourism industries had a negative impact on different aspects of their local community

Conclusions

This report quantified the employment and economic activity generated by the forest industry in Tasmania, and identified the communities in which the industry generates a larger proportion of local jobs. This report also tracked change over time, identifying how the industry is changing after a decade of rapid change in which there was a large decline in volumes harvested from native forest, transfer of much of the plantation estate into new ownership and management after collapse of the MIS sector, and subsequent growth in harvest volumes from a maturing hardwood plantation estate.

The findings show that, after a period in which the industry contracted substantially in size, expenditure has grown since 2013, and employment has remained relatively stable, with growth in hardwood plantation jobs offsetting some loss of native forest jobs. This is a significant change from earlier periods of rapid employment decline between 2008 and 2011. Business outlook is cautiously optimistic for much of the industry, particularly in the plantation sector, although many native forest dependent businesses report lower confidence in business conditions.

Whereas the Tasmanian forest industry historically was largely reliant on harvest of native forests, native forest harvest and employment is now less than half of the industry, although it is important to note that 41% of employment relies on native forests despite only native forest representing only 27% of Tasmania's log harvest. This highlights an important point: while hardwood plantation harvest is growing rapidly, fewer jobs are generated per unit of harvest volume in the hardwood plantation sector compared to the native forest sector. In other words, for every cubic metre harvested in native forests, more jobs are generated than are generated by the harvest of the same volume of hardwood plantations. This is because of the greater amount of processing of native forest harvest that occurs within Tasmania: while most hardwood plantation logs are woodchipped and exported, native forest logs are processed into a wider range of products involving more value-adding.

While the 2,714 direct jobs generated up to the point of primary processing (and 3,062 when secondary processing is included) is substantially lower than the employment the industry generated in 2008, it supports a significant proportion of jobs in several communities, particularly in the LGAs of Dorset, Circular Head, Derwent Valley, George Town, Central Highlands, Huon Valley and Waratah/Wynyard.

The industry has high working hours compared to other industries in Tasmania, particularly for harvest and haulage contractors; it offers similar wages to other industries. Businesses report some difficulties recruiting managers, professional staff and some types of contractors, with 50% of businesses reporting difficulty recruiting staff as a key business challenge in the last three years. This suggests that shortage of skilled workers is a key challenge to further expansion of the industry as harvest volumes expand from hardwood plantations. The industry overall has a similar age profile to others in Tasmania, indicating it is not ageing more rapidly than is typical of the broader workforce. However, building skills is challenging in a workforce that has changed substantially in recent years, and one in which many workers have low levels of formal education. The Tasmanian community values the forest industry for the employment it provides, but does not have a strong perception of the industry providing other benefits for local communities, while having concerns about issues such as impacts on roads and landscape quality.

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Appendix 1 Data tables

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

	Cradle Coast		Northern		Southern		Tasmania	
Type of expenditure	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)
Wages/Salaries	38.9	32%	63.6	30%	56.0	25%	158.6	28%
Other Services	8.3	7%	13.8	7%	14.7	7%	44.6	8%
Manufacturing	3.6	3%	7.1	3%	10.0	4%	35.7	6%
Retail and Wholesale Trade	6.1	5%	9.3	4%	9.3	4%	24.9	4%
Electricity, Gas, Water and Waste Services	1.8	1%	3.6	2%	9.0	4%	23.0	4%
Transport, Postal and Warehousing	3.3	3%	7.1	3%	8.8	4%	22.4	4%
Agriculture	3.7	3%	5.3	3%	3.4	1%	12.7	2%
Communication	2.5	2%	3.9	2%	3.6	2%	13.8	2%
Other	2.6	2%	4.4	2%	5.1	2%	12.2	2%
Professional, Scientific and Technical Services	2.0	2%	3.4	2%	3.2	1%	8.7	2%
Construction	1.6	1%	3.6	2%	4.4	2%	11.2	2%
Annuities and donations	0.9	1%	1.3	1%	1.8	1%	4.0	1%
Education and Training	0.2	0%	0.4	0%	0.4	0%	1.0	0%
Mining	0.0	0%	0.1	0%	0.1	0%	0.2	0%
Accommodation and Food Services	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Sub-total	**75.4**	**62%**	**126.9**	**60%**	**129.7**	**57%**	**373.1**	**67%**
Expenditure outside the respective region	46.2	38%	84.8	40%	96.4	43%	186.9	33%
Total	**121.6**	**100%**	**211.7**	**100%**	**226.2**	**100%**	**560.1**	**100%**

