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Social indicators for Australia's forest and wood products industries

Discussion paper

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Summary

Australia's forest and wood products industries contribute to the social and economic wellbeing of communities in multiple ways, for example through providing employment, and through the contributions of forest industry workers and their families to the communities in which they live.

ABARES Australian forest and wood products statistics (AFWPS) series is the principal source of regularly published data on trends in Australia's forest and wood products industries. In 2011, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), with funding support from Forest and Wood Products Australia, investigated expanding the coverage of the AFWPS series to incorporate reporting on social dimensions of forest and wood products industries during 2012–13.

This discussion paper proposes a methodology for including social indicators in the AFWPS series. The methodology was developed based on a desktop review of recent social research examining Australia's forest and wood products industries, and available data on the social dimensions of the industries. A set of draft indicators was developed that was subsequently revised following a review by representatives of Australia's forest and wood products industries at a workshop in March 2012.

This discussion paper proposes four categories of social indicators:

- direct employment
- contributions of the forest and wood products industries to the community
- adaptive capacity of communities with high dependence on the industries
- human dimensions of industry sustainability.

Direct employment

The creation of direct jobs is a critical social contribution of the forest and wood products industries. The generation of indirect and induced employment is also an important contribution but it is not currently feasible to estimate indirect and induced employment for regular AFWPS reporting.

The AFWPS could report on direct employment in Australia's forest and wood products industries, and tree management for environmental service provision industries. These industries are defined as:

- forest and wood products industries—growing, management, harvesting, haulage to mill, milling and processing, importing/exporting, haulage of finished goods to market, and wholesale and retail sales of wood and paper products in Australia. This includes all processing where wood is the dominant component of goods being produced, and excludes processing where wood/paper is a small part of the components utilised. Specialist consulting/research should also be included.

- tree management for environmental service provision industries—all employment generated directly by the growing and management of trees for environmental service provision, and the marketing of environmental services generated by these trees.

However, the available data are not adequate for reporting of employment generated by some of these activities. In the forest and wood products industries, employment estimates for retail sales, wood craft production, firewood production, haulage of finished goods to markets, policy development, and import/export jobs are not readily available. It is not currently feasible to report on employment generated by tree management for environmental service provision industries.

The AFWPS could report on employment in all other activities, and clearly identify the limitations of this reporting—specifically, activities excluded from the reported estimates.

Analysis undertaken for this discussion paper suggests that Australian Bureau of Statistics (ABS) estimates of employment in forest management include workers who fall outside the forest and wood products industries definition proposed, but also exclude a large proportion of those working in forestry support services and harvest and haulage of logs to mill—which do fall under the forest and wood products industries definition. To provide a more accurate understanding of employment in these activities, this paper proposes that AFWPS could report both the ABS estimates and a range of adjusted estimates for actual employment based on the findings of detailed surveys of the industries in some states.

Ideally, employment dependent on native forest versus plantation timber would also be reported. This is not possible at a national scale due to lack of available data.

Expanding the scope of reporting on employment beyond the data listed above would require direct survey of specific parts of the industries. It would include the development of improved methodologies for estimating employment in areas such as harvest and haulage of wood and paper products from mills to market, wood craft and retail sales. Improved methodologies would also be needed for identifying the extent to which employment depends on timber from native forest, plantations, or imported sources. This paper proposes that future work could focus on developing methods for estimating employment based on available information; for example, identifying metrics for estimating employment in log haulage based on available data on volumes of roundwood harvest.

Robust employment estimates for the forest and wood products industries defined in this paper can be made using data from the ABS Census of Population and Housing (Census). Further work needs to be undertaken to identify how best to update data between the five-yearly Censuses using data sources such as the ABS Labour Force Survey.

Contributions of forest and wood products industries to communities

The forest and wood products industries make important contributions to the communities where they operate and where forest industry workers reside. In communities with high dependence on the industry, changes to the industries could significantly affect the community as a whole. Proposed indicators of these contributions are:

- contribution to regional employment
    - proportion of local/regional jobs directly dependent on the forest and wood products industries
    - proportion of households in a region that have one or more members employed in the industries

- community participation
    - extent to which workers participate in volunteering activities
    - proportion of workers reporting working 49 or more hours per week
    - stability of workers in the forest and wood products industries (living in same area)
- contribution to a demand for local services
    - age profile of workers in the forest and wood products industries.

In all cases, these indicators can be measured at five-year intervals using ABS Census data, and could be reported for selected regions, and at state and national level.

Several other indicators can provide a useful understanding of contributions—for example, the direct donations of businesses to communities. However, these indicators would require direct survey of forest and wood products businesses and/or workers, and are therefore not currently able to be reported as part of AFWPS.

Adaptive capacity of communities

To assist in understanding a community's ability to respond when exposed to change and stresses, we can look at the cumulative resources that people have to draw on within a community. The level of resources indicates a community's adaptive capacity—the broad ability or potential for a system to adjust, modify or change its characteristics or behaviour, to cope with change or stresses.

It is proposed that AFWPS report on subindexes that represent different dimensions of an overall community adaptive capacity index:

- human capital—factors relating to labour force and influences on the productivity of labour, including individual education and skills
- social capital—factors relating to social relationships, networks and connections
- economic diversity—employment in different sectors.

These indexes could be reported for areas that have a threshold proportion of employment in forest industries of at least 3 per cent of the total working population. An appropriate geographic scale of reporting is the ABS Statistical Local Area (SLA) scale. This finer scale can then be aggregated for regional, state or national level reporting. The indexes can also be standardised (ranked) to allow a spatial comparison of SLAs across a larger geographic area of interest.

Adaptive capacity and its subindexes are only available at five-year intervals, as they rely on ABS Census data. Further work could be undertaken to validate or improve the indicators these measures use; for example, different factors influencing social capital. However, adjustment of the adaptive capacity index is out of scope of the current project.

Human dimensions of industry sustainability

The wellbeing, adaptive capacity and diversity of the workforce directly employed in the forest and wood products industries are all critical to ensuring sustainability of the industry. Indicators

proposed for inclusion in the AFWPS, and that should be revised as knowledge on these issues and better indicators to represent these concepts emerge, are:

- worker wellbeing—represented by worker income, long working hours, educational attainment and marital status, compared with the total employed workforce
- workforce diversity— represented by the proportion of workers who are of mature age (55years +) or young (< 25 years of age), female, Indigenous, or have a disability, compared with the total employed workforce.

These indicators can be measured at five-year intervals based on ABS Census data. Other indicators can provide information on the topics of worker wellbeing, worker adaptive capacity, and industry diversity, but these cannot be reported currently as they require direct survey of businesses and/or workers. Further work is needed to validate worker wellbeing and workforce diversity indicators, particularly to understand how working in the forest and wood products industries influences the wellbeing and adaptive capacity of workers and how these and workforce diversity affect industry sustainability.

Scale and timing of reporting

The indicators described in this discussion paper cannot be reported at all scales, or for all time periods. This paper proposes using the ABS Census framework for reporting all indicators at national and state scales at least every five years. Regional scales representing key production areas are important for industry information. At regional and smaller SLA scale, indicators other than direct employment in, and dependence on, the industries should only be reported in areas where there is a significant number of people employed in the industries.

Eleven regional forestry regions are identified for initial AFWPS reporting, based on aggregated groups of SLAs where forest sector workers reside. Detailed data are proposed to be reported at individual SLA scale wherever there are more than 20 forest sector workers residing in that SLA. Forest sector employment in capital city regions is significant and because of the differences to regional areas, capital city regions (with more employment in downstream wood and paper product manufacturing) should be reported separately. Regional forestry areas include South West and Central West New South Wales, Central Victoria–Murray, Tasmania, Green Triangle and South West Western Australia. Boundaries of all regions defined are mapped (Map 3).

The methodology proposed comprises:

- Proposal 1 Definitions for employment estimates (page 15)
- Proposal 2 Initial reporting of employment (page 26)
- Proposal 3 Further work to improve estimates of employment (page 27)
- Proposal 4 Reporting on the contributions of forest and wood products industries to the broader community (page 36)
- Proposal 5 Reporting on adaptive capacity of regions with significant employment in forest and wood products industries (page 47)
- Proposal 6 Reporting indicators of human dimensions of industry sustainability (page 59)
- Proposal 7 Geographic scale and time frame to report social indicators (page 65).

Conclusions

Incorporating reporting of social indicators in the AFWPS represents a significant change to current reporting practices, because it provides an added perspective of information. This discussion paper identifies several social indicators that could be reported reliably as part of the AFWPS, using existing datasets and thus minimal additional investment. The discussion paper also identifies the key limitations of the data, indicators and methodology and areas in which further research is needed to expand the scope of social indicators included in the AFWPS.

1 Introduction

Australia's forest and wood products industries contribute to the social and economic wellbeing of many individuals, families and communities across the country. They do this in multiple ways: for example, by providing employment and otherwise influencing the wellbeing of those employed in the industry and their families; by generating economic activity that contributes to further job creation in regional communities; and through the contributions of forest industry workers and their families to the communities in which they live.

The concept of ecologically sustainable development recognises the importance of ensuring use of natural resources is sustainable in terms of social, economic and ecological outcomes. However, there is often relatively little monitoring of the social outcomes of natural resource use. In recognition of this, recent years have seen increasing interest in identifying appropriate methodology for monitoring the social dimensions of primary industries in Australia, including the agricultural industries (Stenekes et al. 2010; Schirmer 2006), and the fishing and aquaculture industries (Schirmer & Casey 2005). Several reports have examined how best to monitor the social dimensions of Australia's forest and wood products industries (Schirmer et al. 2008). However, no regular collection and reporting of data has been done on the social dimensions of Australia's forest and wood products industries; instead, several one-off studies undertaken in specific regions have reported on the social contributions of forest and wood products industries to communities (see for example Schirmer et al. 2011; Schirmer 2010a, b; Schirmer 2009a, b; Schirmer et al. 2005a, b; Tonts et al. 2001).

ABARES Australian forest and wood products statistics (AFWPS) series is the principal source of regularly published data on trends in Australia's forest and wood products industries. In 2011, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), with funding support from Forest and Wood Products Australia, began investigating how to expand the AFWPS series to incorporate reporting on social dimensions of forest and wood products industries in subsequent issues of the AFWPS.

The first stage of this work on reporting social dimensions has involved three parts:

- identifying the social indicators that would ideally be reported on
- identifying indicators that are feasible based on available data
- developing an appropriate methodology for regularly reporting these social indicators.

This discussion paper describes the methodology proposed for reporting on social indicators as part of the AFWPS. The methodology has been developed based on review of available data and recent work examining the social and economic characteristics of Australia's forest and wood products industries, and a workshop with stakeholders from the forest and wood products industries held on 5 March 2012 (Appendix A). The methodology has been tested by generating data for Tasmania as a case study region, and examples from Tasmania are provided in the discussion paper. For some indicators, additional Australia–wide data is provided to give broader context and aid interpretation of data and indicator definitions; specifically, labour force participation, working hours, and income bracket distribution.

This discussion paper provides a basis for generating social indicators for the AFWPS from 2012 to 2014. During this time, the methodology will be refined; this discussion paper identifies some areas where methodology cannot be finalised until data from the 2011 Census are released.

A brief description of the methods used to develop indicators is provided. The main body of the paper then describes the indicators to be included in the AFWPS initially, together with proposals for further work to expand and refine the social indicators. These proposed indicators build on feedback received from industry representatives at the workshop. The proposed indicators fall into four categories:

- **direct employment—**a key indicator of community dependency on forest and wood products industries
- **contributions of forest and wood products industries to communities**
- **adaptive capacity of communities with high dependence on forest and wood products industries**—this composite index is a sum of resources within a community that influence that community's capacity to manage change
- **human dimensions of industry sustainability**—includes aspects relating to workers' wellbeing, capacity to adapt to change and industry workforce diversity.

While the generation of indirect or flow-on employment is also an important contribution of Australia's forest and wood products industries, it is not feasible to report estimates of indirect employment within the resources available for the AFWPS.

Only a few indicators can be measured using already available data sources, such as data from the Australian Bureau of Statistics. These are described in detail in this discussion paper. Other indicators are identified that cannot currently be measured, as they require collection of additional data via direct survey of forest industry businesses and/or workers.

Australia's forest and wood products industries comprise a set of vertically integrated activities from forest growing to wood and paper processing. In recognition of this, the term 'forest and wood products industries' is used throughout this paper to highlight that what is often referred to as a single industry is actually a set of related industries. These industries have in common a reliance on products derived from wood grown in native forests and tree plantations in Australia or in other countries.

2 Methods

The methods used to develop proposed social indicators were:

- a desktop review of recent work reporting social dimensions of Australia's forest and wood products industries, to identify the types of social information reported
- a desktop review of available data sources
- based on the desktop review, development of a proposal for indicators to be included using available data, and testing of these by producing information for Tasmania. Data for Tasmania are cited in this paper to provide examples of the proposed methods and indicators
- a workshop with representatives of Australia's forest and wood products industries in March 2012, in which draft indicators were reviewed and discussed, as were broader reporting needs. The workshop, including participants and a record of notes, is detailed in Appendix A.

Workshop feedback was used to revise the indicators and methodology; modifications made in response to workshop feedback are described in this paper.

These methods resulted in a set of proposals for reporting on the social dimensions of forest and wood products industries as part of the ABARES Australian forest and wood products statistics. These proposals are outlined in this paper.

3 Estimating direct employment in Australia's forest and wood products industries

One of the most important social contributions of the forest and wood products industries is the creation of jobs in rural, regional and urban communities. This chapter proposes an approach to provide improved estimates of direct employment in the forest and wood products industries. The approach has been developed by:

- reviewing current sources of employment estimates and limitations
- identifying how the industries should be defined
- reviewing ways to improve employment estimates using Australian Bureau of Statistics (ABS) data sources and industry surveys.

While the generation of indirect or flow-on employment is also an important contribution of Australia's forest and wood products industries, it is not currently feasible to provide estimates of indirect employment as part of the ABARES Australian forest and wood products statistics (AFWPS). As such, no proposals are made for reporting of indirect employment in this discussion paper.

Available employment estimates

In recent years, estimates of employment in Australia's forest and wood products industries have been produced by various groups for various regions within Australia. Each group produces employment estimates based on different definitions of the industries, and at different scales (Appendix B):

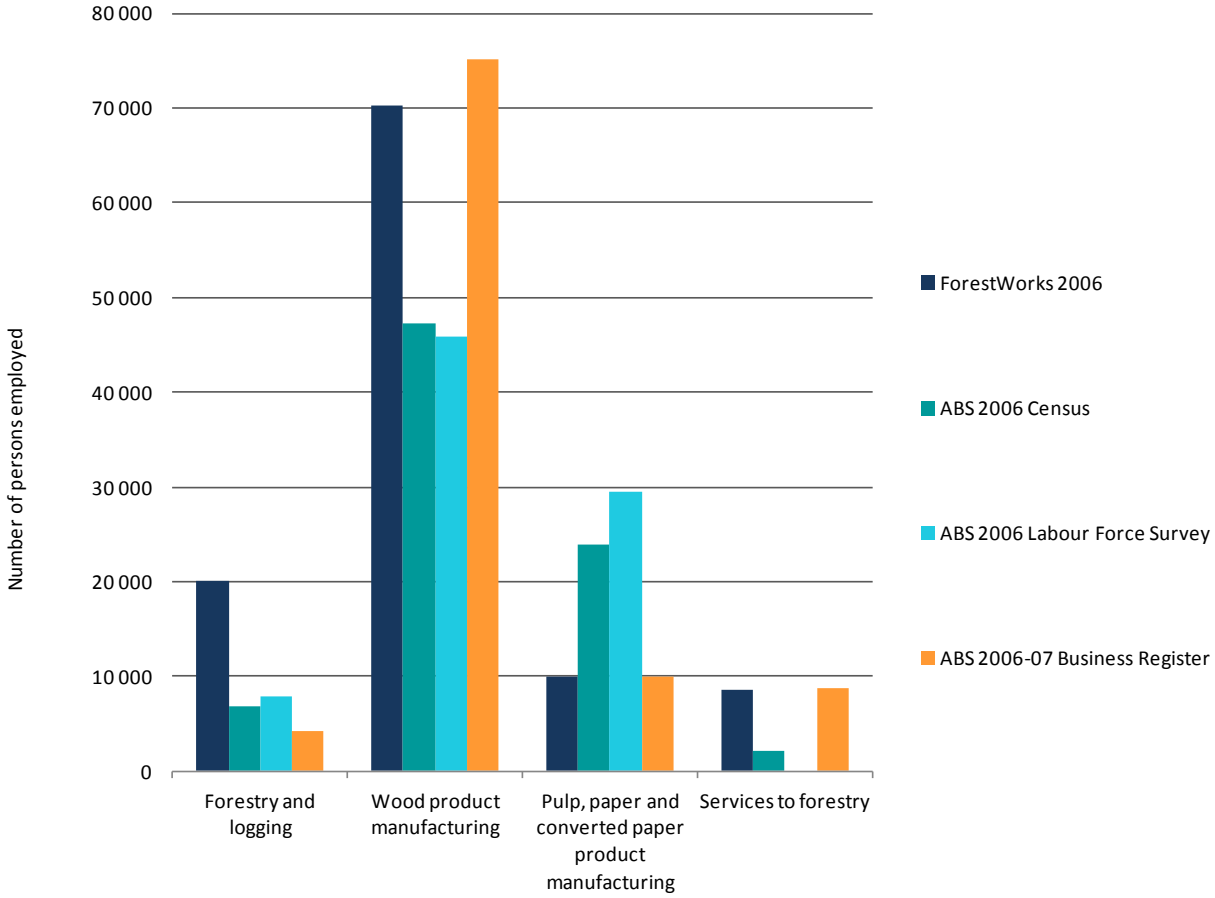
- The ABS estimate employment based on Census data collected once every five years in August (most recently, August 2011). This is the most comprehensive data available. Data are produced at multiple scales from national and state levels to small scales, such as towns, Local Government Areas (LGAs) and Statistical Local Areas (SLAs).
- The ABS Labour Force Survey produces quarterly estimates of employment by industry, based on a monthly nationwide sample survey of labour force participants. Data are reported at national and state scale, but cannot typically be reported reliably at smaller scales.
- The Forest Industry Surveys of the Cooperative Research Centre for Forestry (CRC for Forestry) provides detailed employment estimates for Tasmania (2006, 2008, 2010, 2011), Western Australia (2006, 2008, 2011) and Victoria (2009, 2012), based on a survey of businesses. Data are reported to small scales (towns/LGAs). The closure of the research centre in 2012 means that future surveys are unlikely.
- ForestWorks undertook nationwide surveys of the industry to estimate employment, with reports produced in 2002 and 2006 (ForestWorks 2006). Data were available at finer scales on request.

- A range of one-off studies have estimated employment for individual regions, or for specific parts of the industries. These have used various methods, including surveys of businesses.
- Employment estimates can also be ascribed based on records of the Australian Business Register (ABR).

Limitations and variations in estimates

The estimates produced by these sources vary significantly, partly as a result of differences in methods of data collection and analysis. Figure 1 compares national employment estimates for 2006 based on the ABS Census (80 077 total employed), ABS Labour Force Survey (83 354 total employed), ForestWorks (108 920 total employed) and ABR data (98 100 total employed); these estimates vary by as much as 30.5 per cent. An even higher degree of variability—68.3 per cent difference between upper and lower estimate—can be seen when three different estimates of total industry employment are compared for Tasmania in 2006 (Figure 2).

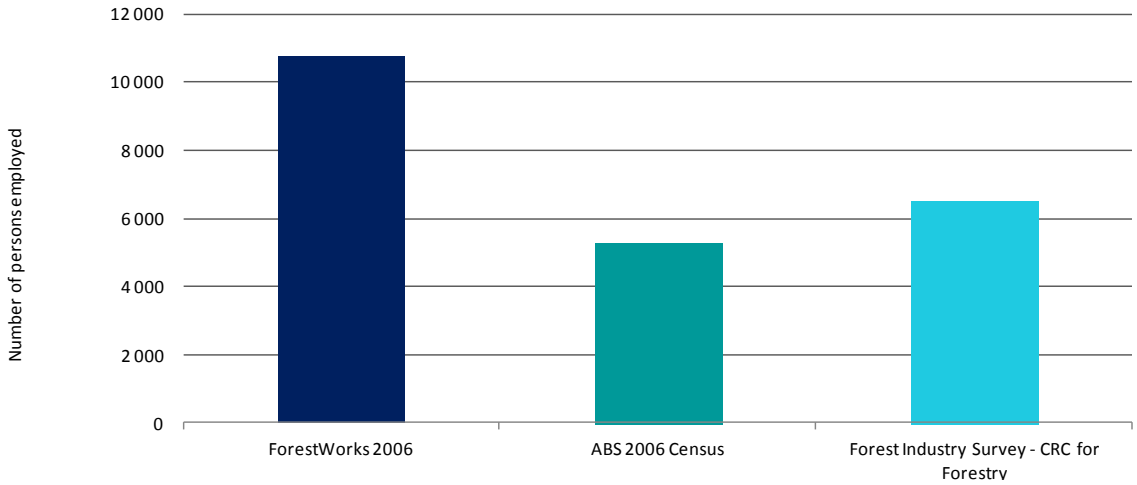
Figure 1 Employment estimates from four data sources, forest and wood products industries, Australia, 2006



ABS = Australian Bureau of Statistics

Data sources: Australian Bureau of Statistics; ForestWorks

Figure 2 Total employment estimates from three data sources, forest and wood products industries, Tasmania, 2006



ABS = Australian Bureau of Statistics; CRC for Forestry = Cooperative Research Centre for Forestry

Data sources: Australian Bureau of Statistics; ForestWorks; Cooperative Research Centre for Forestry

The differences in the estimates are influenced by methods of data collection and the system used to classify workers. For example, the Census and Labour Force Survey are based on individual workers reporting what industry they work in, while the ForestWorks estimate is based on a business survey.

As can be seen in Figure 1 and Figure 2, the differing definitions of what activities form part of forest and wood products industries contribute to variations in estimates of employment in the total sector and sub-sectors (see more on definitions in Table B1, Appendix B). This highlights a need to carefully define the scope of activities considered appropriate for the forest and wood products industries for estimating employment.

Another general limitation is that most estimates do not separate employment in the native forest versus plantation sectors. There is often a need to produce data separately for these sectors, due to the differing policy, management and regulatory issues involved for native forests and plantations, and the different products produced by the two sectors. Only the CRC for Forestry's Forest Industry Surveys estimate separates plantation from native forest based employment. Specific limitations are detailed in Appendix B.

Defining forest and wood products industries

The wide variation in existing employment estimates demonstrates the need to define the forest and wood products industries. This section reviews common approaches to delineating the scope of industries and proposes a definition for forest and wood products industries.

Supply, demand and cluster approaches

It is challenging to define the activities that fall within the forest and wood products industries because the boundaries of different industries are not clear cut. Instead, they generally overlap with no 'clear lines of demarcation' (Leiper 2008, p. 246) and companies can often be classified as belonging to multiple industries. Three approaches can be used to define industries: supply definitions, demand definitions and cluster definitions.

Supply definitions

Traditional definitions of industries are based on the goods or services supplied. A group of firms that produce closely substitutable goods or services are considered an industry (Munir & Phillips 2002). This production, or supply-side, approach underpins national and international industrial classifications, including the ANZSIC classification used by the ABS (ABS 2006). This definition results in the separation of forest and wood products related activities into multiple individual industries across the value chain (Appendix C). The supply-side approach has a number of limitations, including difficulties addressing changes in the nature of goods/services produced over time.

Demand definitions

In recent years, some industry classifications have shifted to using a demand-based approach, in which an industry is defined based on its markets (for example Standard & Poor's 2008). This can limit the ability to segregate industries based on whether they depend on wood/paper products. For example, the window market includes window frames made of wood, made of aluminium, and made of a combination of wood and aluminium. Defining the proportion of employment generated by the window manufacturing industry, that is dependent on wood products, is thus difficult.

The greatest limitation of the supply and demand side approaches is that by separating different parts of the chain of production into separate industries, interdependence across stages of production or a supply chain is not immediately visible. In the case of forest industries, this is a significant limitation, as changes to one part of the supply chain (such as a reduction in the volume of logs harvested from an area of forest or plantation) have significant ramifications for other parts.

Cluster definitions

The limitation of supply and demand definitions can be addressed by using a cluster-based approach, which defines industries as 'groups or networks of firms that undertake complementary activities' (Hicks 2011, p. 94). This approach recognises that industries are interlinked systems involving complex supply chains that may be either vertically integrated within a single firm, or take place across complex networks of firms that are mutually interdependent. It has parallels to a growing focus on the role of 'chains, clusters and complexes of firms' in the analysis of industries (de Valence 2010, p. 54). Industries are defined as aggregations of firms that 'to some degree and in various ways, practice cooperative and collaborative activities' (Leiper 2008, p. 242). These cooperative activities may, for example, include supply of goods and services across value chains, participating in jointly funded research activities, or joint representation of interests to policymakers.

The cluster-based approach results in a much broader definition of what constitutes an industry (see for example de Valence 2010). It is also consistent with previous studies which, while varying in the specifics of how they define the boundaries of the forest industry, all define it as a cluster of related activities occurring across the supply chain. This chain starts from forest growing, continues to forest harvesting, milling and processing, and sometimes (but not always) includes retail sales of wood and paper products.

Developing a definition of forest and wood products industries

A cluster-based approach was used to produce a preliminary definition of the forest and wood products industries, based on review of previous studies and an examination of the cooperative activities engaged in by the Australian forest industries.

This review suggested Australia's forest and wood products industries could be defined as covering:

> the growing, management, harvest, haulage to mill, milling and processing of wood and paper products in Australia, including all processing where wood is the dominant component of goods being produced, and excluding processing where wood/paper is a small part of the components utilised.

This definition is consistent with that recommended by Proctor and colleagues (2003) for use in Australia's State of the Forests reporting obligations. The definition includes all employment by businesses engaged in these activities; for example, an accountant working at a timber processor is included as their employment is generated directly by a business in one of the specified forest and wood products related activities.

This definition was revised based on feedback from the workshop, which centred on:

- segmentation of industries when reporting data
- how to best define direct employment in the industries versus indirect employment generated as a flow-on effect of activity in the industries.

Segmentation

Workshop participants raised several suggestions regarding segmentation. First, that the preliminary definition be restricted to activities related to commercial production of wood and paper products. The definition did not include activities related to management of trees for other purposes such as provision of environmental services (for example, carbon sequestration, reduction in land degradation, provision of habitat). Some workshop participants felt the latter activities should be included. However, these typically involve a cluster of activities that is separate to the production of wood and paper products (although there is overlap in some cases). Rather than incorporating them into the definition of forest and wood products industries, a separate definition of the industry cluster around managing trees for provision of environmental services was developed, and is included in Proposal 1.

Second, participants suggested that, where possible, definitions and reported employment estimates should:

- separate subcategories of activities, such as forest growing, logging, transport of wood products, and production of specific types of wood and paper products
- separate employment dependent on Australian domestic native forest, domestic plantations, and wood and paper products imported to Australia.

A third suggestion regarding segmentation was that data should be reported by full and part-time employment, to better enable an understanding of the types of jobs generated by the forest and wood products industries.

Direct and indirect employment

Workshop participants debated which employment should be included as directly dependent on the forest and wood products industries, and which might be included as indirect employment, generated from flow-on impacts and in other industries.

It was generally agreed that the activities representing direct employment are:

- forest management
- silvicultural contracting
- specialised road construction contracting (people building roads for forest access)
- harvesting
- haulage of logs to mill
- processing of wood and paper products where wood or paper is the dominant component of the goods being produced
- haulage of finished products
- wholesale and retail sales of wood and paper products.

Workshop participants did not agree on whether these activities should be considered direct employment:

- mechanical and service businesses, such as fuel suppliers, mechanics and saw doctors
- haulage of finished wood and paper products from mill to market
- people employed in forest and plantation policy development
- researchers engaged in forest and wood products related research
- carpentry and construction involving wood products
- importers of wood and paper products.

Inclusions in definitions

Workshop participants argued that haulage of finished products should be included in an industry cluster definition. They saw some businesses as solely dependent on haulage of finished products— in some cases specialised transport equipment is needed for this activity. It is therefore placed in the direct employment definition. Further, several workshop participants suggested that wholesale and retail sales of wood and paper products should be included in the definition.

Other ancillary businesses depend indirectly on the forest and wood products and the tree management for environmental service provision industries. Ancillary businesses should not be included in the definition of direct employment because they supply multiple industries and only partly rely on the forest and wood products/environmental services industries. Current resources do not permit estimation of indirect employment generated in other industries as a result of the activities included in the proposed definitions.

Proposal 1 summarises the definitions put forward as a result of this review and consultation. The defined activities should ideally be included in reporting. However, lack of available data for several activities means that not all activities can be reported on.

Proposal 1 Definitions for employment estimates
Two separate industry cluster definitions are proposed for developing employment estimates:

- **Australia's forest and wood products industries**
  Defined as including all jobs (including administration and management roles) generated directly by businesses engaged in:
  Growing, management, harvesting, haulage to mill, milling and processing, importing/exporting, haulage of finished goods to market, and wholesale and retail sales of wood and paper products in Australia. This includes all processing where wood is the dominant component of goods being produced, and excludes processing where wood/paper is a small part of the components utilised. Specialist consulting/research providers are also included.
- **Australia's tree management for environmental service provision industries**
  Defined as all jobs generated directly by businesses engaged in:
  Growing and management of trees for environmental service provision, and marketing of environmental services generated by these trees.

Where it is not possible to report on employment in some of the activities in these definitions, this could be clearly indicated in AFWPS, and consideration given to seeking resources to address the gaps in data.

Improving employment estimates using available data

To provide a robust time series of employment estimates, employment should be reported using data collected regularly using the same methods. Two data sources meet these criteria: The ABS Census, and the ABS Labour Force Survey. Of these, the Census provides considerably more detailed data of industry subsectors. AFWPS reporting could therefore be based on the Census and, where possible, use the Labour Force Survey or other sources to update employment estimates between Censuses.

Although ABS Census data is collected regularly, there are limitations resulting from the way industry employment is categorised. There is evidence that ABS may both under and over count employment in different industry subsectors (Figure 1and Figure 2). Classification of industry activities by ANZSIC categories, and limitations of these categories in representing activities in the definition in Proposal 1, are outlined in appendixes C and D.

This section compares ABS data with industry surveys conducted at the same time, and proposes a methodology for adjusting ABS Census data to better reflect industry activities defined under Proposal 1. Finally it examines whether the Labour Force Survey can be used to estimate trends in employment between Censuses.

Comparison of ABS and Forestry Industry Survey data

ABS Census data were compared to alternative estimates of employment available from various surveys, particularly the CRC for Forestry's Forest Industry Survey (FIS). The CRC survey provides a robust indication of employment in forestry sectors. It is based on a specific sample of firms in forest and wood products industries with known employment profiles. Similar activity definitions to those in Proposal 1 were used for the FIS. The survey sampled a large proportion of businesses involved in these activities in 2006 at the same time that Census data were collected.

These characteristics mean the FIS can be used to identify how ABS estimates of employment relate to the definitions proposed in this discussion paper. It can be relied on as a strong identifier of the differences that result from ABS Census classifications compared with direct

industry survey. A limitation is that FIS data for 2006 were only collected in Western Australia and Tasmania.

Total employment

The FIS estimates of total employment in Western Australia and Tasmania are higher than ABS Census estimates. In Western Australia, FIS estimates a total of 7429 persons employed compared with ABS estimates of 5965, giving a percentage difference of 30.5 per cent. In Tasmania, FIS estimates a total of 8740 persons employed compared with ABS estimates of 7093, giving a percentage difference of 20.8 per cent.

Wood product manufacturing categories

In 2006 the ABS Census and FIS made similar estimates of employment in wood product manufacturing in Western Australia (Census: 3741; FIS 3711) and Tasmania (Census: 3503; FIS 3420) (Figure 3 and Figure 4). In Tasmania, FIS estimates included pulp and paper product manufacturing, and wood product manufacturing. FIS figures for Tasmania were very similar to those produced by the ABS for equivalent categories.

Forestry, logging and services categories

Large differences between the Census and the FIS estimates occurred in the categories used for forestry, logging and associated services to forestry. In Tasmania and Western Australia, the Census overestimated employment in Forestry, and underestimated employment in Logging and Forestry Support Services (Figure 3 and Figure 4).

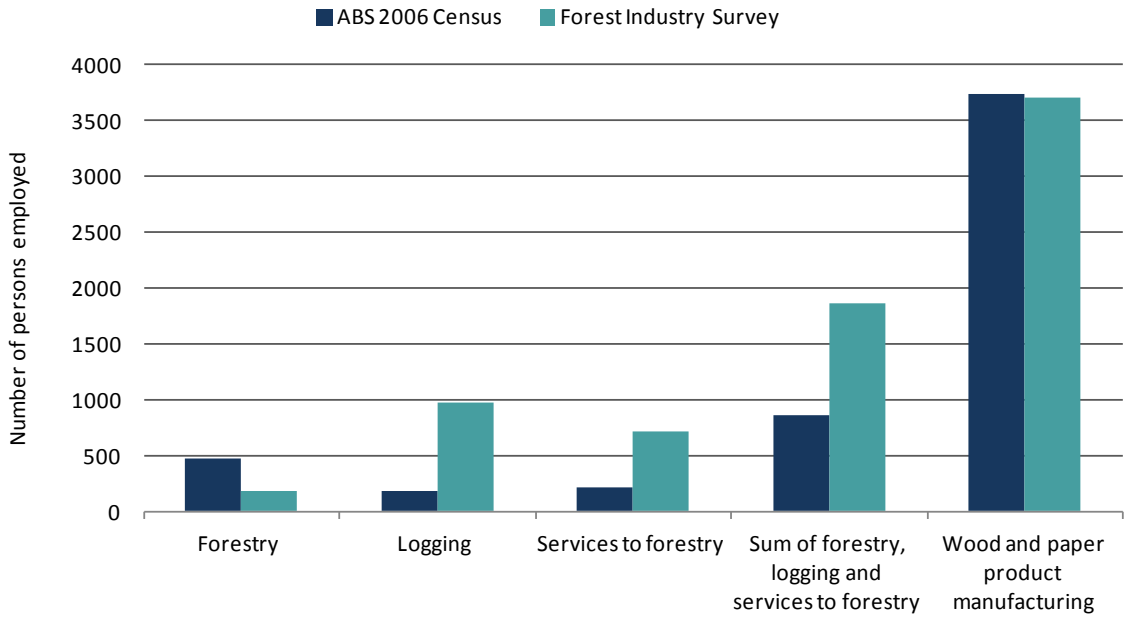
The overestimation of Forestry employment is likely a result of uncertainty that surrounds the survey classification—some people who write forester as their profession actually work in non-commercial tree management, or in consultancies that are more appropriately classified as Forestry Support Services.

Underestimation in the Logging category is largely a result of the ABS classifying haulage workers as part of the transport industry. By contrast, the FIS includes them in its harvest and haulage to mill category.

Underestimation in forestry services is a result of the ABS classifying many silvicultural service firms into Agriculture and Fishing Support Services rather than Forestry Support Services.

These comparisons suggest that ABS estimates for wood and paper processing can be used for reporting without adjustment. However, a form of adjustment may be appropriate based on the ratio of difference between ABS and FIS data for forestry, logging and services categories.

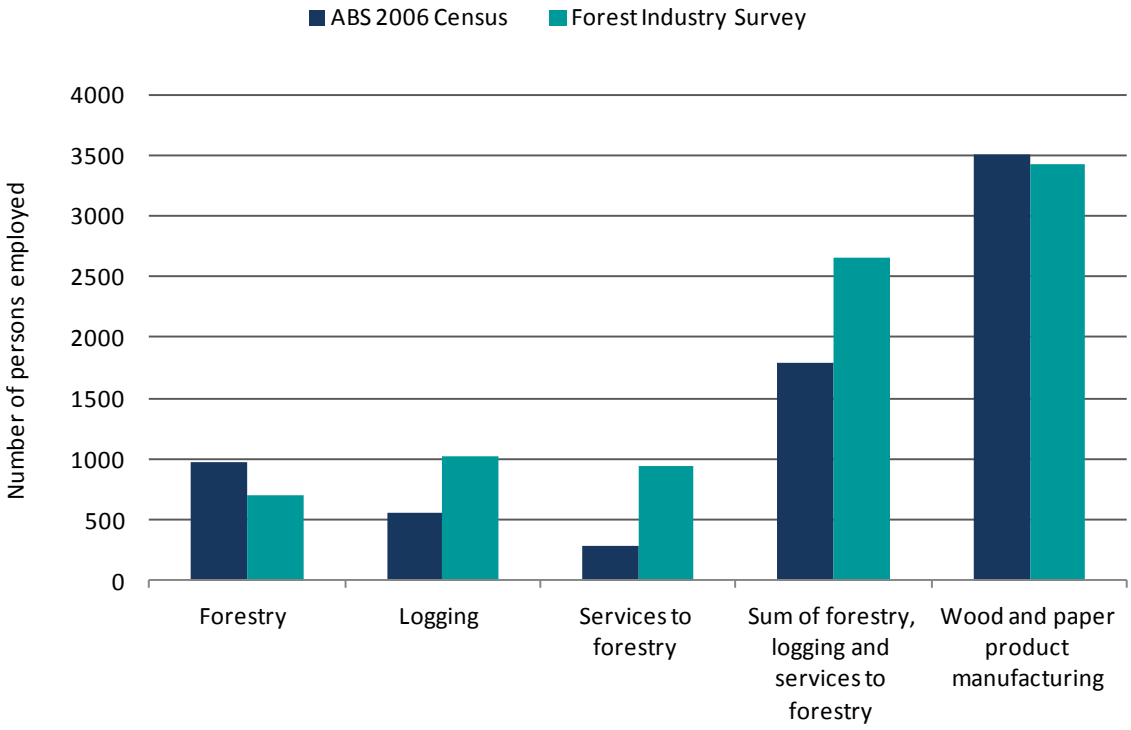
Figure 3 Comparison of ABS Census and Forest Industry Survey employment estimates, Western Australia, 2006



ABS = Australian Bureau of Statistics. For services to forestry, data is for Census class 0510 Forestry Support Services.

Data sources: Australian Bureau of Statistics Census; Cooperative Research Centre for Forestry

Figure 4 Comparison of ABS Census and Forest Industry Survey employment estimates, Tasmania, 2006



ABS = Australian Bureau of Statistics. For services to forestry, data is for Census class 0510 Forestry Support Services.

Data sources: Australian Bureau of Statistics Census; Cooperative Research Centre for Forestry

Available data (including ABS and other sources) does not make it possible to estimate employment generated by tree management for environmental service provision. It is therefore not possible to report on environmental services industries as part of the AFWPS.

Coverage of industry activities by ABS data

The analysis indicates that ABS data provide robust estimates for large parts of the industries, but are likely to under and over count employment in some parts of the industries. Table 1 summarises this analysis and the extent to which ABS data covers the activities included in the proposed definition of the industries.

ABS data can be used to, without need for adjustment, to report employment in:

- wood processing (sawmilling and dressed, woodchip production and secondary wood production)
- pulp and paper processing
- wholesale timber sales.

For wholesale timber sales, it is possible that ABS data under or over count employment. However, the extent of this cannot be estimated as no alternative sources of data for comparison were found.

ABS data provide a partial representation of employment, but are likely to substantially over or under count total employment (Figure 3 and Figure 4) in:

- growing forests/plantations (ANZSIC Forestry)
- transport of logs to mills (ANZSIC Logging)
- silvicultural contracting and nursery production (ANZSIC Forest Support Services)
- research/consultancy services (ANZSIC Forest Support Services).

Schirmer (2008a, b) identified that ABS categorises many silvicultural contractors as 'providing support services to other industries' such as agriculture. Also, workers employed in transport of logs to mills are not classified as part of the ANZSIC Logging category, but as part of the much larger transport industry.

Relevant employment is reported in some categories that do not enable separation of forest/wood product related employment. ABS data therefore cannot be used to report on direct employment in these categories:

- roading contractors
- wood craft
- retail sales
- forest policy development
- import and export of roundwood and wood/paper products

- wooden furniture making (relevant ANZSIC category also includes upholstered seat manufacturing)
- firewood collection.

Furthermore, robust alternative sources of employment data for these categories are not available. For the AFWPS to report on these types of employment, direct survey of businesses engaged in these activities would be needed to develop estimates.

Reporting based on source of timber

Consideration has been given to whether ABS data provide a basis for reporting the employment relating to Australian grown native forests, Australian grown plantations or imported timber. This is not currently possible, as ABS data do not report employment by these categories. Some available data for Tasmania, Western Australia and Victoria identify the proportion of employment dependent on native forests and plantations (Schirmer 2010a, 2008a, 2008b). These data are in some cases out of date, do not include information on imports and are not scheduled for update. Additionally, as the source of different types of wood varies substantially by state, these state level data cannot be generalised to the national level. It is therefore recommended that AFWPS reporting does not attempt to distinguish employment based on the source of timber unless further surveys of forest and wood products industry businesses are undertaken. If surveys were undertaken, it would better enable estimation of employment relating to different sources of wood production.

Table 1 Potential use of ABS data for reporting employment in Australia's forest and wood products industries

Activity	Description	Where reported in ANZSIC a	How ABS data could be used
Wood processing—sawmilling and dressing	Sawmilling and dressing of sawn timber	In specific categories that cover the activity well	Use without change
Wood processing—woodchip production	Woodchipping (infield by mobile mills or in a static mill)	In specific categories that cover the activity well	Use without change
Wood processing—secondary wood products	Processing rough or dressed sawntimber/woodchips into further wood products, such as veneer, medium density fibreboard, wooden structural components	In specific categories that cover the activities reasonably well	Use without change
Pulp and paper processing	All activities involving the transformation of wood into pulp and paper products	In specific categories that cover the activities reasonably well	Use without change
Consultancy and research services	Provision of research/expert advice on industry specific issues	Included in Forestry Support Services category. Extent of under/over count unknown	Use without change
Wholesale sales	Wholesale sales of timber products	Reported in specific category. Extent of under/over count unknown	Use without change
Nurseries	Grow seedlings for plantations, seed collection	Included as part of Forestry Support Services category	Use without change
Harvest and haulage to mill	Harvest and haulage of logs to mills (many businesses integrate these activities)	Logging category includes some jobs. Most haulage classified in transport industry where it cannot be separated from other industries	Needs to be adjusted
Growing forests/plantations	Management of native forest and plantations	The Forestry category includes part of this group but excludes small growers (farm foresters) and includes other jobs falling outside proposed definition	Needs to be adjusted
Silvicultural contracting	Activities such as ground preparation, seedling planting, weed and pest control, pruning, coppicing	Under-represented in Forestry Support Services category, some jobs reported elsewhere	Needs to be adjusted
Wooden furniture making	Construction of wooden furniture	Combined with non-wood related activities, including upholstered seat manufacture with metal frames	Not able to be used

Continued

Activity	Description	Where reported in ANZSIC a	How ABS data could be used
Firewood collection	Harvest of timber, or use of by-products of processing, for firewood	Some included in Logging category, but only partially represented	Not able to be used
Transport of finished wood and paper products to market	Transport of finished wood and paper products to market	Reported as part of Road Freight Transport category, which is dominated by employment unrelated to forestry/wood products	Not able to be used
Retail sales	Retail sales of timber products	Reported as part of retail sales categories that include substantial non-timber related employment	Not able to be used
Suppliers of goods and services other than those listed in this table	Public servants developing policy, import/export of timber/paper products	Not reported in specific categories; forest and wood products jobs not able to be separated from others	Not able to be used
Road construction contractors	Building and maintaining forestry roads, undertaking earthworks	Included in non-forest industry specific categories by the ABS	Not able to be used
Wood craft	Processing of wood into craft products	Not reported (workers classified across multiple categories)	Not able to be used

ABS = Australian Bureau of Statistics; ANZSIC = Australian and New Zealand Standard Industrial Classification standard

Note: **a** More detail on ANZSIC categories in Table C1, Appendix C.

Adjusting ABS data to improve estimates of employment in the forest and wood products industries

This paper has identified that some types of employment are represented in ABS estimates, but known to be an underestimate or overestimate when industry activities are defined according to Proposal 1. In other cases, ABS data cannot be used to estimate employment at all.

These gaps in ABS data were reviewed to identify whether any alternative data can be used to provide estimates in the absence of ABS data, or to adjust ABS data so it better represents the definition of forest and wood products industries proposed for AFWPS reporting.

Adjustment of ABS data is possible for three categories: growing forests/plantations, silvicultural contracting, and harvest and haulage contracting. Adjustment can be made based on the comparison of employment recorded in the Census with that recorded by the FIS at the same point in time. While comparisons of Census and FIS estimates in Figure 3 and Figure suggest that the differences between Census and FIS estimates are consistent in terms of direction, the magnitude of differences is not. The comparison suggests that:

- Employment in Forestry is between 0.37 and 0.72 of Census estimates based on the ratio of FIS to ABS Census data for Western Australia and Tasmania respectively. The reasons for the differences between the two states are not known.

- Employment in Logging (harvest and haulage) is underestimated by the Census, but by substantially more in Western Australia than in Tasmania. The FIS:ABS Census ratios are 5.28 and 1.85, respectively. In Western Australia, this may have reflected that in 2006 many businesses had only recently expanded their harvest of bluegum plantations, and employees may have described their employment on their Census forms in ways that resulted in it being classified as transport rather than logging. Additionally, results from a recent PhD study (Edwina Loxton, pers. comm., 2012) suggest that in Western Australia, many harvest and haulage firms are reluctant to report their activities as being in the forest industry due to some social stigma about the activity of logging.

- Employment in Forestry Support Services is underestimated by the Census, by a greater proportion in Western Australia than in Tasmania. FIS:ABS Census ratios are 3.35 and 3.39, respectively. This likely reflects that in Western Australia, the rapid expansion of bluegum plantations in 2006 was partly undertaken by silvicultural firms that had shifted from other business activities to working in the forest and wood products industries, thus being more readily misclassified into other industries.

While FIS data do not provide a definitive estimate of the proportion by which ABS data under or over count employment when using the industry definitions proposed in this discussion paper, they are consistent in identification of bias direction; and the under and over counts identified were discussed by workshop participants, who believed these should be adjusted for when reporting employment estimates.

However, the sample from Western Australia and Tasmania represents a moderate proportion of national employment in each category; in ABS Census estimates, these two states accounted for 33.7 per cent of national employment in forestry, 29.6 per cent of employment in logging and 24.0 per cent of employment in forestry support services. Further, the FIS data are for two states only, and it is difficult to identify how best to produce a national–scale adjustment of Census data based on them.

Proposed adjustments to ABS data

Until further information is available, it is proposed that the AFWPS report data for the three activities of forestry, harvest and haulage, and services to forestry in two ways. Firstly, presenting ABS estimates. Secondly, additionally presenting a range within which it is considered likely employment may actually fall, based on the upper and lower limits suggested from the Western Australian and Tasmanian FIS data; that is, the ratio of differences between ABS and FIS data (Figure 3 and Figure 4). Proposed adjustments are:

- **commercial forestry**—ABS estimates should be multiplied by 0.37 and 0.72, with the results reported as a range of possible values for employment in the category commercial forestry (the label commercial is recommended to highlight that the estimate does not include small forest growers)
- **logging**—ABS estimates should be multiplied by 1.85 to 5.28, and the results reported as a range of possible values for employment in the category logging and haulage of logs to mill. This label should be used to ensure the data are clearly distinct and identified as incorporating haulage employment
- **forestry support services**—ABS estimates should be multiplied by 3.35 and 3.39 and reported as a range of possible values for employment in the category silvicultural services, nursery production and consultancy/research services.

Estimating employment between Censuses

Ideally, data could be updated between Censuses to identify trends in employment in forest and wood products industries. There is only one regularly collected source of data on employment produced between Censuses: the ABS Labour Force Survey (LFS). This section analyses the value of using the LFS to update employment estimates between Census collections.

Table 2 compares LFS estimates of employment in key parts of Australia's forest and wood products industries with Census data. Two LFS estimates are provided:

- LFS data for August of the Census years (1996, 2001 and 2006), which represent LFS estimates for the same month Census data were collected
- a 'smoothed estimate' which represents the average of the four estimates of employment by industry produced in a calendar year by the LFS.

While Table 2 can help understand how the Census and LFS estimates differ over time, it is not possible to produce a comparable data series of forest and wood products industries employment going back to 1996, due to a lack of comprehensive data from the 1996 and 2001 Censuses. AFWPS reporting will occur for 2006 and 2011, the periods for which data can be adjusted using the approach discussed earlier based on comparisons of FIS and Census estimates.

Of concern is that the Census and LFS report different overall trends in employment for some time periods. In particular, between 2001 and 2006 the Census recorded growth in pulp and paper product manufacturing, and the LFS recorded a decline. This suggests it is not currently possible to use the LFS to estimate employment for years between Censuses, as it may not be recording similar trends to the Census.

The difference in trends could be attributed to:

- Changes in the ANZSIC classification over time—for 1996 and 2001, Census data are based on the ANZSIC 1993 classification, whereas LFS data have been backcast to estimate them using the 2006 ANZSIC classification.

- Differences in data collection methods and sample errors—the LFS is a sample survey of 30 000 households and is therefore subject to sample error. ABS data outputs indicate where LFS estimates are subject to a sampling variability too high for most practical purposes. A significant proportion of LFS employment estimates for part-time employment, female employment and employment in forestry and logging are subject to high sampling variability and are therefore unreliable.