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

	Native Forest		Softwood Plantation		Hardwood Plantation		Tasmania	
Type of expenditure	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)	Value ($m)	Proportion of total (%)
Wages/Salaries	51.6	39%	56.8	23%	50.2	27%	158.6	28%
Other Services	10.4	8%	17.9	7%	16.3	9%	44.6	8%
Manufacturing	7.2	5%	16.2	7%	12.3	7%	35.7	6%
Retail and Wholesale Trade	5.0	4%	10.3	4%	9.7	5%	24.9	4%
Electricity, Gas, Water and Waste Services	3.1	2%	16.6	7%	3.3	2%	23.0	4%
Transport, Postal and Warehousing	4.8	4%	13.2	5%	4.4	2%	22.4	4%
Agriculture	2.6	2%	3.6	1%	6.5	4%	12.7	2%
Communication	3.5	3%	4.9	2%	5.4	3%	13.8	2%
Other	3.2	2%	4.8	2%	4.2	2%	12.2	2%
Professional, Scientific and Technical Services	2.0	1%	3.6	1%	3.2	2%	8.7	2%
Construction	2.4	2%	6.6	3%	2.2	1%	11.2	2%
Annuities and donations	2.5	2%	0.4	0%	1.1	1%	4.0	1%
Education and Training	0.2	0%	0.5	0%	0.3	0%	1.0	0%
Mining	0.0	0%	0.1	0%	0.0	0%	0.2	0%
Accommodation and Food Services	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Sub-total	**98.4**	**74%**	**155.5**	**64%**	**119.1**	**65%**	**373.1**	**67%**
Expenditure outside the respective region	35.3	26%	87.8	36%	63.8	35%	186.9	33%
Total	**133.7**	**100%**	**243.3**	**100%**	**182.9**	**100%**	**560.1**	**100%**

Table A1.3 Economic impacts of the Tasmanian forest industry, by sector, on the Cradle Coast region

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
Output[a] ($m)	**88.5**	**14.9**	**3.2**	**113.0**	**218.9**	**271.8**
Direct ($m)	78.3	8.5	1.8	68.7	192.7	183.3
Production-induced ($m)	4.9	4.0	0.8	26.2	13.8	49.7
Consumption-induced ($m)	5.3	2.4	0.6	18.1	12.4	38.8
GRP ($m)	**13.0**	**6.9**	**1.6**	**52.8**	**76.2**	**150.5**
Direct ($m)	7.3	3.5	0.8	28.2	61.6	101.4
Production-induced ($m)	2.4	2.0	0.4	13.6	7.0	25.5
Consumption-induced ($m)	3.2	1.5	0.4	11.0	7.6	23.7
Household Income ($m)	**8.7**	**4.2**	**1.0**	**31.3**	**20.8**	**66.1**
Direct ($m)	5.7	2.3	0.6	17.4	12.9	38.9
Production-induced ($m)	1.6	1.3	0.3	8.9	4.4	16.4
Consumption-induced ($m)	1.5	0.7	0.2	5.0	3.5	10.8
Employment (total)	**108**	**138**	**25**	**453**	**380**	**1,105**
Direct (total)	56	106	18	225	249	653
Production-induced (total)	23	19	4	129	62	237
Consumption-induced (total)	29	13	3	99	69	214

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 Tasmanian forest industry, by sector, on the Northern region