The publication of data from the 2011 Census will provide an improved basis to compare Census and LFS estimates, as it will be possible to compare the trends each has recorded between 2006 and 2011 based on the same ANZSIC classification. After this comparative analysis is complete, it should be possible to make recommendations on the best approach to estimating forest and wood products industries employment between Censuses.

In addition to the issue of the direction of change, there is high quarterly variability in LFS estimates. Table 3 shows variation in unsmoothed quarterly estimates. Using a smoothed data series based on a moving average—in which each quarter's employment estimate is the average of the most recent four quarters—reduces this variability somewhat. However, variability remains relatively high, with pulp and paper product manufacturing employment estimates varying by up to 12.1 per cent annually (even with a smoothed series), and forestry and logging employment estimates varying by 9.5 per cent. It is highly unlikely that these large quarterly variations in employment reflect actual employment fluctuations, with phone consultation with industry experts suggesting employment variation is typically much smaller during the year than indicated by the LFS.

Table 2 Comparison of ABS Census and Labour Force Survey employment estimates, forest and wood products industries, Australia, 1996, 2001 and 2006

Employment category (and source)	Estimated employment (persons)				Change in employment (%)	
	1996 a (ANZSIC 1993/2006)	2001 a (ANZSIC 1993/2006)	2006 (ANZSIC 1993)	2006 (ANZSIC 2006)	1996–2001	2001–2006 b
Forestry and logging (LFS August)	9027	9678	na	7945	7.2	–17.9
Forestry and logging (LFS smoothed)	9143	9827	na	8347	7.5	–15.1
Forestry and logging (Census)	10 922	10 904	9275	6873	–0.2	–14.9
Difference between LFS (smoothed) and Census estimates for forestry and logging	19.5%	11.0%	na	–17.7%	na	na
Wood product manufacturing (LFS August)	46 012	42 932	na	45 950	–6.7	7.0
Wood product manufacturing (LFS smoothed)	45 130	46 679	na	50 000	3.4	7.1
Wood product manufacturing (Census)	43 661	46 249	45 335	47 311	5.9	–2.0
Difference between LFS (smoothed) and Census estimates for wood product manufacturing	–3.3%	–0.9%	na	–5.7%	na	na
Pulp and paper product manufacturing (LFS August)	26 128	28 030	na	29 459	7.3	5.1
Pulp and paper product manufacturing (LFS smoothed)	25 969	29 571	na	26 375	13.9	–10.8
Pulp and paper product manufacturing (Census)	15 946	16 373	17 979	23 482	2.7	9.8
Difference between LFS (smoothed) and Census estimates for pulp and paper product manufacturing	–38.6%	–44.6%	na	–10.9%	na	na

ABS = Australian Bureau of Statistics; ANZSIC = Australian and New Zealand Standard Industrial Classification standard; LFS = Labour Force Survey; smoothed indicates LFS data averaged for calendar year

Note: a For 1996 and 2001, LFS data are based on the 2006 ANZSIC classification, and Census data on the 1993 ANZSIC classification. The change over 1996–2001 is based on ANZSIC 1993 for Census data, and ANZSIC 2006 for LFS. b Census employment estimates for 2001 and 2006 are based on ANZSIC 1993 classification to ensure comparability. na = Not applicable.

Source: Australian Bureau of Statistics

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Table 3 Variation in Labour Force Survey employment estimates using unsmoothed and smoothed quarterly estimates, averaged over a one-year period

LFS employment category	Variation in 2011 unsmoothed estimates (% difference in employment between largest and smallest quarter)	Variation in 2011 smoothed estimates (% difference in employment between largest and smallest quarter)
Forestry and logging	7.6	9.5
Wood product manufacturing	11.5	6.5
Pulp and paper product manufacturing	40.4	12.1

LFS = Labour Force Survey

Source: Australian Bureau of Statistics

Proposal 2 summarises an initial approach to report forest and wood products industry employment in the AFWPS, until such time as improved data are available enabling expanded reporting. Adjustments of ABS Census data are suggested in order to better represent the definition of forest and wood products industries in Proposal 1. Proposal 3 summarises further work that would be required to report more comprehensive data as part of the AFWPS.

Proposal 2 Initial reporting of employment

For the forest and wood products industries, the AFWPS could include estimates of the following types of employment, including estimates of the number of people employed full and part-time. Limitations listed here should be acknowledged in reporting.

Reporting both ABS and adjusted data (in range specified under Proposed adjustments to ABS data) on:

- forest and plantation management (commercial forestry)
- logging and haulage of logs to mill
- forestry support services (silvicultural services, nursery production and consultancy/research services and forestry).

Reporting unadjusted ABS data on:

- wood processing—sawmilling and dressing
- wood processing—woodchip production
- wood processing—secondary wood products (acknowledging that ABS data may have some undercounting, but the extent of this is not currently known).
- pulp and paper processing
- wholesale timber sales.

The estimates should be accompanied by explanation that some categories of employment, while forming part of the forest and wood products industries, cannot currently be reported. This is because available data does not accurately identify employment that is dependent on wood products. This includes:

- road construction contractors
- wood craft
- firewood collection
- retail timber sales
- import/export of timber products
- wooden furniture and upholstered seat manufacturing
- forest policy development.

The estimates should also clearly state the definition of industry scope used, and that further employment is generated in other industries as a result of activities in the forest and wood products industries.

It is not proposed that AFWPS include employment generated by tree management for environmental service provision in the employment estimate until such time as more robust data are available..

Proposal 3 Further work to improve estimates of employment

This covers research work that falls outside the scope of the current development of social indicators for AFWPS, but could be considered in future to improve the robustness of employment estimates:

- consultation with, and survey of, the tree management for environmental services industry to enable generation of employment estimates
- surveys and consultation with the following industry sectors to develop improved methodologies for estimating employment in the
  - firewood industry
  - harvest and haulage industry (to and from mill)
  - wood craft
  - wholesale sales
  - retail sales
  - all secondary wood processing (processing of initial wood products into further wood products, including wooden furniture production)
- further work to identify the proportion of jobs dependent on wood derived from Australian grown native forests, Australian grown plantations, and imported timber.

In particular, this research work could focus on identifying methods for estimating employment based on available information (for example, identifying metrics for estimating employment in log haulage based on already available data on volumes of roundwood harvest).

In addition, consideration could be given to generating estimates of the indirect employment generated by the forest and wood products industries, something not possible within available resources.

4 Measuring the contribution of forest and wood products industries to the community

The forest and wood products industries contribute to regional communities in multiple ways. The spending generated by the industries contributes to generation of jobs, both directly within the industry, indirectly through creating demand for businesses that supply goods and services to the industry, and through induced spending (such as spending of wages by workers). Workers contribute to their local communities through providing demand for services, such as schools, thus assisting in maintaining the presence of these services in the community. Workers also contribute to the local community by taking part in community, service and sporting groups, in local community events, and by volunteering for a range of local groups. These contributions together influence the wellbeing of the community through contributing to its social and economic viability.

This chapter describes indicators that can assist in understanding how the forest and wood products industries contribute to the community. Three broad types of contribution are considered:

- contribution to regional employment (direct and indirect)
- contribution to social capital (community participation)
- contribution to local services demand.

In all cases, the indicators can be measured at five-year intervals, as they typically rely on ABS Census data, and will be reported at regional, state and national level, with a smaller number reported at local government area scale (see Chapter 7 for a definition of the geographic scales at which each indicator will be reported). These indicators were chosen because they provide some indication of the contribution of the industries to communities, and they can be measured using available data. The indicators do not represent a comprehensive coverage of different contributions; measuring other indicators would require conducting direct surveys of businesses and/or workers employed in the industries, which is currently out of scope for this study.

Contribution to regional employment

The generation of jobs by the forest and wood products industries is often considered one of their key social contributions to communities. A useful indicator of social contribution is therefore to measure how dependent different communities are on the forest and wood products industries for employment. These indicators can be used as an indicator of the sensitivity of a community to change in the forest and wood products industries. Together with understanding the broader adaptive capacity of the community, this can be used to help understand the likely impacts for communities of changes affecting the industries.

Measuring the extent to which a community is dependent on a given industry is different to measuring how dependent individuals are on that industry. Marshall et al. (2010, 2007) and Marshall (2011) have proposed, and extensively tested, a definition of resource dependence intended to inform understanding of social resilience. In their model, important influences on resource dependence are an individual's attachment to an occupation and employability; other

factors in dependence include attachment to the place where the resource user is based, attitude to change, business size, business approach, financial capital, and specialisation. While some of these measures can be scaled up to understand a community's dependence on an industry, they all rely on having data collected directly from people employed in the industry being examined. They are not explored in detail in this document because ABARES Australian forest and wood products statistics (AFWPS) resources do not allow regular survey of forest and wood products industries workers directly to collect data.

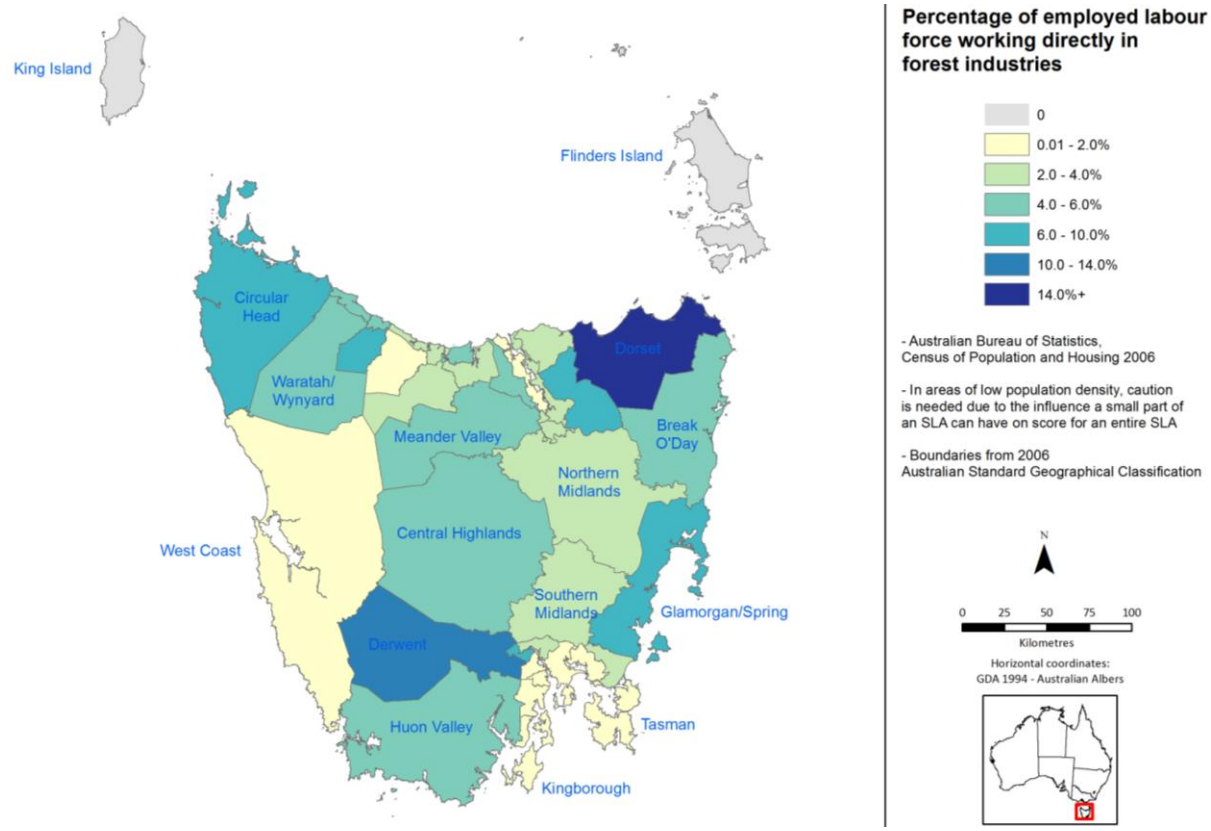
Proposed indicators based on available data

Dependence on direct employment in the forest and wood products industries

Monitoring the proportion of the total employed workforce whose jobs are directly dependent on the forest and wood products industries provides insight into the contribution of the industries to employment in a given region. Direct employment means employment as defined in Proposal 1.

Map 1 presents a mapped example of this indicator, using data from the ABS 2006 Census. In these data, the definition of the forest and wood products industry is based on the sum of employment in forestry and logging, and wood and paper product manufacturing. Timber wholesaling and furniture manufacturing are excluded and the ABS data have not been adjusted. The map is provided as an example of how these types of data can be presented.

Map 1 Percentage of total employed workforce working directly in forest and wood products industries in Tasmania



Note: Forest industries include forestry, logging, wood and paper product manufacturing. This map shows unadjusted data for SLAs from the Australian Bureau of Statistics 2006 Census of Population and Housing.

Household dependence on the forest and wood products industries

Understanding how many households in a community are supported by employment in these industries provides a different perspective to the proportion of employment. For example, in some communities, employment in the industries may be concentrated in a small number of households in which 100 per cent of income depends on the industries, while in others it may be spread across a large proportion of households, but with each household typically having one person working in the industries and another employed outside the industries.

This indicator examines the proportion of households in which a member works in the forest and wood products industries. This provides an understanding of the proportion of households likely to be affected by change to the industries; for example, through a member of a group house not being able to pay rent if they lose their job, through loss of one of two incomes brought in by a married couple, or through loss of all household income (if the household depends solely on the industries).

Measuring this indicator requires a special data order from the ABS because it requires a combination of data from two databases: that counting dwellings and that counting individuals. Box 1 shows comparison data for Tasmania and Australia.

Box 1 Regional employment—household dependence, Tasmania, 2006

Percentage of households (occupied private dwellings) where one or more individuals work in forest and wood products industries:

- Tasmania—3.4 per cent
- Whole of Australia—1.1 per cent

These figures indicate that household dependence on employment in forest and wood products industries is higher in Tasmania than in Australia as a whole.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Indicators for which data are not available

Dependence on the employment generated by the forest and wood products industries can also be measured in other ways. These other measures would require additional data collection and cost, and hence are listed here but not currently proposed for inclusion in AFWPS reporting.

Dependence on indirect and induced employment generated by forest and wood products industries

As well as direct employment, the forest and wood products industries generate indirect and induced employment through spending on goods and services, and spending of wages by workers. The amount generated within a particular region will vary depending on the proportion of goods and services the industry purchases within that region, and the proportion of spending undertaken by employees (for example, of wages) within that region. Estimating indirect and induced employment requires input–output or computable general equilibrium (CGE) modelling.

Economic dependence on forest and wood products industries

This involves measuring the proportion of local economic activity dependent on the forest and wood products industries; for example, proportion of local gross production, local expenditure or local income.

Cultural dependence on employment generated by the industries

This indicator examines the extent to which local identity depends on the presence of the forest and wood products industries, for example through contributing to cultural heritage and community interaction. It combines both employment dependence and other community assets such as social capital.

Contribution to local social capital

Forest and wood products workers and their families contribute to the communities they live in by taking part in community, service and sporting groups, in local community events, and by volunteering for a range of local groups. In addition, forest and wood products businesses contribute to communities through actions such as sponsorship of local events and contribution of staff, facilities and resources.

These activities form part of what is commonly considered social capital. Social capital can be defined as the social networks and norms that provide the 'glue' that holds communities together, with this definition emerging in particular from the work of Putnam (2000). Unpacking this concept, others suggest social capital is the outcome of specific patterns of community participation or interaction; for example, through organised groups or within family and friend networks, and the social cohesion (feeling of belonging, trust in others, and commitment to cooperation and reciprocal relationships) that results from that participation (Berry & Welsh 2010).

Proposed indicators based on available data

These indicators assume that greater levels of participation in social activities indicate the presence of higher levels of social capital, and more positive outcomes in terms of social wellbeing of people in a community.

Community participation—volunteering

The ABS Census asks respondents whether they participated in volunteering activities during the last 12 months (defined as doing voluntary work through an organisation or group). A high rate of volunteering can indicate higher levels of social capital. The extent to which forest and wood products workers volunteer may therefore indicate their contributions to some types of social capital. By comparing the proportion of forest and wood products workers who volunteer with the proportion of the total employed workforce who volunteer, it is possible to identify whether these workers are as likely as other members of the workforce to volunteer.

The community volunteering indicator provides a partial measure of participation in community-related activities, as it includes only volunteer activities, and not participation in many sporting, social or service related community groups. The type of volunteering activities a person takes part in is not identified.

Box 2 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006. In this and all subsequent examples drawing on example Tasmanian data, the indicator is based on workers employed in forestry and logging, services to forestry, and wood and paper product manufacturing only.

Box 2 Community participation—volunteering indicator, Tasmania, 2006

Percentage of people who engage in volunteering activities:
- Forest industry workers—18.6 per cent
- Total employed workforce—22.7 per cent
- Adult population—29.9 per cent.

These figures indicate that forest and wood products workers had lower volunteering rates than the total employed workforce in Tasmania.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Community participation—working hours

People who work long hours are often less able to take part in community activities, although this general trend does not always hold (Schirmer 2010a). The literature suggests a link between long working hours (over 50 hours per week) and negatives effects on mental health and wellbeing (Spurgeon et al. 1997), conditions that could potentially limit participation in community activities. Some people who work long hours including over 50 hours per week may of course be able to participate highly successfully in community life. However, it is likely that longer working hours reduce the potential for this.

Identifying whether forest and wood products workers work relatively long hours can provide some indication of their capacity to participate in their local community and hence their contribution to local social capital—as long as it is recognised that some people who work long hours do participate successfully in community activities.

The ABS Census category of Hours Worked—49 or more hours per week—is suitable for use in this indicator. Box 3 provides a worked example of the indicator for Tasmanian forest and wood products industry workers in 2006. This depiction of long working hours is calculated regardless of labour force status, that is, it includes all workers including those stating they work part-time or full-time.

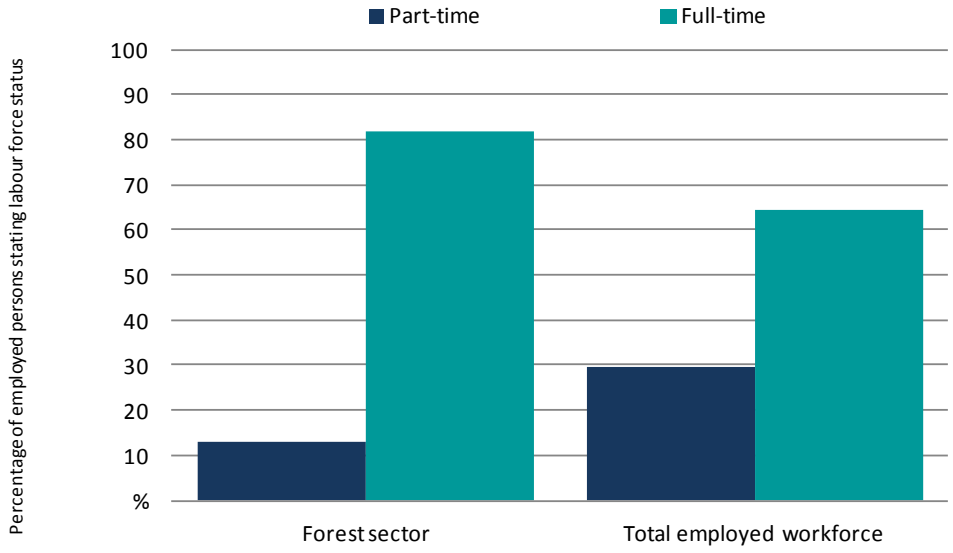
Box 3 Community participation—long working hours, Tasmania, 2006

Percentage of workers working 49 or more hours/week (full-time and part-time):
- Forest industry workers—18.0 per cent
- Total employed workforce—14.9 per cent.

This comparison indicates that in Tasmania, more workers in forest and wood products industries work long hours (49 hours and over per week) than others in the employed workforce. This partly reflects the lower rate people working part-time in the forest sector.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Australia-wide labour force status and distribution of working hours brackets for the forest sector and total employed workforce are shown in Figure 5 and Figure 6. The forest sector is less represented in the four brackets of fewer than 35 hours worked per week (Figure 6), reflecting fewer part-time workers than in the total workforce (Figure 5). The forest sector has a greater proportion of workers in the four brackets over 35 hours per week. The figures for Tasmania reflect the same pattern of longer working hours in the forest sector (Box 3).

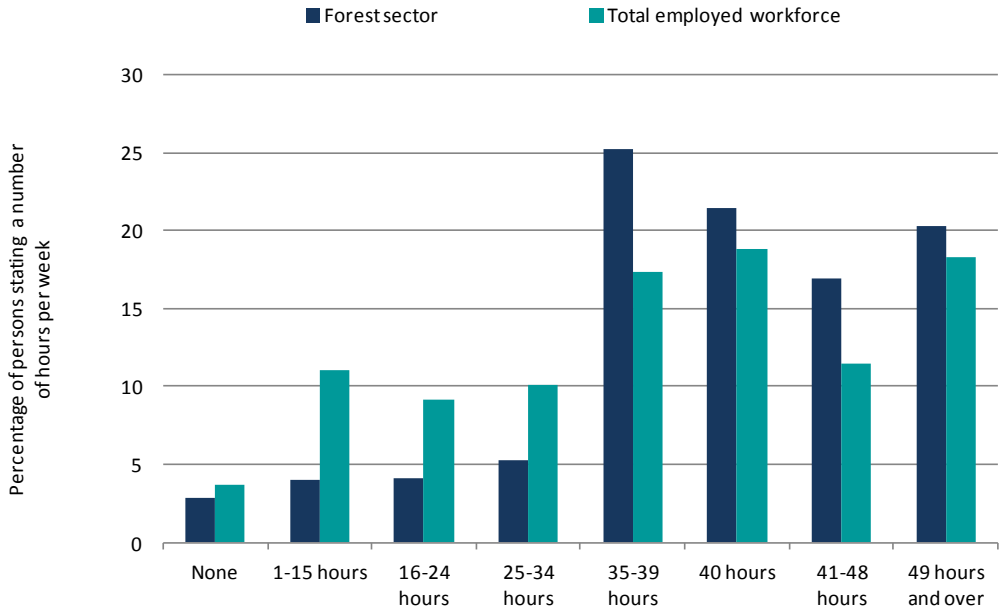
Figure 5 Labour force status comparison of forest sector employees to total workforce, Australia, 2006



Note: Responses other than full-time and part-time (around 5 per cent) cover persons who did not state the number of hours worked.

Data source: Australian Bureau of Statistics 2006 Census of Population and Housing and Labour Force Status

Figure 6 Distribution of hours worked categories for forest sector employees and total employed workforce, Australia, 2006



Note: Percentages calculated from total of (part-time and full-time) workers who stated number of hours worked.

Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Community participation—workforce stability

High rates of movement of forest sector workers into and out of a given community may indicate they are less likely to contribute to that community. Rural and regional communities experience widely varying rates of population turnover. A high rate of turnover is considered to reduce local social cohesion, peoples' attachment to place and social capital; conversely, a low

rate of turnover may contribute to local social cohesion and social capital, but could also limit social diversity and innovation in the local community.

The workforce stability indicator can also be used to measure overall stability of the industry and the employment it generates in a community, be it no change, a decline in forest sector employment, or an increase in employment due to new or expanding forest enterprises.

Further work is needed to identify the extent to which changes in place of residence and migration influence integration into local communities, and how. Ideally, this would be identified through a survey of forest sector workers who had recently moved.

The workforce stability indicator proposed is measured as the percentage of workers employed in the forest sector who lived in the same SLA five years before the Census. A higher per cent indicates relatively higher stability in terms of place of residence within that area; a lower per cent indicates less stability, with more workers moving into the SLA. Box 4 provides a worked example of this indicator for Tasmanian forest sector workers in 2006.

The indicator does not reflect change in place of residence for people who move to a different address in the same SLA. A limitation though is that people could have moved a short distance to a new SLA close to their previous one, thus allowing them access to the same community networks. In capital city regions SLAs are smaller and people may move readily between SLAs and still be part of the same networks. For this reason it is proposed that for capital city regions, this indicator is calculated based on persons staying in the same capital city statistical division, rather than the same SLA.

Box 4 Community participation—workforce stability, Tasmania, 2006

Percentage of people who lived in the same Statistical Local Area (SLA) five years previously:

- Forest industry workers—82.4 per cent
- Total employed workforce—74.4 per cent.

This comparison shows that forest and wood products workers have a relatively higher rate of stability, shown by less movement into SLAs, compared with the overall workforce.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Indicators for which data are not available

The proposed community participation indicators are broad, and ideally should be supplemented by occasional studies that identify whether volunteering, community group membership, and business donations are associated with increased community wellbeing. Specific indicators that can be measured using direct surveys of businesses or workers include:

- Participation in community groups—forest and wood products workers often join local sporting, community and service groups, including emergency service volunteer groups. This indicator measures the extent of this participation to better understand the contribution of the industry to the social capital of regional communities. This provides a broader understanding than the volunteering indicator as it includes non-volunteering community activities.