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
Output[a] ($m)	**158.4**	**18.0**	**7.8**	**145.5**	**377.7**	**458.2**
Direct ($m)	137.6	9.8	4.2	85.1	302.6	290.0
Production-induced ($m)	10.0	4.8	1.9	33.7	39.4	89.8
Consumption-induced ($m)	10.8	3.5	1.7	26.8	35.7	78.5
GRP ($m)	**31.8**	**8.3**	**3.9**	**68.6**	**122.9**	**235.5**
Direct ($m)	20.4	3.8	1.9	35.6	81.5	143.3
Production-induced ($m)	4.8	2.4	1.0	17.0	20.0	45.2
Consumption-induced ($m)	6.5	2.1	1.0	16.0	21.4	47.0
Household Income ($m)	**15.4**	**5.1**	**2.5**	**39.6**	**52.1**	**114.7**
Direct ($m)	9.3	2.7	1.4	21.0	29.1	63.6
Production-induced ($m)	3.0	1.5	0.6	11.2	13.0	29.3
Consumption-induced ($m)	3.0	1.0	0.5	7.4	9.9	21.8
Employment (total)	**224**	**139**	**56**	**617**	**862**	**1,897**
Direct (total)	119	97	37	304	478	1,035
Production-induced (total)	46	23	10	167	188	433
Consumption-induced (total)	59	19	9	146	195	428

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 Tasmanian forest industry, by sector, on the Southern region

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
	Activity combined to preserve confidentiality					
Output[a] ($m)		**129.3**		**90.2**	**324.1**	**424.7**
Direct ($m)		103.6		51.6	201.5	237.8
Production-induced ($m)		10.4		21.1	76.8	108.3
Consumption-induced ($m)		15.3		17.5	45.9	78.7
GRP ($m)		**24.2**		**42.3**	**104.2**	**170.7**
Direct ($m)		9.9		21.0	38.5	69.4
Production-induced ($m)		5.2		10.8	38.4	54.4
Consumption-induced ($m)		9.2		10.4	27.3	46.9
Household Income ($m)		**20.8**		**24.9**	**67.2**	**113.0**
Direct ($m)		13.0		12.7	30.3	56.0
Production-induced ($m)		3.4		7.2	24.1	34.7
Consumption-induced ($m)		4.5		5.0	12.9	22.3
Employment (total)		**355**		**414**	**1,133**	**1,903**
Direct (total)		227		222	565	1,014
Production-induced (total)		48		102	332	482
Consumption-induced (total)		80		90	236	406

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 Tasmanian native forest industry, by sector

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
	Activity combined to preserve confidentiality					
Output[a] ($m)		**154.8**		**78.1**	**205.0**	**289.5**
Direct ($m)		120.2		39.4	138.8	150.1
Production-induced ($m)		12.6		22.4	31.5	66.5
Consumption-induced ($m)		22.0		16.3	34.7	72.9
GRP ($m)		**26.9**		**34.5**	**84.8**	**146.2**
Direct ($m)		7.8		14.2	48.4	70.4
Production-induced ($m)		6.2		10.8	16.0	33.0
Consumption-induced ($m)		12.9		9.5	20.3	42.7
Household Income ($m)		**27.2**		**21.7**	**44.2**	**93.1**
Direct ($m)		17.0		10.1	24.4	51.6
Production-induced ($m)		4.0		7.1	10.1	21.1
Consumption-induced ($m)		6.2		4.4	9.7	20.4
Employment (total)		**429**		**386**	**972**	**1,786**
Direct (total)		258		197	656	1,112
Production-induced (total)		57		106	139	302
Consumption-induced (total)		113		82	177	372

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 Tasmanian softwood plantation industry, by sector