- Contribution of businesses to community activities—forest and wood products businesses often contribute funding, resources and facilities for local community activities. This indicator monitors the nature and extent of these contributions, based on survey of businesses. It requires consistent measurement of the different contributions businesses may make (for example, donations of money, staff time, or provision of access to facilities).

Contribution to local services demand

Forest and wood products workers contribute to demand for local services. Therefore, the presence of these workers can help maintain the presence of key local services, such as schools and health services, particularly in smaller rural and regional communities.

Indicators of employment dependence provide one measure of contribution to local services, as they give an idea of the extent to which demand for services in a given region is dependent on the presence of these industries. The indicators in this section could provide more specific understanding of the types of services supported by the presence of the forest and wood products industries.

Proposed indicators based on available data

Contribution to local services demand—age profile of workers

People typically change the extent to which they access particular services at different stages of life. For example, people in their late twenties and thirties may require access to local childcare services and school services; those in their thirties to fifties are likely to have school-age children. Those approaching retirement may require access to different types of health services compared with younger workers, and within a few years will likely require access to retirement related facilities and services.

This indicator shows whether forest and wood products industry workers have a different age profile to that typical of the community they live in, and therefore may provide a relatively higher contribution to demand for some services. While age is not a perfect indicator of needs for different services, it gives some understanding and is a useful indicator for other purposes, such as for understanding recruitment into the industry (see Workforce diversity in Chapter 6).

Box 5 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 5 Contribution to local services demand, Tasmania, 2006

Workforce age profiles:
Forest/wood products workers
- Under 25 years—12.5 per cent
- Over 55 years—14.0 per cent

Total employed workforce
- Under 25 years—16.1 per cent
- Over 55 years—15.9 per cent.

Forest and wood products workers are more likely to be aged between 25 and 55 than other workers, indicating a higher potential demand for school and child related services, but not disproportionately to ageing related services.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Indicators for which data are not available

Some types of forest and wood products businesses allow community access to facilities and services they own or manage. For example, an area of forest may be used not only for commercial forestry operations but also for recreational purposes, such as walking, mountain bike riding, hunting, or trail bike riding. This indicator can only be measured through a survey of forest and wood products businesses.

Table 4 Summary of proposed indicators to measure contribution of forest and wood products industries to communities

Indicator name	Definition
Employment dependence on forest and wood products industries	Number directly employed in forest and wood products industries/numbers employed in total employed workforce (x 100)
Household dependence on forest and wood products industries a	Number of households in which one plus members are employed in the forest–wood products industries/total no. households (x 100)
Community participation—volunteering	Percentage of forest and wood products industries workers who volunteer, compared with percentage in total employed workforce
Community participation—long working hours	Percentage of forest and wood products industries workers working 49 or more hours per week (full-time and part-time), compared with percentage in total employed workforce
Community participation—workforce stability	Percentage of forest and wood products industries workers living in the same SLA five years previously, compared with percentage in total employed workforce
Contribution to local services demand—age profile	Percentage of forest and wood products industries workers under 25 years and over 55 years, compared with percentages in total employed workforce

Note: Source for all indicators–Australian Bureau of Statistics 2006 Census of Population and Housing

Further work required

Relatively few indicators of community contribution can be readily monitored and many of these are not fully validated. While the available theory suggests the proposed indicators (Table 4) would show the contributions of forest and wood products businesses and workers to the communities in which they work and live, little research has been undertaken in these industries to validate that this is in fact the case. Further work should focus on establishing surveys of forest and wood product businesses and workers to better identify and measure the types of contributions they make to their communities. This would enable measurement of indicators that cannot currently be monitored, and help validate those that are proposed for regular reporting (see Proposal 4).

Proposal 4 Reporting on the contributions of forest and wood products industries to the broader community

The AFWPS could include reporting on indicators that examine different dimensions of the contributions forest and wood products industries make to the broader community. These indicators are proposed:

- contribution to regional employment
  - proportion of local/regional jobs dependent on the industries
  - proportion of households in a region that have one or more members employed in the industries
- contribution to social capital (community participation)
  - extent to which workers participate in volunteering activities
  - proportion of workers working 49 or more hours per week
  - workforce stability
- contribution to local services demand
  - age profile of workers in the forest and wood products industries provides a indication of typical demand for services.

In all cases, the indicators can be measured only at five-year intervals, as they typically rely on ABS Census data, and can be reported at regional, state and national level. Several other indicators that might provide insight into contribution to communities cannot be reported due to a lack of available data. Further work is needed to validate the indicators, and to provide more in-depth information on the types of contributions made by the forest and wood products industries to communities.

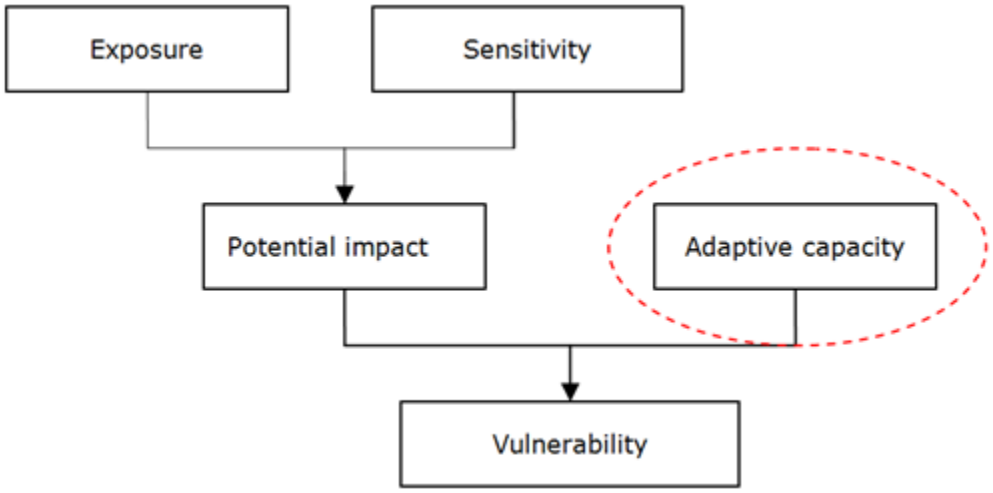
5 Adaptive capacity of communities with high dependence on forest and wood products industries

The forest and wood products industries make important contributions to the communities they operate in. In communities with high dependence on employment in these industries, changes to the industries could significantly affect the community as a whole.

To assist in understanding a community's ability to respond when exposed to change and stresses, we can look at the cumulative resources that people in a community have to draw on. These inherent resources are commonly referred to as a community's adaptive capacity. Adaptive capacity describes the broad ability or potential for a system (for example, community) to modify or change its characteristics or behaviour in order to cope with change or stresses.

The concept of adaptive capacity and its application in this discussion paper originated from the Intergovernmental Panel on Climate Change framework (Allen Consulting 2005) for measuring community vulnerability. This framework has been adapted by ABARES and the Institute of Rural Futures (University of New England) and applied in a number of research projects (Figure 7).

Figure 7 Community vulnerability conceptual framework



Source: Allen Consulting Group 2005, based on Schröter and ATEAM consortium 2004

For the purpose of AFWPS reporting it is not suggested that the entire framework be applied to measure a community's vulnerability to a specific stress or impact (for example, resource depletion, employment change or policy intervention). Alternatively a measure of adaptive capacity is suggested as a useful tool for better understanding the social characteristics of communities that are closely linked to forestry industries in Australia.

This chapter describes how components of an adaptive capacity index can be determined. The method outlines recent work by ABARES to construct national adaptive capacity and vulnerability indexes for relative comparisons on a consistent geographic basis (Statistical Local

Areas). These indexes could be adopted in AFWPS reporting, alongside the other proposed indicators.

Adaptive capacity

Adaptive capacity is defined broadly as factors that determine a community's ability to adapt and reduce current and future impacts and take advantage of opportunities. Some communities may be able to adapt to impacts by reinventing themselves and so avoid loss and harm, whereas others may find it difficult to avoid social and economic damage. The ways in which communities respond to adjustment processes are strongly influenced by local context and historical processes that are ongoing. Communities will have different levels of resources to draw on and varying ability to mobilise them effectively.

A wide range of socio-economic factors that contribute to this capacity have been identified in the literature (Stenekes et al. 2010). Factors in adaptive capacity are increasingly measured by identifying persons' access and ability to make use of various capitals (also called entitlements or resources in some studies), particularly human capital, social capital, financial capital, physical capital and natural capital. Studies citing the importance of human capital include Adger et al. (2009), Grothman and Patt (2005), Marshall and Marshall (2007), Nelson and colleagues (2007), Smit and Wandel (2006) and Tol and Yohe (2007). Social capital is discussed by Adger (2003), Pelling and High (2005) and Vincent (2007). Physical capital is identified as important by Adger et al. (2009), Smit and Pilifosova (2001) and Smit and Wandel (2006). Financial capital is considered important by Marshall and Marshall (2007), Smit and Pilifosova (2001), Nelson and colleagues (2007) and Preston and Stafford-Smith (2009).

The approach taken by ABARES in recent work focuses on representing capitals in these categories:

- **human capital**—labour force and influences on the productivity of labour, including individual education, skills and health
- **social capital**—factors in social relationships, networks and connections
- **economic diversity**—often associated with diversity of employment in different sectors (or employment diversity).

These categories represent a distillation of factors, which together indicate the resources a given community has to draw on to cope with change (Maguire & Cartwright 2008). Socio-economic indicators can help gauge the extent to which socio-economic factors are present within a community. These indicators are widely accepted as reliable and practical tools to summarise complex socio-economic phenomena. They are generally based on measurable characteristics, such as those recorded in data from the Australian Bureau of Statistics Housing and Population Census. The ABS data are deemed most suitable for constructing socio-economic indicators because they allow for consistent assessment through time and over large spatial units, Australia wide.

One approach to choosing a set of indicators from a potentially large field available in the Census is to examine their interrelationships using principal components analysis. This method helps compile a compact set of indicators that can reflect the components listed above. This approach has been used by the ABS in the construction of its Socio-economic Indexes for Areas (SEIFA) to examine welfare of communities, as well as in other studies (see Fenton & Coakes 1998; Vinson 1999).

The basis of principal components analysis (PCA) and development of adaptive capacity indicators in the Murray–Darling Basin by Stenekes and colleagues (2010) was extended in work by ABARES in 2011 to ascertain indicators covering all of Australia, at the scale of Statistical Local Areas (SLAs).

Choosing indicators and construction of adaptive capacity index

In 2011 ABARES developed a national index of relative adaptive capacity in partnership with the Institute of Rural Futures. The initial step was calculating a set of indicators from data items and assembling them as potential constituents of an adaptive capacity index (Table 5). This set was also used in Stenekes et al. (2010), where indicators were selected based on a review of literature that identified key factors that influence community vulnerability and adaptive capacity. The potential indicators are categorised under three key subindexes (components) of adaptive capacity: human capital, social capital and employment diversity. Data items for these indicators were extracted from the 2006 Census DataPacks, omitting migratory and offshore SLAs. The variables cover data on individual and family characteristics, including:

- attachment to place/mobility
- occupation type and employment rates
- age
- level and type of education
- expenditure, debt and income levels
- proficiency in English and cultural background.

Table 5 Proposed community adaptive capacity subindexes and indicators from which they are derived—on a Statistical Local Area basis

Proposed subindex	Indicator	ABS data used
Human capital	65+ years (%)	Total persons aged 65 years and over/total persons
	People <5 years (%)	Total persons aged 0–4 years/total persons
	Population aged 15–24 years (%)	Persons 15–24 years as proportion of total population
	Couple families (%)	Total couples without children + total couples with children/total families
	Lone households 65+ years old (%)	Total lone householders aged 65+ years/total persons in occupied private dwellings
	Lone person households (%)	Total one person households/total occupied dwellings
	One parent (%)	Total single parent families/total families
	Separated and divorced (%)	Total separated + total divorced/total persons 15+ years
	Single parent with children <15 years (%)	Total single parent families with children aged <15 years/total families
	Single persons 15+ years (%)	Total persons not married/total persons 15+ years
	Single persons 15–64 years (%)	Persons between 15 and 64 not married as proportion of total persons aged 15–64 years
	Average no. persons per household	Average household size
	Language spoken at home not English (%)	Total other language spoken at home/total persons
	Born overseas (%)	Country of birth outside Australia/total persons
	Over 15 years, no qualifications (%)	Percentage of persons 15+ years with no qualifications (certificate, diploma, undergraduate degree, postgraduate degree)
	Persons 15+ years with management or commerce qualification (%)	Total non-school field of study management, commerce/total persons 15+ years
	Graduates (%)	Total bachelor degree + total graduate diploma/certificate + total postgraduate degree/total persons 15+ years
	Left school before Year 10	Total Year 9 leavers + total Year 8 leavers + total did not attend school/total persons 15+ years
	Persons 15–24 years attending educational institution (%)	Full or part-time technical college or university students as proportion of persons aged 15–24 years
	Household weekly income <$349 (%)	Percentage of houses with income between $0 and $349 per week
	Income/mortgage differential	(Median household weekly income * 52/12)—median monthly housing loan repayment
	Median household income as fraction of Australian median	Median household income as proportion of the 2006 Australian median ($1026.80)
	Need for assistance (%)	Total need for assistance (disability)/total persons
	Dependency ratio	Persons aged <15 years and >64 years as a proportion of persons aged between 15 years and 64 years
	Dwellings no vehicle (%)	Number of dwellings with no vehicle/total dwellings
	Indigenous persons (%)	Total Indigenous persons/total persons
	Visitors (%)	Total visitors/total persons

Continued

Table 5 Proposed community adaptive capacity subindexes and indicators from which they are derived—on a Statistical Local Area basis *continued*

Proposed subindex	Indicator	ABS data used
Human capital	House being purchased (%)	Dwellings being purchased/total occupied private dwellings
	Dwellings rented (%)	Rented properties/total dwelling structures
	Median monthly housing loan repayment as a fraction of the Australian median	Median monthly house loan repayment as proportion of the 2006 Australian median ($1300)
	Median weekly rent as a fraction of the Australian median	Median weekly rent as proportion of the 2006 Australian median ($190)
	Households using the internet (%)	Total households with internet/total occupied private dwellings
	Of internet users with broadband (%)	Total households with broadband/total occupied private dwellings
	Different address to one year ago (%)	Lived at different address one year ago/lived at different address one year ago + lived at same address one year ago
	Different address to five years ago (%)	Lived at different address five years ago/lived at different address five years ago + lived at same address five years ago
	New residents (< = one year residing in SLA) (%)	Persons living overseas or in different Census Collection District one year ago/total persons aged >one year
	Employed in public sector (%)	Total employed in public admin sector/total employed persons 15+ years
	Labourer (employed 15+) (%)	Total labourers/total employed persons 15+
	Tradespersons (%)	Total technicians and trade workers/total employed persons
	Total unemployment (%)	Total unemployed/total labour force
	Unemployment 20–64 years (%)	Unemployed persons aged 20–64/labour force aged 20–64 years
	Unemployment 15–24 years (%)	Unemployed persons aged 15–24 years/labour force aged 15–24 years
Social capital	Women in non-routine occupations (%)	Female managers + female professionals + female technicians + female community and personal/total female employed persons
	Voluntary work (%)	Total volunteers/total persons 15+ years
Employment diversity	Economic diversity index (Hachmann Index in Moore 2001)	Diversity of local economy relative to Australian economy, calculated using employment by sector data

Note: ABS Census data used is for 'Persons Place of Usual Residence', 2006

Principal Components Analysis and subcomponents of human capital

PCA is used to reduce the 42 potential indicators of human capital to smaller groups of indicators, by identifying the strongest influencing indicators and weighted components. ABARES carried out two separate PCAs: one for SLAs within capital city Statistical Divisions (termed metropolitan); and the other for all other Statistical Divisions (termed rural). This recognises that the relationships among Census indicators may be different in metropolitan areas, compared with rural areas.

The resulting components used to represent human capital in rural SLAs were:

- age advantage
- education advantage
- social advantage
- mobility advantage
- employment advantage.

Components determined to represent human capital in metropolitan SLAs were:

- socio-economic advantage
- age advantage
- mobility advantage
- English speaking advantage.

The individual indicators that comprise each of these advantage components were selected because they have the strongest influence compared with other indicators. Table 6 shows the final reduced set of 34 Census indicators and how they constitute the components of human capital.

Table 6 Reduced set of indicators in components of human capital subindex

Census indicator	Metropolitan component	Rural component
Over 15 years no qualifications (%)	Socio-economic	Education
Persons 15+ years with management or commerce qualification (%)	Socio-economic	Education
Graduates (%)	Socio-economic	Education
Single parent with children <15 years (%)	Socio-economic	Social
Left school before Year 10	Socio-economic	na
Tradespersons (technicians and trades workers) (%)	Socio-economic	na
Median household income as fraction of Australian median	Socio-economic	Age
Households using the internet (%)	Socio-economic	na
Persons aged 15–24 years attending an educational institution) (%)	Socio-economic	Education
One parent (%)	Socio-economic	Social
Median monthly housing loan repayment as a fraction of the Australian median	Socio-economic	na
Median weekly rent as a fraction of the Australian median	Socio-economic	na
Income/mortgage differential	na	Age
Total unemployment (%)	Socio-economic	Employment
Lone households aged 65+ years (%)	Age	Age
65 years and over (%)	Age	Age
Lone person households (%)	Age	Age
Average no. persons per household	Age	Age
House being purchased (%)	Age	Age
Household weekly income <$349 (%)	Age	Age
Labourer (employed 15+ years) (%)	Socio-economic	Education
Dwellings no vehicle (%)	Age	Social
Couple families (%)	na	Social
Single persons 15+ years (%)	na	Social
Need for assistance (%)	Age	na
Single persons 15–64 years (%)	na	Social
Different address to one year ago (%)	Mobility	Mobility
New residents (<= one year residing in SLA) (%)	Mobility	Mobility
Dwellings rented (%)	Mobility	Social
Different address to 5 years ago (%)	Mobility	Mobility
Language spoken at home not English (%)	English-speaking	na
Born overseas (%)	English-speaking	Mobility
Unemployment 20–64 years (%)	na	Employment
Unemployment 15–24 years (%)	na	Employment

SLA = Statistical Local Area. na = Indicator is not used for this component.

Note: In rural SLAs social, age and employment advantage are reversed. In metropolitan SLAs socio-economic, age and English-speaking advantage are reversed (when calculating data items).

Some individual items in Table 6 are reversed when calculating indexes so that, for example, a higher number of labourers results in a lower score for education advantage.

PCA is not required for indicators in the social capital index or the single indicator of economic diversity (Hachmann Index) because the number of indicators is small. PCA is used to reduce a large set of potential indicators into a more meaningful set.

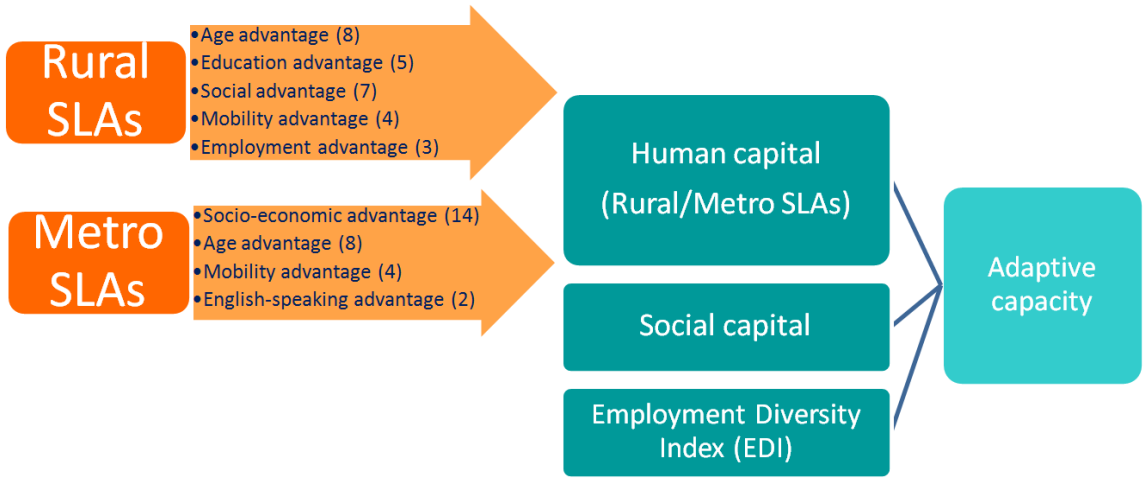
The scores for human capital are added, according to the sets of rural and metropolitan advantage components and weightings of indicators from the PCA, to form a human capital subindex score for each SLA. This is then combined with other subindexes (Figure 8).

Calculation of overall adaptive capacity from subindexes and mapping in regions

The social capital subindex is calculated by adding unweighted standardised scores for the percentage of persons in voluntary work and the percentage of the female workforce in non-routine occupations (Table 5).

The employment diversity index (economic diversity indicator or Hachmann Index) is calculated from ABS employment by industry sector data, using the method described by Moore (2001). The overall relative adaptive capacity for each SLA is calculated by summing the standardised values of the human capital, social capital and employment diversity subindexes (Figure 8). This is standardised again for mapping, to a range of 0.0 to 1.0. These component indexes can be mapped using software such as MCAS–S and ArcGIS.

Figure 8 Construction of adaptive capacity and subcomponents

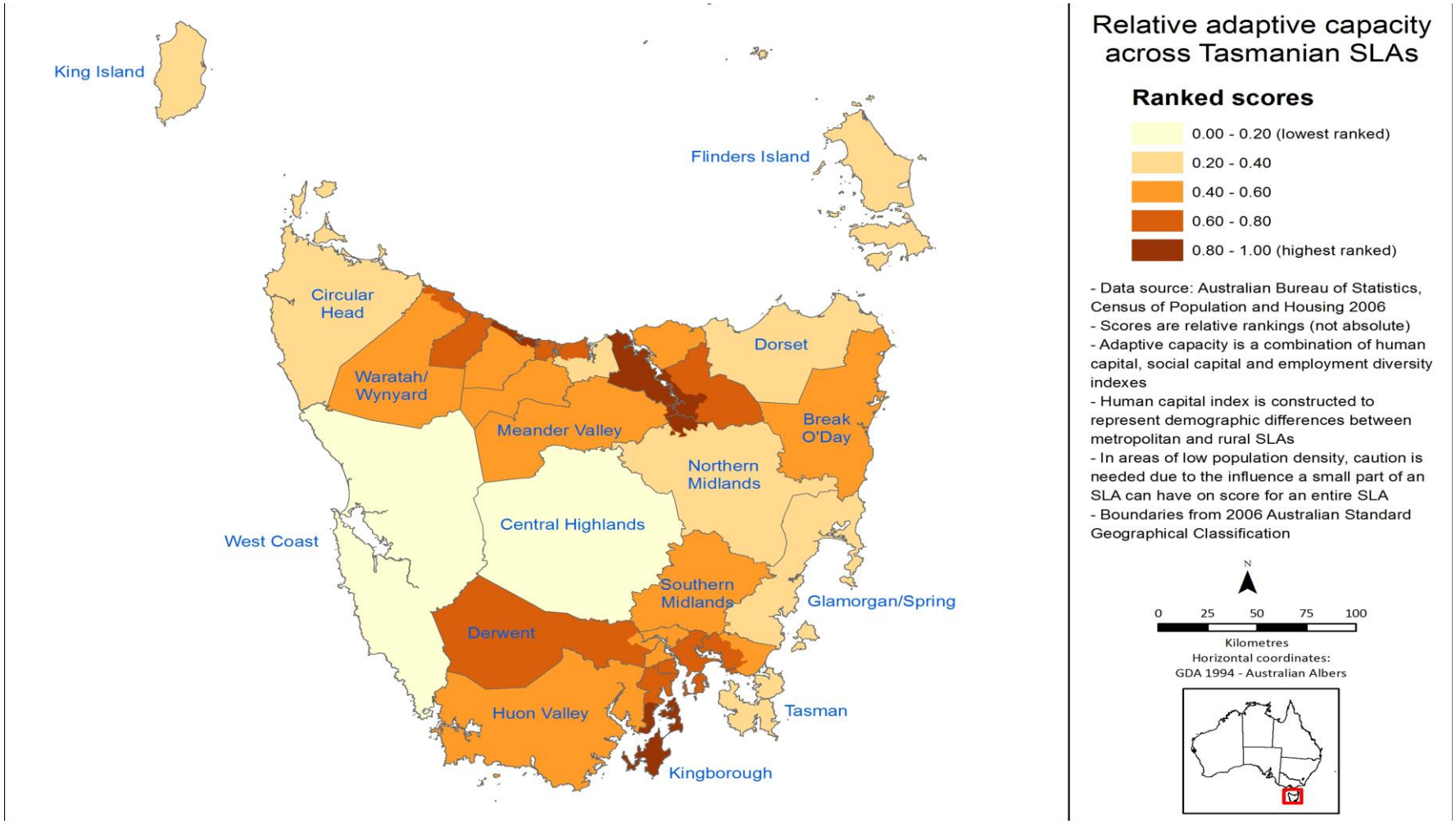


SLA = Statistical Local Area

Note: Numbers in brackets refer to number of individual indicators contributing to a component.

For the Tasmanian case study region, Map 2 shows the relative adaptive capacity values mapped using ArcGIS across SLA boundaries. The values are standardised across Tasmanian SLAs and illustrated using five equal bands in the range 0.0 to 1.0. Data can either be standardised (ranked) relative to all SLAs in Australia or within a region, as illustrated here for Tasmania. The map shows that adaptive capacity varies across Tasmania (as it does across the whole of Australia), depending on the characteristics of particular communities.

Map 2 Relative community adaptive capacity index, Tasmania



SLA = Statistical Local Area

Tables 7 and 8 present adaptive capacity and subcomponent scores in Tasmania, showing the ten SLAs with highest adaptive capacity and the ten SLAs with lowest adaptive capacity.

Table 7 Statistical Local Areas with highest ranked adaptive capacity scores, Tasmania

Statistical Local Area	Human capital	Social capital	Economic diversity index	Adaptive capacity a	Workforce working in forest industries (%) b
West Tamar (M)—Pt A	0.653	0.292	1.014	1.000	1.9
Kingborough (M)—Pt B	0.680	0.363	0.879	0.965	0.5
Meander Valley (M)—Pt A	0.662	0.226	0.983	0.917	2.0
West Tamar (M)—Pt B	0.679	0.263	0.883	0.873	4.0
Northern Midlands (M)—Pt A	0.590	0.255	0.977	0.871	2.5
Launceston (C)—Pt B	0.548	0.259	0.994	0.852	2.7
Central Coast (M)—Pt A	0.516	0.279	0.970	0.817	3.1
Kingborough (M)—Pt A	0.479	0.329	0.935	0.797	1.2
Launceston (C)—Pt C	0.636	0.272	0.806	0.771	6.7
Latrobe (M)—Pt A	0.562	0.281	0.869	0.768	4.3

C = city; M = municipalities

Note: **a** Ranked scores standardised relative within Tasmania statistical local areas. **b** This percentage is illustrative only—includes employment in 'Wooden Furniture and Upholstered Seat Manufacturing categories, which are not included in FWP industry definition).

Table 8 Statistical Local Areas with lowest ranked adaptive capacity scores, Tasmania

Statistical Local Area	Human capital	Social capital	Economic diversity index	Adaptive capacity a	Workforce working in forest industries (%) b
Glamorgan/Spring Bay (M)	0.515	0.286	0.443	0.330	6.6
Tasman (M)	0.531	0.310	0.393	0.319	1.5
Circular Head (M)	0.552	0.291	0.371	0.301	8.1
Flinders (M)	0.502	0.387	0.304	0.281	0.0
King Island (M)	0.560	0.342	0.276	0.267	0.0
Latrobe (M)—Pt B	0.638	0.277	0.259	0.264	2.7
Northern Midlands (M)—Pt B	0.545	0.324	0.270	0.231	3.1
Dorset (M)	0.493	0.287	0.359	0.230	15.9
Central Highlands (M)	0.504	0.303	0.177	0.086	5.6
West Coast (M)	0.487	0.240	0.166	0.000	0.8

C = city; M = municipalities

Note: **a** Ranked scores standardised relative within Tasmania statistical local areas. **b** This percentage is illustrative only—includes employment in Wooden Furniture and Upholstered Seat Manufacturing categories, which are not included in FWP industry definition).

Identifying areas of relatively high dependence on forestry (percentage of employment) and relatively lower adaptive capacity highlights communities where change in the forest and wood products industries may cause the greatest impact. For example, the SLAs Circular Head (M), Dorset (M) and Central Highlands (M) have high employment dependence and lower adaptive

capacity. By contrast, West Tamar (M) and Launceston (C)—Pt C are examples of areas with high employment dependence on forestry industries, but relatively higher adaptive capacity.

National dataset

The national dataset developed by ABARES (based on 2006 Census data) covers all SLAs in Australia, including overall adaptive capacity, social capital, economic diversity index, human capital, and the further subcomponents of human capital. These scores can be used independently or presented in groupings for regions, but still disaggregated at SLA scale. They can also be combined where appropriate, with sensitivity or dependency data, to help build a picture of community vulnerabilities to impacts of change.

Proposal 5 Reporting on adaptive capacity of regions with significant employment in forest and wood products industries

The AFWPS could include reporting on the following indexes that represent different dimensions of overall community adaptive capacity:

- human capital
- social capital
- economic diversity
- adaptive capacity (function of the human capital, social capital and economic diversity subindexes).

These indicators could be reported for areas with proportional employment directly dependent on forest industries of at least 3 per cent (of total working population), on a Statistical Local Area basis. Data can be standardised (ranked) relative across a region, or nationally.

These indicators can be measured only at five-year intervals, as they rely on ABS Census data, and can be reported at statistical unit, or aggregated to regional, state and national level. Further work could be undertaken to validate or improve the indicators depth (factors influencing social capital). However, adjustment of the adaptive capacity index is out of scope of the current project supported by Forest and Wood Products Australia.

6 Human dimensions of industry sustainability: workforce characteristics

Identifying key socio-demographic characteristics of workers provides insights into the human dimensions of industry sustainability. Human dimensions of industry sustainability that could be examined are worker wellbeing and workforce diversity. An understanding of these distinct but related concepts is important because it enables industry to maintain a stable, diverse and representative workforce.

For the industry to maintain a stable workforce, it must provide working conditions that are satisfying and rewarding, and fulfil a moral obligation to ensure wellbeing of those in the industry. Monitoring wellbeing of workers enables identification of issues that need to be addressed to avoid high turnover of staff and loss of skilled workers

Tracking workforce diversity provides insight into whether businesses are successfully recruiting workers from all parts of the available workforce, as well as whether the industry is providing opportunities for some groups who typically have greater difficulty accessing the workforce (such as Indigenous workers and workers with a disability).

Wellbeing

Wellbeing is defined here as an individual's subjective quality of life, or subjective wellbeing. Subjective wellbeing is an extensively researched area (see for example Cummins 2000a; Costanza et al. 2007; Layard 2010). While subjective wellbeing is defined based on a person's perceptions of their own quality of life, this does not—as some in the field argue—exclude the use of objective indicators. Research suggests multiple measurable factors are consistently associated with higher subjective wellbeing. Prominent wellbeing theorists argue that using this knowledge to guide selection of objective indicators is an optimal approach to understanding wellbeing at an aggregate level (Cummins 2000a). Causal factors commonly identified as affecting subjective wellbeing levels are physical health, family status, employment, income, and age; these are mediated by factors relating to an individual's personality (Layard 2010). While some factors are not directly influenced by employment in the forest and wood products industries, others (particularly employment and income) are, and the workplace is also an important influence on physical health. Wellbeing is the general term used further in this report.

Workforce diversity

Employee diversity in an industry or workplace can be used to indicate opportunities that the industry or workplace provides for its workforce. The Australian Government and specific industries are assisting employers to support people with a disability, the long-term unemployed, mature-age people, those from culturally and linguistically diverse backgrounds and Indigenous Australians to find and stay in employment.

The Department of Agriculture defines workplace diversity as acknowledging the value of individual differences and making the most of these differences in the workplace. Diversity incorporates the principle of equal employment opportunity and addresses disadvantage. The concept of workplace diversity can also describe socio-economic background, family responsibility, working style and life experience. In sociology a definition of workforce diversity

is: the composition of work units in terms of the cultural or demographic characteristics that are salient and symbolically meaningful in the relationships among group members (DiTomaso et al. 2007). Diversity can help foster innovative ideas and a supportive work environment that promotes values of respect and professionalism. This chapter presents data in four areas that could help indicate diversity in forest industries: age profile, gender balance, and employment of Indigenous people and people with a disability.

Limitations

While worker wellbeing and workforce diversity are critical concepts, identifying specific indicators useful for ABARES Australian forest and wood products statistics (AFWPS) reporting is difficult for two reasons. First, there is limited empirical work on what indicators best represent wellbeing for workers in the forest and wood products industries. This will be addressed in part by work undertaken in 2012–13, funded by the CRC for Forestry, which is examining wellbeing and adaptive capacity of Victorian forest industry workers. When results of this work are available, the indicators proposed for AFWPS here could be reviewed. Second, many indicators suggested in the literature on wellbeing cannot be measured using available data. Monitoring workforce diversity is less problematic, with several indicators able to be measured using ABS Census data.

It was not possible in this project, given the resources available, to develop a full conceptual framework that identifies either how working in the industries may influence worker wellbeing, or how workforce diversity influences industry sustainability. While these concepts have a strong broad research base, the gap in research means there is a lack of understanding of how each can be applied to the forest and wood products industry. Given this lack, a limited set of indicators is proposed.

The proposed indicators representing concepts of wellbeing and workforce diversity are summarised in Table 9, and are discussed in more detail in the following sections.

Table 9 Summary of proposed indicators to measure worker wellbeing and workforce diversity

Indicator name	Definition (% of forest and wood products workers)
Worker wellbeing	
Worker income	Full-time earning low (<$600/week) and high (>$1300/week) income, compared to the percentage in the total employed workforce
Long working hours	Full-time working 49 or more hours per week, compared to the percentage in the total employed workforce
Educational attainment	Workers who have completed high school and have a non-school qualification, compared with percentage in the total employed workforce
Marital status	Separated/divorced compared to the percentage in the total employed workforce
Workforce diversity	
Age	Aged <25 and 55+ years, compared to the percentage in the total employed workforce
Gender	Female compared to the percentage in the total employed workforce
Indigenous	Indigenous compared with percentage in the total employed workforce
People with disabilities	Have a disability compared with percentage in total employed workforce

Note: Source for all indicators–Australian Bureau of Statistics Census of Population and Housing

Proposed indicators based on available data

Indicators were selected based on two criteria. First, they needed to be measurable using existing data. Second, a reasonable evidence base needed to exist suggesting the indicators

provide useful insight into the concepts of worker wellbeing, or workforce diversity. These indicators do not provide a comprehensive picture of wellbeing, but can provide some limited insight using available data. They could be revisited as more empirical evidence becomes available.

Worker wellbeing — proposed indicators

Income

Income is often regarded as an indicator of personal wellbeing and capacity to adapt to change. In general, higher income is considered indicative of more positive wellbeing, although there are limitations to this. A person's wellbeing is affected by multiple variables, only one of which is income. While there is ongoing debate about whether money can buy happiness, a growing body of evidence suggests that access to financial resources is associated, up to a certain point, with higher levels of subjective wellbeing (Diener & Suh 2000). Cummins (2000b, p. 133) argued that 'money buys happiness to the extent that external resources permit optimal functioning of the subjective wellbeing homeostatic system' of individuals.

Schirmer and colleagues (2011) found that forest industry workers in Tasmania who reported higher confidence in being able to meet their financial obligations also had higher confidence in their capacity to adapt to change; and those who had lost jobs in the industry were more likely to feel they had successfully coped with that change. Income is an imperfect indicator of financial resources because a person may be able to access significant resources outside the industry and may have varying financial obligations. Worker income does, however, indicate what a person's employment in the forest and wood products industries is contributing to their financial capacity.

Comparing the average income of forest and wood products workers with the average income for the total workforce, and comparing the rate of income growth with the average, can provide an indication of worker wellbeing and capacity to adapt to change. Income data should be interpreted with care, given that the same income will translate to different levels of financial wellbeing depending on a worker's obligations; for example, the number of people who need to be supported on their income and costs of living in their community. However, if workers employed in the industries are earning a higher income than the average for the total employed workforce in their region, this might indicate a higher likelihood of positive financial wellbeing.

The ABS produces data by income category, rather than exact income earned. This means it can be difficult to track rates of change. In addition, income categories used by the ABS to report income data have changed over time and may change again, reducing comparability of income measures over time. Therefore the indicator is best measured for a single point in time, comparing income of forest and wood products workers to the total employed workforce for the same region. Box 6 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 6 Worker income, Tasmania, 2006

Percentage of forest and wood products workers working full-time who earn less than $600 and $1300 plus per week:

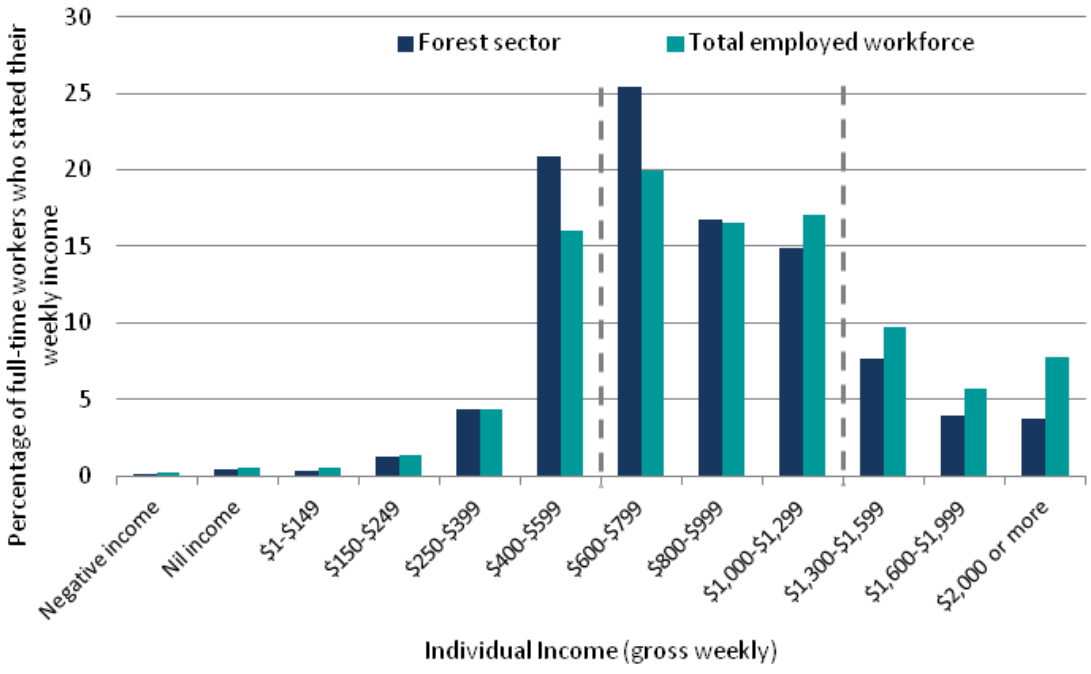
- Forest/wood products workers
  - Under $600 per week—24.6 per cent
  - Over $1300 per week—16.0 per cent
- Total employed workforce
  - Under $600 per week—28.6 per cent
  - Over $1300 per week—15.0 per cent.

Forest and wood products workers have a slightly higher rate of higher incomes, and lower rate of low incomes, compared with the employed workforce as a whole. The comparison is for full-time workers only, to remove the effects of the high percentage of forest and wood products workers who are employed full-time compared with the employed workforce as a whole.

Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Figure 9 shows that more workers are on higher incomes in the total workforce compared with the forest sector (across the three categories over $1300 per week). When the Australia figures are summed, 15 per cent of the forest sector workers and 23 per cent of the total workforce earn over $1300 per week (across these income categories). Using a cut-off of $600 per week to represent relatively lower incomes, 27 per cent of forest workers are on low incomes, compared with 23 per cent of the total Australian workforce. These are figures from cumulative Australia data. State-by-state or local area data, when reported, may show different industry sector income distribution, as seen in Tasmania figures (Box 6).

Figure 9 Distribution of income categories, full-time forest sector employees and total workforce, Australia, 2006



Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Long working hours (full-time workers)

People who work long hours are commonly thought to be subject to higher levels of stress and lower overall wellbeing, a result of reduced opportunities for personal and social interaction, as well as 'sleep disturbance, fatigue and disrupted exercise and dietary regimes' (Bohle et al. 2004, p. 1). General evidence indicates a link between working hours of greater than 50 hours per

week and negative effects on health and wellbeing (Spurgeon et al. 1997). While this is not always the case—long working hours can also bring in higher income, associated with improved wellbeing—stress and associated problems do appear to be a relatively common outcome of longer hours (Bohle et al. 2004; Golden & Wiens-Tuers 2006). Identifying whether forest and wood products employees work longer hours than average can give an indication of their wellbeing. For this reason, working hours of full-time workers is proposed as an indicator of human dimensions of industry sustainability. As with other indicators, this indicator should be re-evaluated when data from the CRC for Forestry study become available on worker wellbeing.

Working part-time hours may be positive or negative depending on a person's preferences and individual situation. It is not possible to identify whether an increase in part-time work represents an increase or decrease in wellbeing as this will vary substantially depending on the reasons for working part-time (Schirmer 2010a). Part-time work is not included in the proposed indicators for this reason.

Box 7 provides a worked example of this indicator for the Tasmanian forest and wood products industry workers in 2006.

Box 7 Long working hours, Tasmania, 2006

Percentage of full-time forest and wood products workers working 49 or more hours per week, Tasmania:

- Forest/wood product workers—21.6 per cent
- Employed workforce—24.1 per cent

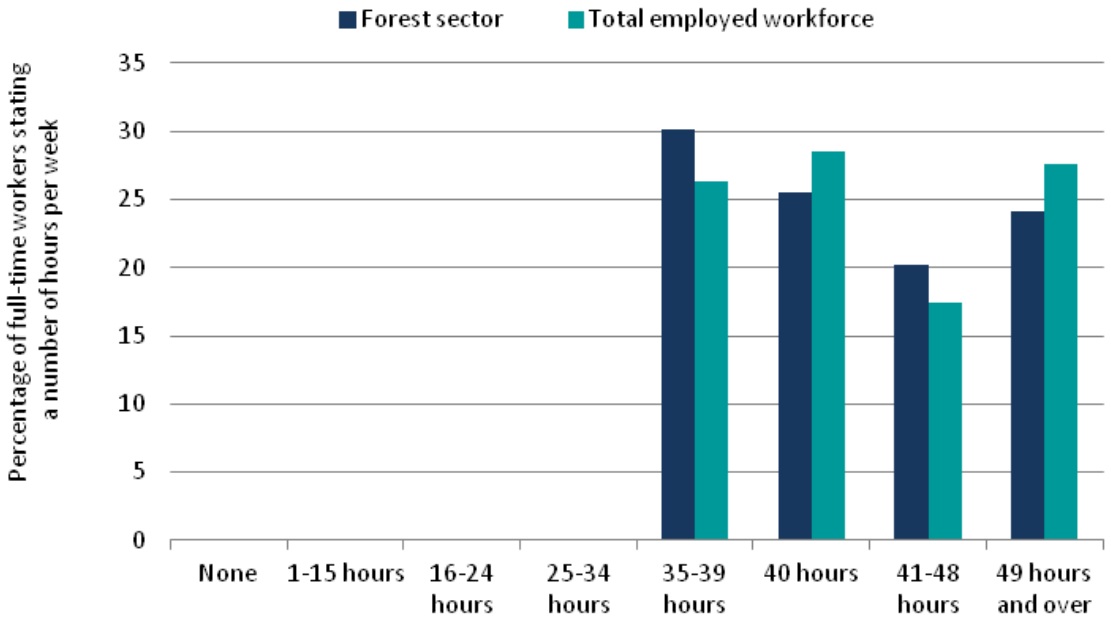
In Tasmania, forest and wood products industry workers working full-time are less likely to work 49 or more hours per week than others in the workforce.

Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Australia-wide distribution of full-time workers hours (Figure 10) reflects the Tasmanian figures with more of the total workforce in the category of 49 or more hours worked per week, compared with the forest sector. In the categories of 35–39 hours and 41–48 hours, the forest sector has higher percentages than the total workforce. Hours of 41–48 have been associated with reduction in productivity, but this range is somewhat of a grey area for effects on wellbeing, with less evidence as for the negative effects of over 49 hours (Spurgeon et al. 1997). Therefore over 49 hours is a suitable category for this indicator.

This data shows a different pattern to the distribution of working hours when part-time workers are included. When part-time workers are included (as proposed in the contribution to community section), the percentage of forest workers exceeding 49 hours per week is greater than for the total workforce. This suggests that, while there may be fewer part-time workers in forest sector industries, many working part-time are working longer hours (in excess of 49 hours).

Figure 10 Distribution of hours worked, full-time forest sector employees and total employed workforce, Australia, 2006



Data source: Australian Bureau of Statistics 2006 Census of Population and Housing; Labour Force Status data (full-time employees)

Educational attainment

Personal level of educational attainment is a recognised indicator of wellbeing and contributor to industry sustainability, and thus provides information relevant at the scale of both workers and businesses. Formal educational attainment also contributes to the resources and skills that enable people to adapt to change. Studies have identified a strong link between higher educational attainment and higher levels of wellbeing (Helliwell & Putnam 2004). This effect on wellbeing is likely to result from the effect education has on other factors, such as income, access to satisfying employment and health (Helliwell & Putnam 2004). The educational attainment of a worker in the forest and wood products industries is therefore a useful indicator of their wellbeing.

The forest and wood products industries often train workers through courses that are not recognised as formal educational attainment. This may reduce the usefulness of the proposed indicator to some extent, as some of the skills workers have will not be recorded in ABS statistics. However, formal educational attainment that is transferable across industries was identified in the industry workshop as essential to assisting workers to adapt to change. Box 8 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 8 Worker educational attainment, Tasmania

Percentage of people with high school equivalent qualifications and non-school qualifications:

- Forest/wood products workers
  - High school—21.4 per cent
  - Non-school qualification—40.9 per cent
- Total employed workforce
  - High school—40.7 per cent
  - Non-school qualification—1.2 per cent
- Adult population
  - High school—34.5 per cent
  - Non-school qualification—31.7 per cent.

These comparisons show forest and wood products workers are less likely to have these types of formal educational attainment than other workers.
Data source: Australian Bureau of Census of Population and Housing 2006

Marital status

Marital status refers to whether a person is married/de facto, separated/divorced, has never been in a married/de facto relationship, or is widowed. People who have divorced or been widowed have been shown to have lower wellbeing over an extended period of time (Easterlin 2003). They may also experience a reduction in access to financial resources (Smyth & Weston 2000). While this may initially appear unrelated to a person's work, anecdotal evidence suggests that periods of stress in the forest and wood products industry may be associated with higher rates of divorce. Workshop participants reported this perception based on their own observations.

Comparing the proportion of forest and wood products workers that are separated or divorced with the average proportion in the total employed workforce, and noting whether this proportion is changing at a different rate to the average, is likely to provide an indication of the wellbeing of workers. If forest and wood products workers experience a greater rate of separation and divorce than comparable groups, it is an indicator that work in the industry may be contributing to stress that leads to higher separation/divorce, and vice versa. As with any social indicator, multiple factors will be involved in any major life change such as divorce. However, it is well established that work stress is a common contributor to separation and divorce (Matthews & Gump 2002). The indicator measurement requires a comparison of the forest industry with the total workforce to ensure that separation and divorce are only likely to be related to working conditions in the forest and wood products industries; for example, if they occur at a rate higher than the average.

Workshop participants felt this indicator was worth examining, but that consideration should be given to excluding it from regular reporting if little or no useful information emerged. Box 9 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 9 Worker marital status, Tasmania, 2006

Percentage of people who are divorced/separated:

- Forest/wood products workers—11.6 per cent
- Total employed workforce—12.8 per cent
- Adult population—12.5 per cent.

Forest and wood products workers are less likely to be separated/divorced than those in other groups, although the differences are relatively small.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Workforce diversity — proposed indicators

Age and ageing of the workforce

The age profile of employees in the forest and wood products industries can be an indicator of workforce diversity, and provides a useful indicator of the attractiveness of these industries to workers and of the sustainability of the workforce. A rapidly ageing workforce with few younger recruits is likely to face issues such as loss of skills and difficulty replacing retiring workers. A very young workforce, for example, resulting from rapid expansion, may have different skills needs to an older workforce. Links to adaptive capacity are less well established: some studies suggest that older workers are less productive than younger workers (Kryger 2005) and hence a high proportion of older workers indicates lower adaptive capacity of businesses. Other studies argue that older workers are less able to adapt to workplace changes, such as introduction of new technology, although this is debated (Yeatts et al. 1999).

This indicator is therefore best considered a measure of industry success in recruiting a demographically sustainable workforce. It identifies whether forest and wood products workers have a different age profile to that typical for the total employed workforce, and whether the workforce is ageing more rapidly than average over time.