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
Output[a] ($m)	**68.1**	**16.1**	**3.1**	**100.5**	**494.3**	**545.8**
Direct ($m)	57.6	8.0	1.5	54.0	313.9	298.8
Production-induced ($m)	5.8	4.6	0.8	26.6	112.8	150.6
Consumption-induced ($m)	4.7	3.5	0.8	19.9	67.6	96.4
GRP ($m)	**22.1**	**7.4**	**1.6**	**48.3**	**164.3**	**243.7**
Direct ($m)	16.7	3.1	0.7	23.9	68.3	112.7
Production-induced ($m)	2.7	2.2	0.4	12.8	56.6	74.8
Consumption-induced ($m)	2.8	2.0	0.4	11.6	39.4	56.2
Household Income ($m)	**6.1**	**4.6**	**1.0**	**26.4**	**90.7**	**128.7**
Direct ($m)	3.1	2.2	0.5	12.5	38.4	56.8
Production-induced ($m)	1.6	1.4	0.3	8.4	33.9	45.7
Consumption-induced ($m)	1.3	1.0	0.2	5.4	18.3	26.2
Employment (total)	**76**	**125**	**23**	**457**	**1,347**	**2,028**
Direct (total)	29	86	16	231	541	903
Production-induced (total)	23	21	4	126	466	640
Consumption-induced (total)	24	18	4	100	340	486

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 the Tasmanian hardwood plantation industry, by sector

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
Output[a] ($m)	**167.0**	**25.9**	**3.7**	**214.6**	**280.2**	**441.0**
Direct ($m)	142.0	12.9	1.9	112.2	244.0	262.7
Production-induced ($m)	13.0	7.4	1.0	57.5	21.2	100.1
Consumption-induced ($m)	11.9	5.6	0.9	44.8	15.0	78.2
GRP ($m)	**26.7**	**12.0**	**1.9**	**100.6**	**84.1**	**225.2**
Direct ($m)	13.4	5.2	0.9	46.7	65.0	131.1
Production-induced ($m)	6.3	3.6	0.5	27.6	10.3	48.4
Consumption-induced ($m)	7.0	3.2	0.5	26.2	8.8	45.7
Household Income ($m)	**15.4**	**7.3**	**1.2**	**59.2**	**19.7**	**102.7**
Direct ($m)	8.0	3.5	0.6	28.6	9.4	50.2
Production-induced ($m)	4.0	2.3	0.3	18.3	6.1	31.0
Consumption-induced ($m)	3.3	1.5	0.2	12.3	4.1	21.5
Employment (total)	**217**	**215**	**34**	**824**	**257**	**1,547**
Direct (total)	100	154	27	323	95	699
Production-induced (total)	57	33	5	274	86	454
Consumption-induced (total)	61	28	5	226	76	396

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 Tasmanian forest industry, by sector – all of Tasmania, all parts of the industry

	Growers (forest management companies)	Nurseries and silvicultural businesses	Other (including consultants, equipment sales, training)	Harvest & haulage contracting businesses	Wood and paper processing	Whole Industry (excludes transfers)
Output[a] ($m)	**370.8**	**49.5**	**18.8**	**393.1**	**979.5**	**1,276.8**
Direct ($m)	310.4	24.6	9.4	205.6	696.7	711.8
Production-induced ($m)	26.2	14.2	4.9	106.5	165.6	317.4
Consumption-induced ($m)	34.2	10.7	4.6	81.0	117.2	247.6
GRP ($m)	**66.5**	**22.9**	**9.5**	**183.4**	**333.1**	**615.3**
Direct ($m)	33.7	9.8	4.3	84.9	181.7	314.4
Production-induced ($m)	12.7	6.9	2.5	51.2	82.9	156.2
Consumption-induced ($m)	20.0	6.2	2.7	47.3	68.5	144.7
Household Income ($m)	**42.9**	**14.0**	**5.9**	**107.2**	**154.5**	**324.6**
Direct ($m)	25.3	6.8	3.1	51.2	72.3	158.6
Production-induced ($m)	8.0	4.3	1.6	33.9	50.1	97.8
Consumption-induced ($m)	9.6	2.9	1.3	22.2	32.1	68.1
Employment (total)	**572**	**402**	**148**	**1,667**	**2,576**	**5,365**
Direct (total)	284	285	101	751	1,292	2,714
Production-induced (total)	113	63	23	506	691	1,397
Consumption-induced (total)	175	54	23	409	593	1,254