Box 10 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 10 Workforce diversity—age profile, Tasmania, 2006

Percentage of forest and wood products workers aged <25 and >55 years compared with the percentage in the employed labour force:

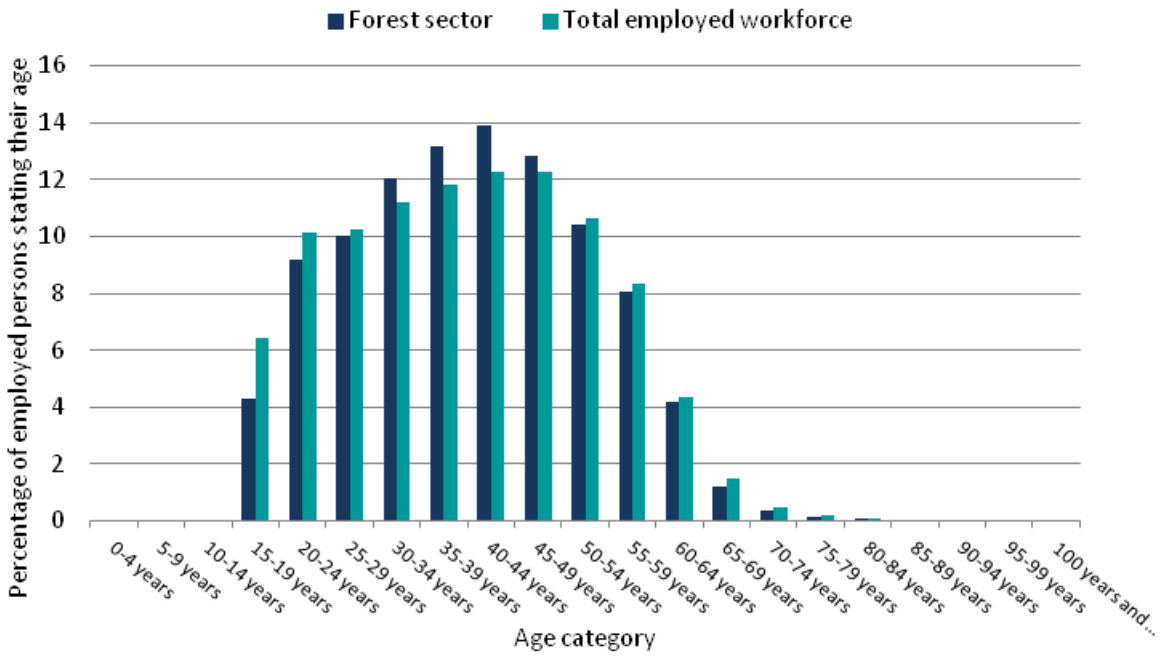
- Forest/wood product workers
  - Under 25 years—12.5 per cent
  - Over 55 years—14 per cent
- Total employed workforce
  - Under 25 years—16.1 per cent
  - Over 55 years—15.9 per cent.

A lower percentage of forest and wood products industries workers are less than 25 and greater than 55 years old, compared with the general workforce. This indicates a relatively lower rate of employment of young and mature-age workers.

Data source: Australian Bureau of Statistics Census of Population and Housing 2006

Data on the distribution of workers ages Australia-wide shows higher percentages in the categories under 25 and over 55 years for the total workforce, compared with the forest sector (Figure 11). Of these two sides of the age profile, the larger difference appears in employment of young workers less than 25 years old. The forest sector has greater representation compared with the total workforce in the three age group categories aged between 30 and 44 years.

Figure 11 Age distribution, forest sector workers and total employed workforce, Australia, 2006



Note: Age in five-year groups.

Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Gender

Identifying the proportion of female workers provides some understanding of the level of inclusiveness of employment in the forest and wood products industries. With these industries traditionally being male-dominated, identifying the rate of change in employment of women provides an indicator of whether barriers to women entering the industry are being addressed successfully. It is also an indicator of the pool of labour available to the industries; lack of inclusion of women indicates a potential lack of ability to recruit from a significant section of the workforce.

Box 11 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 11 Workforce diversity—gender, Tasmania, 2006

Percentage of females:

- Forest/wood products workers—12.4 per cent
- Total employed workforce—46.9 per cent
- Adult population—51.0 per cent.

There is a lower rate of employment of female workers in forest and wood products industries than in the total employed workforce.

Data source: Australian Bureau of Statistics Census of Population and Housing 2006

Indigenous employment

Socially inclusive employment provides benefits for workers of minority or disadvantaged groups and for the broader community. This indicator identifies the proportion of forest and wood products workers who self-identify as Indigenous, compared with the average for the workforce of a region or occupation. The National Indigenous Forestry Strategy includes among

its goals increasing involvement of Indigenous people in employment in the forest industry, and recognises that this employment (together with other forms of meaningful engagement with the industry) can contribute to improved wellbeing in Indigenous communities (NIFS 2005).

Not all Indigenous people identify as Indigenous on the Census or in surveys, thus potentially undercounting the proportion employed. However, this undercounting is likely to be at a similar rate for workers in the forest and wood products industries and other occupations, suggesting the indicator is still meaningful. Box 12 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 12 Workforce diversity—Indigenous employment, Tasmania, 2006

Percentage of people who self-identify as Indigenous:
- Forest/wood products workers—3.2 per cent
- Total employed workforce—2.7 per cent
- Adult population—3.7 per cent.

Forest and wood products industries have a higher proportion of Indigenous workers than the wider employed workforce.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Employment of people with disabilities

Socially inclusive employment provides benefits for workers of minority or disadvantaged groups and for the broader community. Assistance programs aim to help people with disabilities participate in the labour force. This indicator identifies the extent to which the forest and wood products industries provide opportunities for this group of people.

This indicator identifies the proportion of forest and wood products workers who identify as having a core activity need for assistance—which is defined in the Census as a person who needs someone to help with, or be with them, for self care activities, body movement activities or communication activities. These definitions appear in questions on the Census household form. From this data, the ABS identifies the proportion of people with disabilities as those who have a core need for assistance with some form of daily activities.

Data in Box 13 are available through ABS TableBuilder. More specific analysis of workers who identify as having different types of disability is possible—the Census asks respondents to identify whether the cause of the need for assistance is a short-term health condition (lasting less than six months), a long-term health condition (lasting six months or more), a disability (lasting six months or more), because of age or difficulty with the English language, or other causes. However, because this level of analysis would require specialised data order from the ABS, no worked example is given. Box 13 provides a worked example of this indicator for Tasmanian forest and wood products industry workers in 2006.

Box 13 Workforce diversity—employment of people with disabilities, Tasmania, 2006

Percentage of workers who have a disability resulting in a need for assistance with core daily activities:
- Forest/wood products workers—1.1 per cent
- Total employed workforce—0.7 per cent.

Forest and wood products industries have a higher proportion of workers who have a disability than the wider employed workforce.
Data source: Australian Bureau of Statistics 2006 Census of Population and Housing

Indicators for which data are not available

Several other indicators could be used to understand the wellbeing of forest and wood products workers and workforce diversity. These include measures that require either direct survey of workers (see Schirmer et al 2011 for examples), or special data orders from the ABS. Some data is not available at appropriate scales. These potential indicators and data sources are:

- workplace injury rates—some limited data available from SafeWork Australia and the ABS
- housing loan repayment obligations of forest and wood products workers—ABS special data order
- home ownership and characteristics of housing—ABS special data order
- number and age of children—ABS special data order
- overall satisfaction with life—worker survey
- satisfaction with working conditions—worker survey (may include measuring working hours, social interaction, noise, safety, fairness of treatment)
- financial wellbeing, measured based on ability to meet financial obligations—worker survey
- psychological wellbeing, such as optimism/depression measures—worker survey
- participation in social networks—worker survey
- attachment to place—worker survey
- attachment to industry—worker survey
- perceptions of forest and wood products industries by broader community (measure of social cohesion and trust)—worker survey
- access to workplace training—worker survey
- permanency of work—worker survey (may include measuring length of contract, variability in working hours)
- confidence in future employment in industry—worker survey
- staff turnover—business survey
- confidence in future—worker survey
- confidence in own ability to adapt—worker survey (see Marshall & Marshall 2007 for examples of questions).

Further work required

Further work is needed to identify whether indicators proposed in this chapter are valid measures of the human dimensions of industry sustainability. This can be achieved through surveys of workers that measure concepts such as worker wellbeing and identify key influencing factors. This information can provide a basis for development of a more comprehensive set of relevant indicators tailored to understanding the forest and wood products industries.

Proposal 6 Reporting indicators of human dimensions of industry sustainability

The AFWPS could include reporting on types of indicators that provide an understanding of human dimensions of industry sustainability. These include:

- Worker wellbeing
  - income
  - long working hours
  - formal education
  - marital status
- Workforce diversity
  - age
  - gender (female employment)
  - indigenous employment
  - employment of people with disabilities.

In all cases, the indicators can be measured only at five-year intervals, as they typically rely on ABS Census data, and can be reported at regional, state and national level. Further work is needed to validate the indicators, and to provide more in-depth information on how working in the forest and wood products industries influences worker wellbeing, and on how characteristics of the workforce influence sustainability of the industries.

7 Scale and timing of Australian forest and wood products statistics reporting

Not all the indicators described in this discussion paper can be reported at all scales, or for all time periods. Both the frequency and geographic scale of reporting depend on data availability. In many cases, it is only possible to report on an indicator every five years, as data are only produced when the ABS Census is conducted.

The size of the forest and wood products industries is also an important consideration. These industries tend to be clustered in specific locations in Australia. This means that in some areas little if any of the workforce depends solely on forest and wood products, while in other areas a large proportion of the workforce depends entirely on these industries. Detailed indicators, such as profiles of the average income of workers, can only be reported for areas with a reasonable sized workforce. Where there are few workers, the ABS undertakes randomisation of data to preserve confidentiality of responses, resulting in unreliable analyses. At least 20 workers (and often more) at local scale, are necessary to have confidence in the results.

To ensure Australian forest and wood products statistics (AFWPS) reports reliable and meaningful data, it is important to define the regions for which data should be reported and the frequency of reporting. This chapter outlines the proposed scope and scale of reporting.

Changes to the boundaries of geographic regions over time will present a challenge to accurate reporting. The ABS is shifting to reporting on a new geographical classification system, the Australian Statistical Geography Standard (ASGS), which replaces the Australian Standard Geographical Classification (ASGC). Under the new system, regions such as SLAs (each local government area has typically been split into 1–4 SLAs) are replaced by Statistical Areas of different scales. The equivalent to an SLA is the SA2 region but boundaries will differ between the two systems. Data from the 2011 Census will be reported using both ASGS and ASGC standards, but 2006 data are only available on the ASGC standard.

To achieve a time series, it is necessary to use ASGC definitions. However, where possible, 2011 data should also be reported using the appropriate equivalent ASGS boundaries. This is likely to result in relatively little difference in reporting at larger scales. However, at small scales particularly that of the SLA, differences in estimates will occur depending on the system used. The feasibility of reporting 2011 data using the ASGS classification will vary for different indicators; however, data will be reported where feasible, to provide the basis of a new time series using 2016 Census data.

Given that 2006 data are available only on the ASGC classification, and will not be available on the new classification for some time, this approach provides the only viable way of rapidly building a body of social data on forest and wood products industries across Australia.

All data should be reported based on a person's place of usual residence on Census night, the standard way data from the Census are released. This is appropriate for data on social dimensions of the industry. This is because social impacts of the employment generated by an industry are often experienced largely (although not wholly) in the towns where workers reside, which are not always the same as those in which they work; for example, workers may commute from one town to another for their employment.

Four scales of reporting data for geographic regions were considered:

- national
- states and territories
- regional—a scale typically defined to encompass an area of significance to the forest and wood products industries. Typically a sub-state scale is used but includes multiple government areas. Examples previously used in the forest and wood products industries are Regional Forest Agreement (RFA) regions and National Plantation Inventory (NPI) regions.
- local—defined as the SLA (and SA2 if it is feasible to produce some or all 2011 data using the ASGS).

Each scale, other than the regional, is relatively easy to define. However, a problem at local scale occurs when boundaries of a region shift over time, reducing comparability of data. Local Government Area (LGA) may be an alternative for local scale reporting, with more stable boundaries.

The regional scale is more difficult to define, as it is typically defined as a region encompassing some significant area of the forest and wood products industries. Participants in the March workshop felt that this scale was important for reporting, as information at a meaningful regional scale is useful for a range of purposes relating to industry communication.

Regional reporting definitions for Australian forest and wood products statistics November 2012

Regional reporting is important to understand trends and enable meaningful communication in key industry areas. Regions and their boundaries for initial AFWPS reporting in November 2012 were identified based on groupings of forest sector employment apparent in 2006 Census data. The regions are similar to, but do not always correspond to, the National Plantation Inventory (NPI) and Regional Forest Agreement (RFA) regions (Table 10). It was not considered appropriate to use either of these regions because the NPI and RFA regions were constructed around wood flows and location of forests, rather than where forest sector workers reside. Estimating employment based on the NPI and RFA boundaries would most likely lead to an underestimate of employment in the forest sector. Furthermore, the crucial link between forest sector employment and communities would not be complete.

The regions are an aggregation of SLAs where forest sector workers reside. SLAs as the base unit enable finer scale detail to be analysed within each region. Employment data are reported at individual SLA scale where more than 20 forest sector workers reside in that SLA. Census data below this number cannot be considered reliable (due to randomisation). SLAs within a region with 20 or fewer forest and wood products workers are aggregated and reported as 'remainder of region'. For the Northern Australia region, where pockets of employment are widely dispersed, a criteria of more than five workers in an SLA was used to identify SLAs to include within the region.

This distinction between types of regions is made:

- regional areas (non-metropolitan)—where more employment is typically generated by the growing, harvest and haulage and initial processing of wood products

- capital cities—where a majority of downstream employment in wood and paper processing occurs, particularly involving transformation of initial wood and paper products (for example, sawnwood, pulp) into further processed products (such as window frames, trusses, and joinery).

- Capital city regions are defined by Statistical Divisions, and do not include any of the SLAs in regional areas.

Table 10 Forest sector reporting regions compared with National Plantation Inventory and Regional Forest Agreement regions

AFWPS reporting region (regional)	Relevant NPI	Relevant RFA	ABARES Climate Change study regions a
Tasmania	Tasmania	Tasmania	R6
South West Western Australia	Western Australia (part)	Western Australia	Key employment areas, within R5
Green Triangle	Green Triangle	West Victoria (part)	Similar to R1 but more contained
Mount Lofty Ranges	Mount Lofty Ranges and Kangaroo Island	none	Mount Lofty Ranges from Fleurieu Peninsula to Mid North
Central Victoria–Murray	Central Victoria and part Murray Valley	Parts of West Victoria and North East Victoria	Western part of R4, west of Gippsland through to boundary of Green Triangle and north east to Wodonga; includes Murray areas both sides of border to cover red gum employment
Gippsland and Central Highlands	Central Gippsland and part Murray Valley	Parts of North East Victoria, Central Highlands Victoria, and Gippsland Victoria	Eastern part of R4 in Victoria, as far west as Melbourne and stopping just short of Wangaratta, Wodonga
South Coast New South Wales	Southern Tablelands and part East Gippsland/Bombala	Eden NSW and Southern NSW (coast)	Eastern part of R4 in NSW, east of Dividing Range, north to Sydney
South West and Central West New South Wales	Part Murray Valley, Southern Tablelands and Central tablelands	Southern NSW (not coast)	Western part of R4, west of Dividing Range, from Albury, Tumut, Tumbarumba north to Warrambungle
Northern New South Wales	Northern Tablelands and North Coast NSW	North East NSW	South part of R2, from Sydney northwards
South East Queensland	South East Queensland	South East Queensland CRA Regions	Southern part of R2, from Queensland border northwards
Northern Australia	Northern Territory and North Queensland	none	Pockets of employment; within R3
Other	none	none	Aggregate of all other SLAs outside defined regions (except in capital cities)

AFWPS = ABARES Australian forest and wood products statistics; NPI = National Plantation Inventory; RFA = Regional Forest Agreement; SLA = Statistical Local Area; CRA = Comprehensive Regional Assessment

Note: **a** Regions used in ABARES 2011 climate change report: R1 Green Triangle; R2 north-eastern New South Wales – south-eastern Queensland; R3 northern Australia; R4 south-eastern New South Wales – eastern Victoria; R5 south-western Western Australia; R6 Tasmania.

Data are reported on a worker's place of usual residence (where they live), rather than where they work. In many cases, a person will live and work in the same SLA, but in some cases they do not. Reporting is based on where forest sector workers live because many of the flow-on benefits of the industry to communities occur where a worker lives. A person's place of usual residence is typically where they develop social networks, join community groups, send children to school, and spend a high proportion of their income.

Social indicators for AFWPS are reported at national and state/territory scale, for capital cities, and the 11 defined regional forestry regions listed in Table 10 (aggregated level and individual SLAs). All SLAs outside these regions are aggregated into a reporting category of Other. These SLAs have very low levels of forest sector employment. This category includes other territories, persons of no usual address and off-shore areas.

Map 3 shows the extent of regional and capital city reporting regions for the forest sector.

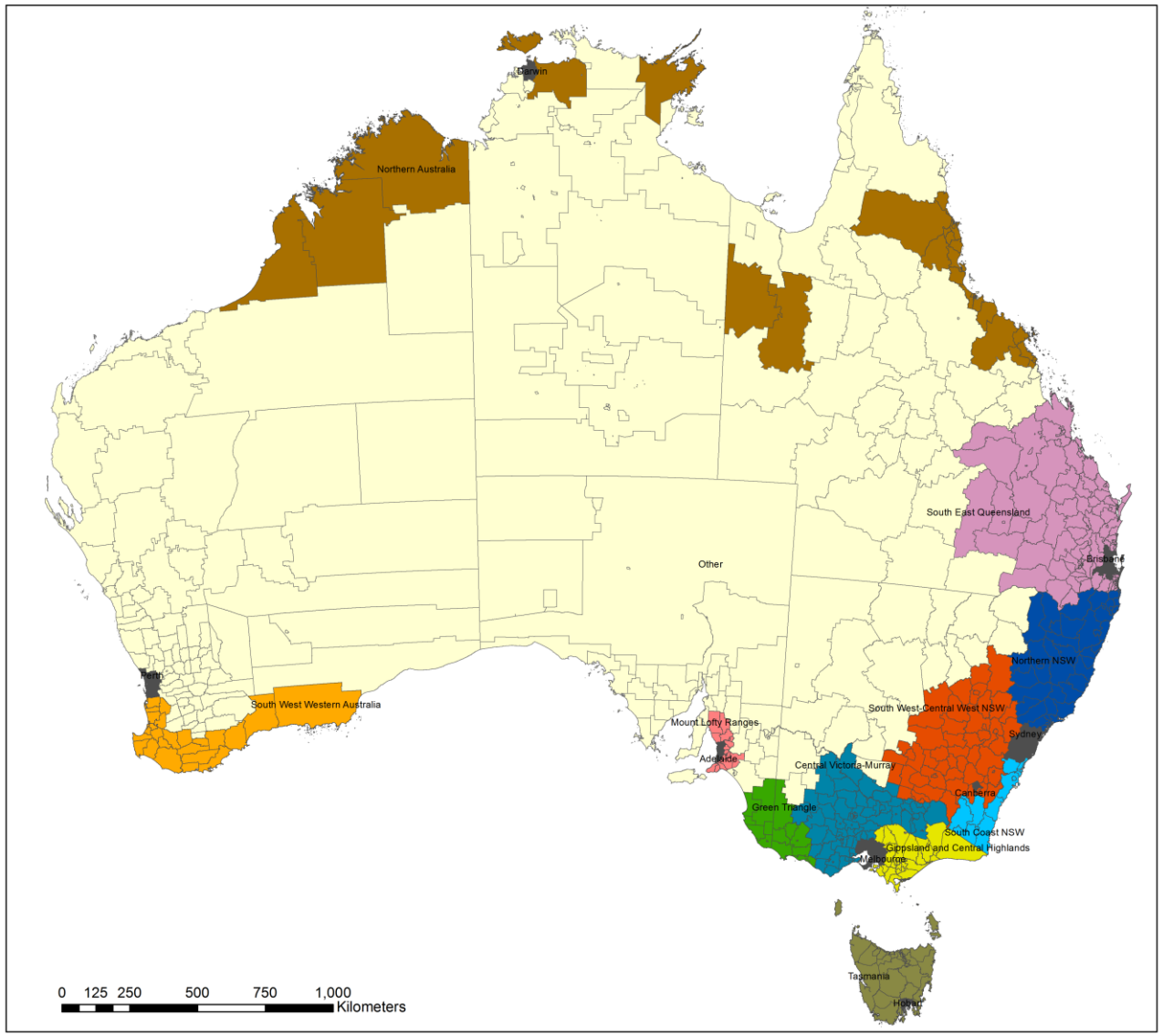
Data reported for each scale

Not all data can be reported at all scales. For example, reporting community adaptive capacity and its subindexes (such as the economic diversity index) at coarse scales above SLA geography would not be appropriate as it eliminates the nuances of smaller communities.

Data will be reported at four scales in this way:

- National scale—only employment broken down by sector, absolute number and percentage employment dependence.
- State scale—only employment broken down by sector, absolute number and percentage employment dependence.
- Region scale (aggregate of all SLAs for region as a whole)—all indicators reported. Industry employment broken down by sector. Region scale includes capital city regions. This scale includes SLAs within 'Remainder of region' (fewer than 20 workers in forest sector).
- SLA scale reported individually where greater than 20 workers in SLA—reporting indicators are
    - employment (direct with no adjustment). Employment data will not be broken down by sector at this scale
    - economic diversity index
    - contribution to community
    - human dimensions of industry sustainability (workers' wellbeing and workforce diversity).

Map 3 Regions for Australian forest and wood products statistics reporting



Forest sector reporting regions

- Central Victoria-Murray
- Gippsland and Central Highlands
- Green Triangle
- Mount Lofty Ranges
- Northern Australia
- Northern NSW
- South Coast NSW
- South East Queensland
- South West-Central West NSW
- South West Western Australia
- Tasmania
- Adelaide
- Brisbane
- Canberra
- Darwin
- Hobart
- Melbourne
- Perth
- Sydney
- Other

Notes:

Only the main region label is provided.
Coloured areas incorporate all SLAs in region including' remainder of region'
(SLAs with <20 forest sector workers).

Capital cities are defined by ABS Statistical Division boundaries.

Region boundaries defined by Australian Bureau of Statistics statistical local areas (SLAs)

Source: ABARES 2012

Table 11 Proposed frequency and geographic scale for indicator reporting

Indicator/data type	Local scale a	Regional scale	State/ territory scale	National scale
Employment (separately reported by industry sector)	5-yearly, all Australia	5-yearly, all regions	5-yearly	TBD
Dependence on forest and wood products industries employment (direct)	5-yearly, all Australia	5-yearly, all regions	5-yearly	TBD
Household dependence on forest and wood products industries	5-yearly, selected regions	5-yearly, selected regions	5-yearly	5-yearly
Community participation—volunteering	5-yearly, selected regions	5-yearly, selected regions	5-yearly	5-yearly
Community participation—long working hours	5-yearly, selected regions	5-yearly, selected regions	5-yearly	5-yearly
Community participation—workforce stability	5-yearly, selected regions	5-yearly, selected regions	5-yearly	5-yearly
Contribution to local services—age profile of workers	5-yearly, selected regions	5-yearly, selected regions	5-yearly	5-yearly
Adaptive capacity of communities with high dependence on forest and wood products industries (>3% employment in forest dependent industries)	5-yearly, selected regions	na	na	na
Worker wellbeing—income	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Worker wellbeing—long working hours	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Worker wellbeing—education	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Worker wellbeing—marital status	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Workforce diversity—age profile	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Workforce diversity—gender	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Workforce diversity—employment of Indigenous people	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly
Workforce diversity—employment of people with a disability	5-yearly, selected regions	5-yearly, selected regions	na	5-yearly

TBD = to be determined

Note: **a** Only geographic areas with more than 20 workers will be reported on; below this number, data cannot be considered reliable. **na** Not applicable at this scale.

Proposal 7 Geographic scale and time frame to report social indicators
Indicators should be reported using data from the 2006 and 2011 Censuses at national, state and regional scale. A small number—principally those related to direct employment—should be reported at the local scale. Below the state scale, data for indicators other than direct employment in, and dependence on, the industries should only be reported for regions with a significant number of people employed in the industries. Boundaries defined for 11 forestry regions, and capital cities for reporting are shown in Map 3

8 Conclusions

This discussion paper proposes inclusion of several social indicators as part of future reporting in ABARES Australian forest and wood products statistics (AFWPS). This would involve reporting on trends in:

- direct employment generated by the forest and wood products industries
- social contributions of the industries to the communities in which they operate
- adaptive capacity of communities with high dependence on employment generated by the industries
- human dimensions of industry sustainability.

Human dimensions of industry sustainability include the wellbeing and diversity of the workforce. Inclusion of these indicators in the AFWPS would substantially expand reporting of the social contributions and impacts of the forest and wood products industries.

The proposed indicators can be analysed using existing data sources. These data sources have some limitations that should be clearly communicated when reporting the indicators as part of the AFWPS series. ABARES identified a large number of additional indicators during development of this methodology. However, incorporation of these indicators into future reporting would require investment in direct surveys of businesses and workers, which falls outside the scope of AFWPS reporting.

Appendix A: Workshop report

This appendix provides a record of discussions at held at the Australian forest and wood products statistics—Social indicators workshop on 5 March 2012, in Canberra. The workshop was facilitated by Dr Jacki Schirmer and ABARES Social Sciences. Each agenda item (Table A1) was accompanied by PowerPoint presentations of the material that forms part of the main body of this discussion paper.

Table A1 Agenda Forest and Wood Product Statistics Social Indicators Workshop

Time	Item
12.00 am	**Lunch**
1.00 pm	**Welcome and overview** Estimating jobs generated by Australia's forest industries Overview of proposed approach and key issues to consider Participants will be asked to assist in (i) defining the jobs that are directly generated by Australia's forest industries and (ii) discussing optimal measurement approaches
2.15 pm	**Measuring the contributions of forest industries to the community** Participant idea generation Overview of available data Group discuss to identify best indicator options
2.50 pm	**Capacity of forest industry dependent communities to adapt to change** Overview of proposed approach Discussion/comments
3.20 pm	Afternoon tea
3.50 pm	**Wellbeing of forest industry workers** Participant idea generation Overview of available data Group discuss to identify best indicator options
4.30 pm	**The importance of scale: What regions should data be reported for?** Presentation on options for geographic boundaries in which data may be reported Participants will be asked to discuss the scale at which key data (particularly employment) should be reported
4.50 pm	**Next steps and wrap up**

Workshop participants

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Australian Forest Contractors Association (AFCA)

Australian Forest Products Association (AFPA)

Bureau of Infrastructure, Transport and Regional Economics (BITRE)

Department of Agriculture, Fisheries and Forestry (DAFF)

Engineered Wood Products Association (EWPA)

Forestworks

JS Consulting

National Timber Councils Association (NTCA)

Salwood

Timber Communities Australia (TCA)

University of Canberra

Note: Representatives from Forest and Wood Products Australia were unable to attend the workshop.

Workshop summary

Introduction/issues

- The Australian forest and wood products statistics publication is limited by the available data and there are some problems
- Forestry and logging—Australian Bureau of Statistics (ABS) does not include haulage (trucks, contractors)—so how can we adjust for that?
- The ABS does broadly capture the service sector
- Issue is with differences in definitions—some surveys include a lot more on manufacturing, furniture; we do want to go down this path somewhat—but where does 'the industry' end?
- The ABS has benefit of being consistent in definitions, although it does not differentiate between native and plantation jobs
- Proposing method of using the ABS (Census) as it is the most accurate (5-yearly); then use the ABS Labour Force (survey) to apply trends to Census data
- Participant response—'Yes there is sense in using ABS data that we have; but we want to understand the relationships (between that data and other knowledge of industry)'
- Definition proposed essentially '… employment generated directly … growing, milling wood products … including processing where wood is dominant component of goods …' So this excludes processing where wood is a small part.

Comments and discussion

Attribution of comments to individuals has been removed, although ABARES has kept full information for reference if required.

- Forestworks—some retail outlets are solely timber, others such as Bunnings have a wood area. Also the importers are important. It is important to know 'those who are selling wood'
- Australian Forest Contractors Association commented that shops may be dependent on timber sales.
- Discussion that it is hard to separate out retail (timber) jobs because retailers sell other things, and hard to separate using ABS classes; facilitators commented that it is important to look at how we could incorporate or estimate retail jobs, without having to survey.
- Wholesale jobs are important; facilitators commented that we do include this. It is the retail that is harder to report on.
- National Timber Councils Association highlighted a need to measure employment across native/plantation sectors.

- Timber Communities Australia commented that we need to be able to get at indirect employment.
- Brainstorming exercise with discussion to get views on what is 'absolutely core' to direct employment (Table A2).
- Australian Forest Contractors Association stressed that transport companies, generally, would not exist without the forest industry. All jobs in the supply chain need to be counted.
- National Timber Councils Association commenting on indirect employment, stated that petrol stations are important. If there is dependency come through, this should be reflected somehow; facilitators commented petrol stations (discussion re Mt Gambier) are included in other industries.
- Australian Forest Contractors Association suggested surveys with local council, to look at how many businesses in these towns would close, if not for forestry. Facilitators explained that this project does not have resources for this, but we can describe this as a need.
- Engineered Wood Products Association asked what happens with imported products and jobs if timber comes into mills. Facilitators confirmed we (ABARES) pick that up adequately if it is (rough logs) processed in Australia. But if manufactured overseas, it is not Australia's industry.
- Nomenclature needs to shift to forest, wood and products industries (not industry).
- Australian Forest Products Association suggested the following definition of direct employment: 'all employment generated directly by the growing, management, harvest, haulage to mill, milling and processing of wood and paper products in Australia, including all processing where wood is the dominant component of goods being produced'.
- The group discussed whether production of recycled paper and forest certification consultants should be included. It was suggested that when considering direct versus indirect, it is useful to examine how the mining and tourism industries define these issues. When discussing imported timber, there was some discussion about whether rough sawn timber versus finished products should be considered part of forest and wood products industries. Also need to consider bioenergy, biorefineries and biofuel.
- ABARES could investigate whether consumption and import figures for wood products can be used to estimate import jobs, together with data on people employed per unit of imports.
- Need to consider how many people employed in the Wood Structural Component Manufacturing category say they are in construction and so are not counted as part of wood products industries.

Table A2 Brainstorming direct employment activities to include—discussion points raised

Organisation	Type of job	Comments added about whether it should be considered as part of direct employment
DAFF	Forest managers, forest planners	Included in management which is well represented. But ABS won't include if working in government sector.
Participant	Transport workers (roundwood to mill)	'Important'. They work in lots of areas including forestry. General agreement among the group that transport of logs to mill should be included.
AFCA	Transporters of processed product	Hard to determine proportion of transports working with forestry. Facilitators suggested potential for work to develop a metric to help this. Should be put as recommendation in report.
AFPA	Silvicultural workers (often seasonal)	Agreement that people spreading herbicide, doing fire management are contractors.
ForestWorks	Non-commercial timber production	Raised as something to consider. For example, forests in carbon farming, green corps. Others: 'We shouldn't muddy the water with this' and some agreement to limit to commercial forestry. Facilitators: 'We can point this out as a gap'.
Salwood	Knowledge-based services	'The Association of Consultant Foresters would have a list'. Academics and training.
ForestWorks	Powerline management, trimming management	'May be arborists'.
Participant	Truss, door and windows manufacturing people	Facilitators: Yes do need a metric (to help calculate) this as ABS undercount is likely.
AFCA	Machine operators	–
	Haulage trucks	–
AFPA	Research and development	These people are moving out of state agencies.
	Engineers (of buildings)	Facilitators: 'The construction industry is traditionally out of forest industry definition—are people happy with it out?' All agreed.
AFCA	Firewood jobs	'There's a lot of these actually, they do other jobs and spend several days a week (winter) on firewood'. Association of firewood merchants may have data.
	IT	'IT guys supporting forest contractors'.
	Auto-electricians	–
ForestWorks	Emerging industries (bioenergy, biofuel)	'Should include these when it's dependent on (forest) industry'.
ABARES	Certifiers	'These might be under consultants (in services)'. Facilitators: check is needed on if/how ABS classes certifiers.
TCA	Planning and professional services	For example, VicForests and Department of Sustainability and Environment staff. Seen as important because their actions affect what areas are available for harvesting. 'Need to not lose track of these people in the changing state departments'.
BITRE	Consultants	Other industries, such as tourism and mining, include consultants in their estimates—and have to gather data from various places. See University of Queensland study.
ForestWorks	Furniture manufacturers	–
	Port workers	Many logs go through ports for export. Facilitators: 'Ports covered well if associated with woodchipping, but not if logs are exported—yes this is an issue'.

Methods—what other methods for estimating employment?

- Timber Communities Australia suggested something should build on existing ABS data.
- ForestWorks indicated we have the information but it depends on how the surveys are used.
- ForestWorks suggested another approach could be, knowing how many trees are felled, labour figures could be extrapolated just from that (a past joint URS Australia/DAFF project?). For example, a jobs/tonne woodchip basis—would be a different way of predicting employment.

Contribution to communities

- Australian Forest Contractors Association suggested for volunteering, also measure the type and quality of contribution. The people that create things have a multiplier effect—some volunteer effort is more powerful (gave example of some forest industry workers having specific firefighting skills that others do not have).
- ForestWorks suggested an important indicator would be the training opportunities that forestry gives.
- Salwood pointed out that forest industries contribute to communities through sporting clubs, infrastructure (roads and picnic areas), and employment.
- ForestWorks added skill development and community groups to the Salwood list.
- Bureau of Infrastructure, Transport and Regional Economics proposed that if indirect employment is measured, we should consider using a base versus non-base approach to capture flow-ons.

Adaptive capacity of communities

- Bureau of Infrastructure, Transport and Regional Economics has a wealth dataset that goes to Statistical Local Area (SLA) scale.
- Query regarding whether economic diversity is best measured at SLA scale, as the SLA is not a self contained region and the diversity within it is not necessarily a good measure.
- Some discussion about whether adaptive capacity measurements are about the community or the individuals within a given community.
- Participants suggested it is useful to try to identify thresholds of community viability, rather than vulnerability.
- One participant asked whether it will be possible to compare vulnerability over time.

Wellbeing of forest industry workers

- Discussion that deeper questions have to be measured via surveys (not ABS Census)
- The facilitators gave several options and examples of using ABS data to explore wellbeing. Some elicited comments including:
    - Injury rates/likeliness (no specific comments).
    - Wage levels. A Lot of discussion about whether figures look accurate. Depends on part/full-time and these need separation as the rates look low.

  - Working hours (total). Not saying part-time is bad, but long total hours.
  - Ageing workforce and changing age profiles (no specific comments).
  - Gender (female employment). Any benchmarking useful?
  - Marital status. Divorce can be indicative of lower wellbeing. Some participants thought that this indicator is not so suitable.
  - Education (no specific comments).
  - Indigenous participation. This created discussion, and general support. Indicates opportunities in community for disadvantaged groups.
- Other options—a participant asked whether the Household, Income and Labour Dynamics in Australia (HILDA) survey of wellbeing and livelihood could be used. Also, can stress/depression be measured?
- Other ideas brainstormed through participants' written notes (Box A1).

Box A1 Brainstorming measures of wellbeing of forestry workers, from participant notes

Suggested factors/measures for reporting in Australian forest and wood products statistics:

- How workers feel valued by employers
- Income
- Feeling of future potential with industry
- Opportunities for acquiring new skills in their industries
- Length of time one has been out of work ('unemployable' instead of Australian Bureau of Statistics 'not employable')
- Cost of living pressures
- Alternative sources of income in region (not where they work)
- Ask in a survey: Would you encourage your kids to enter the industry?
- Ask in a survey: Would you encourage your grandkids to enter the industry?
- Hobbies and outside interests
- Pets
- Time in a job
- Health—stress, depression, heart disease
- Contribution to local community—whether engaged or detached. Measure by surveying community (or use proxy volunteer work from Australian Bureau of Statistics)
- Conflict in/about workplace
- How often have you changed jobs
- Access to skills development
- Access to learning new job roles
- Qualifications obtained
- Collective enterprise agreements equals real wage rates
- Time in industry/churn of jobs
- Opportunities for learning (skills)
- Health (mental illness, depression)
- Adverse media coverage of industry
- Workplace complaints.

Scale

- Australian Forest Contractors Association suggested that forestry regions are more relevant than state level for reporting.
- Not a lot of discussion about preferences for Statistical Local Area versus Local Government Area units in reporting.
- Engineered Wood Products Association suggested state government decentralisation will affect regions.

Workshop participants discussed types of data, uses and scale:

- Direct job numbers
  - uses in seeking industry support at political level, in policy development
  - report at all scales (national, SLA, town, sector)
  - report at Local Government Area (LGA) and timber supply regions; use something comparable over time; LGA and regional
  - national
  - national and regional
  - state/regional/LGA.
- Jobs dependence (percentage in an area)
  - use for identifying impact of change in resource availability
  - report at region and local level, at LGA
  - national, state, regional
  - regional
  - state/regional/LGA.
- Contribution of industry to community
  - use for targeting investment to industry
  - report at LGA scale
  - national, community by case study
  - LGA/regional
  - State/regional.
- Wellbeing of forest workers
  - report at region or state level
  - national, state level.
- Australian Forest Products Association suggested regional data to be reported for National Plantation Inventory areas and Regional Forest Agreement areas.

Wrap up

- Facilitator informed participants the workshop would feed into the methodology report for ABARES Australian forest and wood products statistics. The report would be circulated to the attending workshop participants.
- Participant suggested a role for representatives could be to put some pressure on for new things/action needed. Facilitators noted a section in report would show actions needed.

Summary of suggested follow–up actions

- Develop a metric(s) for estimating transport jobs and/or recommend that a metric be developed.
- Highlight that non-commercial activities (for example, carbon farming, Landcare) are a potential gap in employment figures.
- Check on significance of firewood jobs (through the merchants association).
- Check on how the ABS classes certifiers or people working in forest certification.
- Suggest need for surveying with local councils to show how many town businesses would go out of business in the absence of forestry.
- Use of 'industries' in preference to 'industry' to refer to forest and wood products industries.

Appendix B: Detailed of existing sources of employment estimates

Table B1 Available estimates of employment in Australia's forest industries

Data source	Time frame	How forest industries are defined	Data scales and geographic coverage
ABS Census of Population and Housing	5-yearly	ANZSIC industry classification **a**	Multiple scales, from town/local government area to national for all Australia
ABS Labour Force Survey	Quarterly estimates	ANZSIC industry classification **a**	National, state and capital city/balance of state scale
ABS Business Register	Annual estimates	ANZSIC industry classification **a**	National and state data only produced to ANZSIC industry subdivision level, which substantially reduces ability to identify employment specific to the forest and wood products industries
ForestWorks	Data produced in 2001, updated 2006	Industries split into: – forest growing and management – timber harvesting and haulage – sawmilling and timber processing – timber product manufacturing – wood panel and board production – pulp and paper manufacturing – timber merchandising support service internal/external to industry. Does not distinguish between native forest and plantation.	National, state and sub-state; sub-state scales sometimes have low reliability and are subject to high sample error
CRC for Forestry Forest Industry Surveys **b**	2006–12	Industries defined as all activities reliant on management and production of wood and paper products, up to the point at which products include a large proportion of non-wood components. Plantation and native forest based employment are separated.	– Western Australia (2006, 2008, 2011) – Tasmania (2006, 2008, 2010, 2011) – Victoria (2009). Data can be broken down to the scale of individual towns and local government areas

ANZSIC = Australian and New Zealand Standard Industrial Classification

Note: **a** See Appendix C for ANZSIC category list. Does not distinguish between employment dependent on native forest and plantations. **b** For Victoria data coverage see Schirmer 2008a, b; Schirmer 2010a, b; Schirmer et al. 2011. Data can be broken down to the scale of individual towns and local government areas.

Other industry definitions

Several one-off studies have used surveys to gather data on employment. Survey definitions of the forest and wood products industries vary. All include forest and plantation growing and management, harvest and haulage contracting, and sawmilling in their definition. Most include processors that use roundwood as inputs. The majority include processors that transform initial products (for example, sawn timber, woodchips, pulp) into further products; they also include silvicultural contractors. Few include wholesale sales of timber products. Very few include activities beyond wood and paper product production, such as furniture making, retail sales of timber products, or jobs, such as carpentry, that utilise wood products (Dwyer Leslie Pty Ltd &

Powell 1995; Margules Groome Poyry Pty Ltd 1995; Wareing et al. 2002; URS Forestry 2004, 2003; CIE 2005; MBAC Consulting 2005a, b; Schirmer et al. 2005a, b).

Appendix C: How the ABS classifies workers into forest and wood products industries

The ABS uses the Australian and New Zealand Standard Industrial Classification (ANZSIC) to classify workers into different industries.

ANZSIC uses a hierarchical classification of industries. This means workers generally considered as part of the forest industries are included in multiple categories (Table C1). In some categories, it is not possible to separate workers dependent on other industries from those dependent on forest industries; for example, a small proportion of workers employed in transportation industries depend on the industry, but it is not possible to identify what percentage using ABS data.

Not all categories in Table C1 necessarily form part of Australia's forest industries. They are included as past studies have sometimes suggested these categories. At the Australian forest and wood products statistics—Social indicators workshop on 5 March 2012 in Canberra, participants discussed the content of Table C1 and whether and when these industry work activities should be considered part of the forest industry.

Comments have been added to Table C1 about applicability or possible issues with some ANZSIC categories regarding forest industry employment.

Table C1 Australian and New Zealand Standard Industrial Classification for forestry related industries

ANZSIC category code	Description	Comments regarding forest industry employment
Forestry (0301)	Class consists of units mainly engaged in growing standing timber in native or plantation forests, or timber tracts, for commercial benefit. Class also includes gathering of forest products such as mushrooms, kauri gum or resin from forest environments. **Primary activities** • Forest product gathering • Forestry growing operation • Kauri gum digging • Native orchid gathering • Pine cone collecting • Resin gathering • Sphagnum moss gathering. **Exclusions/references** Units mainly engaged in: • providing support services to forestry, including silvicultural services, such as planting, pruning or thinning, or forest nursery operation—included in Class 0510 Forestry Support Services • logging forests—included in Class 0302 Logging • investing in any of the above activities—included in Class 6240 Financial Asset Investing • distilling eucalyptus oil—included in Class 1899 Other Basic Chemical Product Manufacturing (not elsewhere classified).	–

ANZSIC category code	Description	Comments regarding forest industry employment
Logging (0302)	Class consists of units mainly engaged in logging native or plantation forests, including felling, cutting and/or roughly hewing logs into products such as railway sleepers or posts. Class also includes units mainly engaged in cutting trees and scrubs for firewood. **Primary activities** • Firewood cutting (forest) • Logging • Mine timber hewing (forest) • Pole hewing (forest) • Post shaping (forest) • Railway sleeper hewing • Rough shaping of forest timber • Timber hewing (forest) • Tree cutting or felling. **Exclusions/references** Units mainly engaged in: • gathering forest products—included in Class 0301 Forestry • log sawmilling or woodchipping—included in Class 1411 Log Sawmilling.	Does not include haulage to mill
Forestry Support Services (0510)	Class consists of units mainly engaged in providing support services to forestry. Services include silvicultural services, such as planting, pruning and thinning trees, forest reafforestation, forest plantation conservation or maintenance. Class also includes units mainly engaged in operating forestry planting stock nurseries. **Primary activities** • Forest conservation service • Forest nursery operation or service • Forest pest control service (except aerial or wild animal control) • Forest planting • Reafforestation service • Silvicultural service • Timber plantation maintenance • Timber tract maintenance • Tree pruning (forest) • Tree thinning (forest). **Exclusions/references** Units mainly engaged in: • planting or propagating non-forest nursery stock—included in either Class 0111 Nursery Production (Under Cover) or 0112 Nursery Production (Outdoors) • wild animal pest control—included in Class 0420 Hunting and Trapping • aerial pest control services—included in Class 0529 Other Agriculture and Fishing Support Services • forest fire fighting services—included in Class 7713 Fire Protection and Other Emergency Services.	Does not include road contracting and other earthworks, fertilising, aerial spraying

ANZSIC category code	Description	Comments regarding forest industry employment
Log Sawmilling (1411)	Class consists of units mainly engaged in manufacturing rough sawn timber, and boards. **Primary activities** • Log sawmilling • Rough sawn timber manufacturing • Shook manufacturing (for containers). **Exclusions/references** Units mainly engaged in: • hewing or rough shaping timber or cutting firewood in forests—included in Class 0302 Logging • manufacturing softwood or hardwood wood chips—included in Class 1412 Wood Chipping • kiln drying, seasoning or chemically preserving timber (except chemical preservation of logs sawn at the same unit)—included in Class 1413 Timber Resawing and Dressing.	–
Woodchipping (1412)	Class consists of units mainly engaged in manufacturing softwood or hardwood wood chips. **Primary activities** • Hardwood wood chip manufacturing • Softwood wood chip manufacturing.	–
Timber Resawing and Dressing (1413)	Class consists of units mainly engaged in resawing or dressing timber, timber boards and mouldings. Dressing timber includes seasoning (kiln or air drying) or chemical preservation. **Primary activities** • Air-drying timber • Building timber manufacturing • Chemically preserving timber (except chemical preservation of logs sawn at the same unit) • Dressed timber or moulding manufacturing • Kiln drying timber • Seasoning timber • Wooden flooring manufacturing (solid timber only). **Exclusions/references** Units mainly engaged in: • manufacturing wooden structural fittings (including kitchen fittings) or components such as doors, windows and other wooden framing—included in Class 1492 Wooden Structural Fitting and Component Manufacturing • manufacturing veneers or plywood—included in Class 1493 Veneer and Plywood Manufacturing • manufacturing reconstituted wood products—included in Class 1494 Reconstituted Wood Product Manufacturing.	–

ANZSIC category code	Description	Comments regarding forest industry employment
Prefabricated Wooden Building Manufacturing (1491)	Class consists of units mainly engaged in manufacturing wooden prefabricated buildings. **Primary activities** • Building, prefabricated wood, manufacturing • Bus shelter, prefabricated wood, manufacturing • Carport, prefabricated wood, manufacturing • Conservatory, prefabricated wood, manufacturing • Garage, prefabricated wood, manufacturing • Gazebo, prefabricated wood, manufacturing • Kit set home, prefabricated wood, manufacturing • Shed, prefabricated wood, manufacturing.	–
Wooden Structural Fitting and Component Manufacturing (1492)	Class consists of units mainly engaged in manufacturing wooden structural fittings and components such as roof trusses, doors, wood-framed doors, wall and window frames, shop fronts and joinery (including kitchen fittings) for buildings. **Primary activities** • Finger-jointing manufacturing • Roof truss, wooden, manufacturing • Wood or wood–framed door manufacturing • Wood-framed window manufacturing • Wooden kitchen cabinet manufacturing • Wooden structural component/fitting manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing corestock—included in Class 1494 Reconstituted Wood Product Manufacturing • manufacturing dressed timber, mouldings or floorboards—included in Class 1413 Timber Resawing and Dressing • manufacturing wooden furniture (except custom-made built-in furniture)—included in Class 2511 Wooden Furniture and Upholstered Seat Manufacturing • assembling or installing wooden structural fittings manufactured by other units—included in Class 3242 Carpentry Services • on-site fabrication of built-in furniture or other joinery—included in Class 3242 Carpentry Services.	–
Veneer and Plywood Manufacturing (1493)	Class consists of units mainly engaged in manufacturing veneers and plywood. **Primary activities** • Core, plywood or veneer, manufacturing • Glue laminated lumber (Glulam) manufacturing • Laminated veneer lumber (LVL) manufacturing • Plywood manufacturing • Veneer manufacturing.	–

ANZSIC category code	Description	Comments regarding forest industry employment
Reconstituted Wood Product Manufacturing (1494)	Class consists of units mainly engaged in manufacturing wood boards and sheets from reconstituted wood fibres such as wood chips, sawdust, wood shavings, slabwood or off-cuts. Also includes units that manufacture laminations of timber and non-timber materials (including decorative plastic laminates on boards or other substrates). **Primary activities** • Chip board manufacturing • Corestock manufacturing • Fibreboard manufacturing • Hardboard manufacturing • Laminations of timber and non-timber materials manufacturing • Medium density fibreboard (MDF) manufacturing • Oriented strand board (OSB) manufacturing • Particleboard manufacturing.	–
Other Wood Product Manufacturing (not elsewhere classified) (1499)	Class consists of units mainly engaged in manufacturing wood products not elsewhere classified, including wicker ware, cork, bamboo or cane products (excluding furniture). **Primary activities** • Container, wooden, manufacturing • Ornamental woodwork manufacturing • Pallet (wooden) manufacturing • Picture or mirror frame, wooden, manufacturing • Tool handle, wooden, manufacturing • Trellis, wooden, manufacturing • Wood product manufacturing (not elsewhere classified). • Wood turning. **Exclusions/references** Units mainly engaged in: • manufacturing shooks for containers—included in Class 1411 Log Sawmilling • manufacturing wooden, wicker, bamboo or cane furniture—included in the appropriate classes of Group 251 Furniture Manufacturing • manufacturing wooden toys and sporting goods—included in Class 2592 Toy, Sporting and Recreational Product Manufacturing.	–