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 Cradle Coast 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=129)	Forestry, wood & paper manufacturing (n=61)	Forestry, wood & paper manufacturing (n=68)	Farming (n=212)	Farming (n=81)	Farming (n=131)	Tourism (n=168)	Tourism (n=57)	Tourism (n=111)
Local employment	6%	2%	10%	3%	1%	5%	2%	0%	4%
Cost of living (food, rent)	5%	3%	7%	5%	5%	5%	17%	18%	16%
Friendliness of the local community	13%	15%	10%	4%	2%	5%	5%	4%	6%
Health of local residents	13%	10%	17%	7%	5%	8%	7%	4%	9%
Traffic on local roads	58%	60%	56%	31%	35%	28%	42%	47%	39%
Quality of local roads	52%	47%	57%	30%	38%	24%	24%	25%	24%
Attractiveness of the local landscape	52%	53%	52%	5%	5%	5%	7%	7%	6%
Local water quality	25%	23%	26%	16%	20%	14%	7%	4%	8%
Health of local environment	33%	33%	32%	14%	15%	14%	13%	14%	12%
Bushfire risk	24%	22%	25%	9%	18%	5%	21%	27%	17%
Land prices	20%	13%	26%	9%	14%	6%	13%	14%	13%

Table A1.11 Proportion of Northern 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=41)	Forestry, wood & paper manufacturing (n=102)	Farming (n=240)	Farming (n=51)	Farming (n=189)	Tourism (n=200)	Tourism (n=39)	Tourism (n=161)
Local employment	15%	12%	17%	3%	2%	3%	2%	3%	2%
Cost of living (food, rent)	6%	12%	4%	5%	6%	5%	16%	13%	17%
Friendliness of the local community	23%	22%	24%	3%	2%	3%	6%	3%	6%
Health of local residents	21%	29%	18%	9%	12%	9%	7%	3%	8%
Traffic on local roads	60%	54%	63%	28%	29%	28%	50%	54%	49%
Quality of local roads	57%	61%	56%	28%	33%	26%	28%	23%	29%
Attractiveness of the local landscape	50%	44%	53%	10%	8%	10%	7%	5%	7%
Local water quality	36%	29%	39%	27%	24%	28%	8%	13%	7%
Health of local environment	41%	39%	42%	23%	22%	23%	11%	8%	12%
Bushfire risk	38%	34%	39%	15%	16%	14%	24%	26%	24%
Land prices	23%	29%	21%	10%	16%	8%	14%	8%	15%

Table A1.12 Proportion of Southern 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=108)	Forestry, wood & paper manufacturing (n=64)	Forestry, wood & paper manufacturing (n=44)	Farming (n=207)	Farming (n=73)	Farming (n=134)	Tourism (n=218)	Tourism (n=71)	Tourism (n=147)
Local employment	9%	9%	9%	2%	3%	2%	3%	1%	3%
Cost of living (food, rent)	8%	11%	2%	5%	6%	4%	23%	20%	25%
Friendliness of the local community	24%	29%	17%	2%	6%	0%	5%	4%	5%
Health of local residents	23%	23%	24%	8%	18%	3%	5%	4%	5%
Traffic on local roads	69%	69%	70%	24%	22%	25%	61%	51%	66%
Quality of local roads	72%	75%	67%	30%	26%	32%	43%	40%	45%
Attractiveness of the local landscape	62%	69%	52%	9%	13%	7%	14%	7%	18%
Local water quality	33%	39%	24%	23%	33%	17%	5%	0%	7%
Health of local environment	43%	53%	28%	21%	25%	19%	15%	9%	18%
Bushfire risk	29%	32%	25%	12%	10%	13%	19%	14%	21%
Land prices	18%	19%	16%	12%	10%	13%	27%	21%	29%

Table A1.13 Proportion of Cradle Coast 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=129)	Forestry, wood & paper manufacturing (n=61)	Forestry, wood & paper manufacturing (n=68)	Farming (n=212)	Farming (n=81)	Farming (n=131)	Tourism (n=168)	Tourism (n=57)	Tourism (n=111)
Local employment	79%	84%	75%	89%	94%	86%	95%	96%	94%
Cost of living (food, rent)	44%	44%	43%	61%	63%	60%	40%	46%	38%
Friendliness of the local community	46%	49%	43%	72%	81%	66%	80%	86%	76%
Health of local residents	40%	40%	39%	60%	64%	58%	36%	43%	33%
Traffic on local roads	29%	28%	29%	29%	28%	30%	31%	32%	31%
Quality of local roads	28%	30%	27%	28%	23%	31%	30%	26%	32%
Attractiveness of the local landscape	27%	30%	24%	69%	74%	66%	68%	67%	69%
Local water quality	20%	20%	21%	33%	35%	32%	22%	29%	19%
Health of local environment	28%	28%	28%	47%	48%	47%	33%	38%	30%
Bushfire risk	45%	45%	45%	41%	36%	44%	18%	14%	19%
Land prices	24%	23%	25%	53%	57%	50%	38%	32%	41%

Table A1.14 Proportion of Northern 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=41)	Forestry, wood & paper manufacturing (n=102)	Farming (n=240)	Farming (n=51)	Farming (n=189)	Tourism (n=200)	Tourism (n=39)	Tourism (n=161)
Local employment	73%	85%	68%	89%	90%	88%	91%	92%	90%
Cost of living (food, rent)	33%	49%	26%	49%	57%	46%	33%	41%	31%
Friendliness of the local community	35%	44%	31%	68%	63%	69%	74%	79%	73%
Health of local residents	32%	39%	29%	53%	46%	55%	39%	44%	38%
Traffic on local roads	21%	24%	20%	32%	29%	32%	32%	33%	31%
Quality of local roads	33%	37%	31%	31%	22%	34%	38%	36%	38%
Attractiveness of the local landscape	24%	27%	23%	67%	75%	65%	62%	54%	64%
Local water quality	15%	15%	16%	28%	27%	28%	30%	26%	31%
Health of local environment	18%	15%	20%	42%	39%	43%	36%	41%	35%
Bushfire risk	35%	27%	38%	39%	37%	40%	22%	21%	22%
Land prices	20%	24%	19%	46%	43%	47%	48%	56%	46%

Table A1.15 Proportion of Southern 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=108)	Forestry, wood & paper manufacturing (n=64)	Forestry, wood & paper manufacturing (n=44)	Farming (n=207)	Farming (n=73)	Farming (n=134)	Tourism (n=218)	Tourism (n=71)	Tourism (n=147)
Local employment	80%	81%	77%	88%	85%	90%	93%	96%	91%
Cost of living (food, rent)	22%	19%	26%	45%	42%	47%	27%	24%	29%
Friendliness of the local community	30%	34%	24%	65%	58%	68%	74%	79%	71%
Health of local residents	22%	19%	27%	48%	49%	47%	32%	33%	32%
Traffic on local roads	14%	16%	12%	21%	22%	20%	20%	20%	21%
Quality of local roads	16%	17%	14%	20%	18%	21%	25%	19%	28%
Attractiveness of the local landscape	15%	8%	24%	66%	60%	69%	54%	56%	54%
Local water quality	10%	7%	15%	21%	18%	22%	23%	21%	23%
Health of local environment	18%	15%	23%	39%	36%	41%	31%	33%	30%
Bushfire risk	30%	26%	36%	44%	39%	46%	22%	17%	24%
Land prices	19%	16%	23%	33%	29%	35%	34%	34%	34%