ANZSIC category code	Description	Comments regarding forest industry employment
Pulp, Paper and Paperboard Manufacturing (1510)	Class consists of units mainly engaged in manufacturing wood pulp (chemical or mechanical), paper or paperboard. Includes the manufacture of bulk paper from any fibre (including used paper) and the production of pulp from used paper. **Primary activities** • Newsprint manufacturing • Paper manufacturing • Paper pulp manufacturing • Paperboard manufacturing • Wood pulp manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing corrugated paperboard sheeting or containers, or paperboard containers—included in Class 1521 Corrugated Paperboard and Paperboard Container Manufacturing • manufacturing paper stationery are included in Class 1523 Paper Stationery Manufacturing • manufacturing bitumen or tar treated papers, felts or foils (including laminated or impregnated) in which the lamination or impregnation is the main ingredient—included in Class 1709 Other Petroleum and Coal Product Manufacturing • manufacturing non-bituminous and non-plastic laminations of paper or paperboard with other materials, non-bitumised building paper or paperboard, or abrasive coated papers, in which the lamination or coating is the main ingredient—included in Class 2090 Other Non-Metallic Mineral Product Manufacturing • manufacturing chemically treated paper or sensitised photographic paper—included in Class 1891 Photographic Chemical Product Manufacturing.	–
Corrugated Paperboard and Paperboard Container Manufacturing (1521)	Class consists of units mainly engaged in manufacturing corrugated paperboard containers, sheeting or solid paperboard containers. **Primary activities** • Corrugated paperboard container manufacturing • Corrugated paperboard manufacturing • Paperboard container manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing paperboard—included in Class 1510 Pulp, Paper and Paperboard Manufacturing • manufacturing paper bags and sacks—included in Class 1522 Paper Bag Manufacturing.	–
Paper Bag Manufacturing (1522)	Class consists of units mainly engaged in manufacturing paper bags (including multiwall bags of paper). **Primary activities** • Paper bag manufacturing	–

ANZSIC category code	Description	Comments regarding forest industry employment
Paper Stationery Manufacturing (1523)	Class consists of units mainly engaged in manufacturing paper stationery products, including paper products used for writing, filing and similar applications. **Primary activities** • Paper label manufacturing (except adhesive) • Paper stationery manufacturing • Paperboard game manufacturing • Paperboard toy manufacturing • Playing cards manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing non–paper stationery products such as pens and pencils—included in Class 2599 Other Manufacturing (not elsewhere included) • manufacturing adhesive paper labels—included in Class 1529 Other Converted Paper Product Manufacturing • printing paper stationery—included in Class 1611 Printing; and • publishing greeting cards or calendars—included in Class 5419 Other Publishing (except Software, Music and Internet).	–
Sanitary Paper Product Manufacturing (1524)	Class consists of units mainly engaged in manufacturing sanitary paper-based products from paper or cellulose wadding. **Primary activities** • Disposable paper nappy (cellulose-based) manufacturing • Facial tissue manufacturing • Paper napkin manufacturing • Paper towel manufacturing • Sanitary napkin (cellulose-based) manufacturing • Sanitary paper product manufacturing (not elsewhere included) • Tampon (cellulose-based) manufacturing • Toilet tissue manufacturing.	–

ANZSIC category code	Description	Comments regarding forest industry employment
Other Converted Paper Product Manufacturing (1529)	Class consists of units mainly engaged in manufacturing paper products not elsewhere classified. **Primary activities** • Adhesive paper label manufacturing • Moulded paper pulp product (for example, egg trays or cartons) manufacturing • Paper product manufacturing (not elsewhere included) • Wallpaper manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing wood pulp, paper or paperboard—included in Class 1510 Pulp, Paper and Paperboard Manufacturing • manufacturing paper stationery—included in Class 1523 Paper Stationery Manufacturing • manufacturing bitumen treated papers, felts or foils (including laminated or impregnated) in which the treatment is the main ingredient—included in Class 1709 Other Petroleum and Coal Product Manufacturing • manufacturing non-bituminous and non-plastic laminations of paper or paperboard with other materials, non-bitumised building paper or paperboard, or abrasive coated papers, in which the lamination or coating is the main ingredient—included in Class 2090 Other Non-Metallic Mineral Product Manufacturing • manufacturing chemically treated photocopying paper or sensitised photographic paper—included in Class 1891 Photographic Chemical Product Manufacturing.	–
Printing and Printing Support Services (161)	Class consists of units mainly engaged in printing and/or providing reprographic services. Printing methods may include offset lithographic, reprographic, digital, relief and screen printing. Units may print onto a variety of materials, including paper, plastic and metal. Also includes units mainly engaged in screen printing on wearing apparel.	Not generally considered part of forest industries as involves use of paper products not manufacture of them

ANZSIC category code	Description	Comments regarding forest industry employment
Wooden Furniture and Upholstered Seat Manufacturing (2511)	Class consists of units mainly engaged in manufacturing furniture of wood or predominantly of wood (except custom-made built-in furniture), complete upholstered seating with wooden or metal frames (including seats convertible into beds) or in upholstering wooden furniture. Also includes units mainly engaged in manufacturing upholstered seats with frames of any material for transport equipment. **Primary activities** • Bedroom suite, wooden, manufacturing • Chair manufacturing (except dental chairs fitted with mechanical devices) • Dining room furniture, wooden, manufacturing • Disassembled furniture, wooden, manufacturing • Disassembled kitchen furniture, wooden, manufacturing • Furniture part, wooden, manufacturing • Furniture reupholstering • Lounge suite manufacturing • Office furniture, wooden, manufacturing • Outdoor furniture, wooden, manufacturing • Seat, upholstered, manufacturing • Table, wooden, manufacturing • Upholstered furniture manufacturing. **Exclusions/references** Units mainly engaged in: • manufacturing custom made built–in furniture or installing (except on-site fabrication) shop fronts made of wood or joinery (not elsewhere included)—included in Class 1492 Wooden Structural Fitting and Component Manufacturing • manufacturing furniture predominantly of metal, including sheet metal and tubular metal—included in Class 2512 Metal Furniture Manufacturing • manufacturing dental chairs fitted with mechanical devices—included in Class 2412 Medical and Surgical Equipment Manufacturing • finishing or French polishing furniture—included in Class 9499 Other Repair and Maintenance (not elsewhere included).	Not all jobs dependent on wood products. Not always considered part of forest industries
Construction (Division E, covering all construction activities, for example house construction, non-residential building construction)	The Construction Division includes units mainly engaged in the construction of buildings and other structures, additions, alterations, reconstruction, installation, and maintenance and repairs of buildings and other structures. Units engaged in demolition or wrecking of buildings and other structures, and clearing of building sites are included in Division E Construction. Also includes units engaged in blasting, test drilling, landfill, levelling, earthmoving, excavating, land drainage and other land preparation. Industries in this division are defined on the basis of their unique production processes. As with all industries, production processes are distinguished by use of specialised human resources and specialised physical capital. Construction activities generally administered or managed at a relatively fixed place of business, but actual construction work is performed at one or more different project sites.	Not typically considered part of forest industries, with exception of carpentry (see Carpentry Services 3242)

ANZSIC category code	Description	Comments regarding forest industry employment
Carpentry Services (3242)	Class consists of units mainly engaged in carpentry work or the fixing of wooden formwork on construction projects. **Primary activities** • Carpentry work on construction projects • Joinery work on construction projects (on-site fabrication only) • Roof truss, wooden, fixing • Wooden flooring installation • Wooden formwork erection • Wooden kitchen cabinet installation • Wooden roof truss installation. **Exclusions/references** Units mainly engaged in manufacturing prefabricated, wooden built-in cabinets, cupboards or shop fronts and their installation (except on-site fabrication)—included in Class 1492 Wooden Structural Fitting and Component Manufacturing.	Rarely included in definitions of forest industries, but dependent on wood products
Timber Wholesaling (3331)	Class consists of units mainly engaged in wholesaling timber (except firewood). **Primary activities** • Plywood wholesaling • Timber dealing, wholesaling, (except firewood) • Veneer, wood, wholesaling. **Exclusions/references** Units mainly engaged in firewood wholesaling—included in Class 3739 Other Goods Wholesaling (not elsewhere included).	Excludes firewood
Furniture and Floor Covering Wholesaling (3731)	Class consists of units mainly engaged in wholesaling furniture or floor coverings (except ceramic floor tiles). **Primary activities** • Blind wholesaling (except textile) • Floor covering wholesaling (except ceramic floor tiles) • Furniture wholesaling • Mattress wholesaling. **Exclusions/references** Units mainly engaged in: • wholesaling ceramic tiles—included in Class 3339 Other Hardware Goods Wholesaling • wholesaling canvas blinds—included in Class 3711 Textile Product Wholesaling.	Includes many activities not dependent on wood products; wood product sales small component of total

ANZSIC category code	Description	Comments regarding forest industry employment
Paper Product Wholesaling (3736)	Class consists of units mainly engaged in wholesaling paper stationery, greeting cards and paper or paper products not elsewhere classified. **Primary activities** • Greeting card wholesaling • Paper or paper board container wholesaling • Paper product wholesaling (not elsewhere classified) • Paper stationery wholesaling • Paper wholesaling. **Exclusions/references** Units mainly engaged in wholesaling building paper and paper board—included in Class 3339 Other Hardware Goods Wholesaling.	–
Hardware and Building Supplies Retailing (4231)	Class consists of units mainly engaged in retailing hardware or building supplies. **Primary activities** • Carpenters' tool retailing • Cement retailing • Ceramic floor tile retailing • Garden tool retailing • Hardware retailing • Lacquer retailing • Lawn mower retailing • Lock retailing • Mineral turpentine retailing • Nail retailing • Paint retailing • Plumbers' fittings retailing • Plumbers' tools retailing • Timber retailing • Tool retailing • Wallpaper retailing • Woodworking tool retailing.	Small proportion of activities involve wood products

ANZSIC category code	Description	Comments regarding forest industry employment
Road Freight Transport (4610)	Class consists of units mainly engaged in the transportation of freight by road. It also includes units mainly engaged in renting trucks with drivers for road freight transport and road vehicle towing service. **Primary activities** • Furniture removal service • Log haulage service (road) • Road freight transport service • Road vehicle towing • Taxi truck service (with driver) • Truck hire service (with driver). **Exclusions/references** Units mainly engaged in: • operating road freight terminals—included in Class 5299 Other Transport Support Services (not elsewhere classified) • providing road freight forwarding services are included in Class 5292 Freight Forwarding Services • providing crating or packing for road freight transport—included in Class 7320 Packaging Services • leasing or hiring trucks without drivers—included in Class 6619 Other Motor Vehicle and Transport Equipment Rental and Hiring.	Small proportion of activities involve wood and wood products
Rail Freight Transport (4710)	Class consists of units mainly engaged in operating railways for the transportation of freight by rail.	Small proportion of activities include wood and wood product transport
Water Freight Transport (4810)	Class consists of units mainly engaged in the operation of vessels for the transportation of freight or cargo by water.	Small proportion of activities include wood and wood product transport
Air and Space Transport (4900)	Class consists of units mainly engaged in operating aircraft for the transportation of freight and passengers.	Small proportion of activities include wood and wood product transport
Stevedoring Services (5211)	Class consists of units mainly engaged in providing stevedoring services for loading or unloading of vessels. **Primary activities** • Ship loading or unloading service (provision of labour) • Stevedoring service.	Small proportion of activities include wood and wood product transport
Port and Water Transport Terminal Operations (5212)	Class consists of units mainly engaged in the maintenance and leasing of port facilities to facilitate the land–sea transition of goods and passengers. Also included are units mainly engaged in the operation of ship mooring facilities or water transport terminals for passenger or freight (including sea cargo container terminals and coal or grain loaders).	Small proportion of activities include wood and wood product transport

ANZSIC category code	Description	Comments regarding forest industry employment
Scientific Research Services (6910)	Class consists of units mainly engaged in undertaking research in the agricultural, biological, physical or social sciences. Units may undertake the research for themselves or others.	Small proportion of activities include wood and wood product transport
Surveying and Mapping Services (6922)	Class consists of units mainly engaged in providing surveying and mapping services (including exploration surveying services on contract). Units in this class use a variety of surveying techniques depending on the purpose of the survey, including magnetic surveys, gravity surveys, seismic surveys or electrical and electromagnetic surveys. These services may also include surveying and mapping of areas above or below the surface of the earth.	Small proportion of activities include wood and wood product transport
Nature Reserves and Conservation Parks Operation (8922)	Class consists of units mainly engaged in the preservation of flora and fauna in their natural environment such as nature reserves and conservation parks. **Primary activities** • Bird reserve operation • Conservation park operation • Fauna reserve operation (fauna not actively managed) • Flora reserve operation • National or state/territory park or reserve operation • Tourist caves operation • Wildlife park or reserve operation (wildlife not actively managed). **Exclusions/references** Units mainly engaged in: • operating zoological parks and gardens, botanical gardens and other related activities where flora and fauna is actively managed in a controlled environment—included in Class 8921 Zoological and Botanical Gardens Operation • undertaking public administration activities in relation to national, state or territory parks and reserves—included in the appropriate classes of Division O Public Administration and Safety.	Not generally considered part of forest industries but involves management of some forested areas

ANZSIC category code	Description	Comments regarding forest industry employment
Other Machinery and Equipment Repair and Maintenance (9429)	Class consists of units mainly engaged in the repair and maintenance of machinery and equipment not elsewhere classified. Also includes units which either sharpen/install blades and saws or provide welding repair services. **Primary activities** • Agricultural or farm machinery and equipment repair and maintenance • Blade sharpening • Brushcutter repair and maintenance • Construction machinery and equipment repair and maintenance • Electric motor repair and maintenance, including armature rewinding (except factory based) • Electrical generating and transmission equipment repair and maintenance • Engine repair (except automotive) • Food machinery and equipment (industrial) repair and maintenance • Forestry machinery and equipment repair and maintenance • Foundry machinery and equipment repair and maintenance • Heavy machinery and equipment repair and maintenance • Hydraulic equipment repair and maintenance • Lawn mower repair and maintenance • Machine tool repair and maintenance • Material handling equipment repair and maintenance • Mining machinery and equipment repair and maintenance • Outboard motor repair • Paper making and printing trade machinery repair and maintenance • Pump and compressor repair • Refrigeration equipment (industrial) repair and maintenance • Shipping barrel and drum reconditioning and repairing • Stove and/or oven (industrial) repair and maintenance • Textile machinery repair and maintenance • Washing machine and/or clothes dryer (industrial) repair and maintenance • Welding repair service (including automotive).	Small proportion of activities dependent on wood and paper products
Other categories	Trade associations Unions	Small proportion of activities dependent on wood and paper products

Appendix D: Reporting forest and wood products employment using ABS data

Table D1 summarises activities across the supply chain that fall within Australia's forest and wood products industries. For each, the equivalent data produced by the ABS is described, alongside the ANZSIC industry category that best equates to that part of the forest and wood products industries (the ANZSIC classification is used by the ABS to classify workers into different industries). Limitations to using currently produced ABS data to estimate employment in each industry category are identified. Methods for overcoming these limitations, and whether they can currently be implemented, are also summarised. This provides a basis for building an estimate of overall employment in Australia's forest and wood products industries.

Table D1 Australia's forest industries activities—work needed to improve or enable employment reporting

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Growing and management of native forest and plantations—large growers	Those employed in government agencies and businesses that manage native forest and plantations for commercial wood and paper production by businesses (rather than individual growers). Excludes silvicultural contracting.	A0301 Forestry	Yes, with adjustments	Category needs to be adjusted to include part of ANZSIC category A0300 Forestry and Logging, not further defined, to avoid undercounting of employment in forestry. This will be done by assuming that workers in A0300 are split between forestry and logging based on the same ratio as that of the numbers employed in A0301 Forestry and A0302 Logging.
Growing and management of native forest and plantations—small growers	Individual farm foresters that manage native forest and plantation on their own properties for commercial wood and paper production (farm foresters). Excludes silvicultural contracting.	Group is not reported in ANZSIC, as the primary occupation is usually agriculture, not forestry.	No	Direct surveys are needed to identify: – the number of people – the extent to which their livelihood depends on the forest industry – how many people are typically employed per unit of activity in this type of tree growing activity.

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Silvicultural contracting	Those employed in businesses that undertake silvicultural activities specialised to the forest industry. These activities include ground preparation, seedling planting, weed and pest control, pruning, and related activities	Part of this group is included in ANZSIC category A0510 Forestry Support Services.	Yes, if combined with growing seedlings and consultancy services and adjustment methodology applied	Category A0510 Forestry Support Services includes other types of employment and silvicultural contracting. Many silvicultural contractors are classified into A052 Agriculture and Fishing Support Services, for example. Estimating actual number of silvicultural contractors can be achieved by comparing the A0510 figures in 2006 in Tasmania and Western Australia with those reported by Schirmer et al (2008a, b) to identify typical ratio of ABS reported workers to those in silvicultural contracting.
Growing seedlings	Workers employed at nurseries that grow seedlings to be planted and grown for commercial wood and paper production.	Part of A0510 Forestry Support Services. The number of people employed in nurseries is not defined separately to those undertaking other activities included in A0510.	Yes, if combined with silvicultural contracting and consultancy services and adjustment methodology applied	Category A0510 Forestry Support Services includes other types of employment and silvicultural contracting. Many silvicultural contractors are classified into A052 Agriculture and Fishing Support Services, for example. Estimating actual number of silvicultural contractors can be achieved by comparing the A0510 figures in 2006 in Tasmania and Western Australia with those reported by Schirmer and colleagues (2008a, b) to identify typical ratio of ABS reported workers to those in silvicultural contracting.
Roading contractors	Contractors who build, repair, and maintain forestry roads; many of these also undertake other earthworks activities in forestry areas.	Included in non-forest industry specific categories by the ABS.	No	Data available for Tasmania and Western Australia for numbers of roading contractors are not reliable enough to provide basis for production of ongoing estimates. Work needed to enable identification of typical roading contractors employed, which will require direct survey of the firms that engage these contractors as well as the contractors themselves (to enable identification of metrics such as the number of contractors typically employed per kilometre of road upgraded or built, which will enable future estimates to be based on survey of forest and plantation managers rather than requiring direct survey of the much larger number of roading contracting firms).

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Harvest and haulage to mill	Contractors who harvest trees, and haul logs to mills. Presented as a single category as many businesses integrate harvest and haulage activities.	A0302 Logging includes part of the employment in this category. However, many are included as part of I4610 Road Freight Transport, a category dominated by workers with no involvement in log haulage.	Yes, with adjustments	To identify underestimation by the ABS resulting from haulage workers being classified in the transport industry, ABS data must be compared with forest industry survey data collected at the same time as ABS data. This is possible using data reported in Schirmer (2008a, b) for Western Australia and Tasmania, which was collected in August 2006, at the same time as ABS Census. This can provide a metric for adjusting employment figures. A0302 includes people harvesting timber for firewood and those harvesting timber for processing into other wood products (see Firewood category).
Wood processing—sawmilling and dressing	Sawmilling and dressing of sawn timber (included in a single category as these activities are often integrated on a single site)	C1410 Log Sawmilling and Timber Dressing, not further defined; C1411 Log Sawmilling; C1413 Timber Resawing and Dressing	Yes	ABS data and other estimates are reasonably similar when previous studies that have collected data at the same time as the ABS are examined. As new data become available, process of checking estimates should continue, to evaluate whether there is any significant departure between ABS data and other sources of information.
Wood processing—woodchip production	Woodchipping (in–field by mobile mills or in a static mill)	C1412 Wood Chipping	Yes	ABS data and other estimates are reasonably similar when previous studies that have collected data at the same time as the ABS are examined. As new data become available, process of checking estimates should continue, to evaluate whether there is any significant departure between ABS data and other sources of information.

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Wood processing—secondary wood products	Processing of rough or dressed sawntimber or woodchips into further wood products, such as veneer, medium density fibreboard, wooden structural components and fittings (excludes pulp and paper)	C149 Other Wood Product Manufacturing (includes all subcategories)	Yes, with limitations	ABS data can be used, with a notation that they may involve some undercounting due to definition issues. ABS are likely to have some biases, and in some cases to undercount employment, as workers in these industries do not always describe their job in ways that result in accurate classification. Currently, comparison studies do not provide an adequate basis for comparing ABS estimates with the actual level of employment generated. Further work is needed to survey an adequate sample of these types of processors and compare the results regarding to employment to those generated by the ABS.
Wooden furniture making	Construction of wooden furniture	C2511 Wooden Furniture and Upholstered Seat Manufacturing	No	C2511 includes people whose work is entirely with fabric and metal. Does not include those who work with wood, proportion of which is not known; direct survey of furniture industry needed to identify proportion of employment (wholly or partly) directly dependent on wood products. Employment in this category may have little dependence on wood products so incorporating it in estimates of forest and wood products employment without adjustment may substantially inflate estimates of employment in these industries.
Wood craft	Processing of wood into craft products	not included	No	ABS data do not separately identify craftpersons who work specifically with wood for their livelihood; therefore, direct survey of woodcraft industry is needed to identify employment generated in this industry.
Pulp and paper processing	All activities involving the transformation of timber into pulp and paper products	C15 Pulp, Paper and Converted Paper Product Manufacturing (includes all subcategories)	Yes	ABS data and other estimates are reasonably similar when previous studies that have collected data at the same time as the ABS are examined. As new data become available, process of checking estimates should continue, to evaluate whether there is any significant departure between ABS data and other sources of information.

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Firewood collection	Harvest of timber from native forests and plantations, or use of by-products of sawmilling and other wood processing, for firewood	Some included in A0302 Logging; however not all included	No	Firewood collection and production is sometimes undertaken by logging firms, in which case it is included in A0302 Logging. Some employment in sawmills is firewood related; for example, where sawmills bundle offcuts and sell them for firewood (Schirmer et al. 2010); however, large proportion of independent operators collect firewood so activity is likely undercounted in ABS statistics. Direct survey needed to identify actual employment numbers and how they relate to figures reported in relevant ANZSIC categories.
Consultancy and research services	Provision of research and expert advice on forest industry specific issues by consultants and researchers	Part of A0510 Forestry Support Services. Numbers of people employed in consulting and research is not defined separately to those undertaking other activities included in A0510.	Yes, if combined with silvicultural contracting and growing seedlings, and adjustment methodology applied	See silvicultural contracting
Transport of finished wood and paper products to market	Not considered part of direct employment as transport often involves companies and equipment not specialised to the forest industry; businesses involved in transport not typically involved in cooperative industry activities	Included as part of the broad category I4610 Road Freight Transport, which has a much larger number of workers with no involvement in log haulage.	No	If employment in transport to market included, a methodology for estimating this employment needs to be developed, and a survey undertaken to generate estimates

Activity	Description	ANZSIC classification covering this activity a	Can this activity be reported on in AFWPS currently?	Work needed to improve or enable reporting of employment in this industry
Wholesale sales	Sales of timber products in the wholesale market	F3331 Timber Wholesaling	Yes, with limitations	Not known how many timber wholesales included in F3331; wholesaling is often incorporated in activities of companies engaged in forest industries activities, in which case the wholesaling activity is included in their employment estimates, likely F3331 is an underestimate, but that the remaining employment is captured by other forest and wood product industries categories. Direct survey work would be needed to confirm this
Retail sales	Sales of timber products in the retail market	Included in multiple retailing categories, such as G4231 Hardware and Building Supplies Retailing	No	ANSZIC classification has multiple categories of retail sales; none of these separate sales of wood and paper products from sales of other, non-wood and paper, products. Reporting on retail sales jobs therefore requires direct survey and development of a specific methodology to do so.
Carpentry	While dependent on wood products, job relies on specific skills not always related to production of these products; carpenters not typically involved in cooperative industry activities	Included in E3242 Carpentry Services	Yes	ANZSIC estimate can be used; however, some debate about whether carpenters should be included in the definition of employment directly dependent on forest and wood products industries
Construction and building	Not included as involves substantial work with materials other than wood/paper	na	na	na
Suppliers of goods and services other than those listed in this table	Not included	na	na	Suppliers of goods and services to forest industry businesses not included as part of the industry, unless specified above

AFWPS = Australian forest and wood products statistics

Note: **a** Division abbreviations: A is Agriculture, Forestry and Fishing; C is Manufacturing; E is Construction; F is Wholesale Trade; G is Retail Trade; I is Transport, Postal and Warehousing; A 4-digit number refers to a class within a division, subdivision (2-digit) or group (3-digit); na Not applicable.

Glossary

Data item	A single number, such as number of people in the workforce
Index	A single number representing a complex concept and obtained by combining subindexes
Indicator	A single data item or a number derived arithmetically from more than one data item that is taken to indicate the level of a simple concept, for example, the proportion of unemployed in the workforce is an indicator of the level of unemployment
LGA	Local Government Areas are administrative regions used by Australian local governments and councils. Local Government Areas are not defined or maintained by the ABS, but are defined by the Departments of Local Government, or their equivalent in each state or territory
Subindex	A single indicator or a number derived arithmetically from more than one indicator
SLA	A Statistical Local Area is a unit of geography used for data aggregation by the Australian Bureau of Statistics. In most cases an SLA is identical or formed from a division of whole Local Government Areas (LGAs)

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