FOREST AND WOOD PRODUCTS INDUSTRY SECTOR

IRC Skills Forecast and Proposed Schedule of Work

2019-2022

Prepared on behalf of Forest Management and Harvesting IRC, Timber and Wood Processing IRC and Timber Building Solutions IRC for the Australian Industry and Skills Committee (AISC)

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IRC SKILLS FORECAST AND PROPOSED SCHEDULE OF WORK 2019-2022

Purpose

The Industry Reference Committee (IRC) Skills Forecast and Proposed Schedule of Work identifies proposed Vocational Education and Training (VET) training package development work necessary to meet the needs of industry and sets out the evidence of that need. The Australian Industry and Skills Committee (AISC) consider this information in prioritising and commissioning training package development work.

The IRC annual review of the Skills Forecast and Proposed Schedule of Work allows the identification of priority projects and provides the likely timing of training package development work over the next four years.

The Skills Forecast and Proposed Schedule of Work needs to provide the AISC with sufficient information on each project to consider:

- What work is to be commissioned;
- Clear evidence of employer and industry need;
- Alignment to Ministers' Priorities (see Appendix).

The Skills Forecast and Proposed Schedule of Work is to be developed in line with:

- Standards for Training Packages 2012;
- Training Package Products Policy;
- Training Package Development and Endorsement Process Policy.

This Skills Forecast presents the latest industry intelligence and resulting schedule of work for priority industry skills areas of the Forest Management and Harvesting IRC, Timber and Wood Processing IRC and Timber Building Solutions IRC.

This document is not intended to be identify and address every challenge faced across all industry sectors; it identifies and addresses the issues, challenges and opportunities that industry has identified as 'priority' for this stage of the schedule and acts as a resource and reference for industry and associated skills, learning and accreditation bodies seeking to act upon them.

Detailed data and information concerning industry skills needs across all sectors covered by the Forest Management and Harvesting IRC, Timber and Wood Processing IRC and Timber Building Solutions IRC, including information from previous Skills Forecasts, can be found on the Skills Impact website www.skillsimpact.com.au and is available to Industry, RTO and consumers in line with Ministerial priorities.

METHOD & STRUCTURE

This Skills Forecast and Proposed Schedule of Work was developed through research of national and industry data sources, and ongoing input from IRC members and key stakeholders.

IRC members undertake consultation with industry, and guide consultation processes undertaken on their behalf throughout each year. Consultation may include personal meetings, conference attendance, organised workshops, surveys, project feedback collection and unsolicited contributions sent to the SSO.

The Skills Forecast structure is guided by the Australian Industry Skills Commissions (AISC), which requires the following to be included:

- **Sector overview:** Brief description of the industry and industry sub-sectors, the Training Package, and current challenges and opportunities.
- **Employment & Skills Outlook:** Overview of the data, strategies and policies relevant to the industry.
- **Key Changes and Proposed Responses:** identifying the drivers for change from industry (e.g. occupations, technology, emerging markets), regulation, and nationally important policies, and proposed responses including the impact on stakeholders.
- **Consultation Undertaken:** Information on the consultation previously undertaken to support the proposed responses, including issues and sensitivities raised.
- **Proposed Schedule of Work:** The current proposed schedule of work over the next four-year period as modified from previous plans as a result of consultations and the need to meet changing priorities
- **Project Details:** details of proposed projects proposed for approval of the AISC to be undertaken in 2019-2020.

Administrative Information

Name of Industry Reference Committees (IRCs):

1) Forest Management and Harvesting
2) Timber and Wood Processing
3) Timber Building Solutions

Name of Skills Service Organisation (SSO): Skills Impact

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EXECUTIVE SUMMARY

The resources, processes and systems used to create and maintain the built environments in which Australians live, work, rest and play are undergoing a rapid transformation. In the context of a growing population, urban land-use tensions and sustainability concerns associated with the use of non-renewable materials, the national forestry and wood products industries are facing increasing pressure to meet the current and future needs of the Australian economy.

The industry's extensive supply chain has never been more active than over the last few years. In addition to the multitude of applications for forestry and wood products, the industry provides the house framing, flooring, cabinetry, fencing and garden landscaping materials for virtually all free-standing Australian dwellings, as well as for the significant majority of low- to medium-rise dwellings.

As Australia's dwelling approvals and construction cycle escalated to record highs in 2017 and 2018, the supply chain was stretched to its limits, with capacity constraints evident across the country. In early 2019, housing starts began to slow but, notably, approvals of free-standing dwellings – where the majority of timber is used – were only marginally below annual record levels.

In that context, the forestry and wood products industries maintain a significant labour force, with approximately 70,000 people directly employed and thousands of additional jobs indirectly supported by the industry. It also contributes substantially to the Australian economy, generating some $23 billion of economic activity[1] annually.

In light of its capacity constraints and the need to react to housing cycle contingencies, industry continues to adapt and adopt technological advancements as diverse as drones, scanners, laser scanners, cutters and finishing systems, plant genomes, block-chain applications and big data analytics.

Processing initiatives within advanced manufacturing fields, including bioenergy, biochemicals, artificial intelligence, and new, engineered wood products and building systems solutions are impacting the industry skills and workforce profiles.

The emergence of new and advanced timber building systems is leading to new work functions, including 'manufacture and install' processes. Though these are not unique skills for the wider Australian economy, they are new to many manufacturing businesses and have immediate applicability for multi-residential dwellings. Over time, they will impact on the manufacturing of free-standing, single-family dwellings, particularly as emphases on housing affordability leads to increased modularisation.

Changes to the National Construction Code (NCC)[2] have meant timber-manufactured products are increasingly an option for higher-rise buildings. A range of fire-protected timber buildings, up to 25 metres in height (around eight storeys) can now be constructed. Growing connectivity with the commercial construction sector breeds new relationships and skill considerations for ensuring efficient product development and delivery.

From a 'top to bottom' perspective, the forest and wood products industries are inter-related, with numerous sectors integrating conservation and land management practices in the management of forest reserves and parks, and arboriculture in the provision of environmental and recreational services. Likewise, there are growing links between the indoor and outdoor timber furniture manufacturing sectors, as well as collaboration between pulp and paper manufacturing businesses and emerging bioindustries through the use of biofuels, bioenergy and biomaterials manufacturing.

[1] Department of Agriculture, 2018, *Growing Better Australia*
[2] See http://ausfpa.com.au/media-releases/green-light-for-more-mid-rise-timber-buildings-throws-spotlight-on-urgent-need-for-more-plantations/

In 2018, research was published on the 'state of the industry' for Tasmania, Victoria and Queensland[3]. These reports include summaries on industry directions, critical skill requirements and the application and adoption of national skill standards at regional and state levels within the forest management sector.

In the super-heated housing and building materials economy of the last half decade, Australia's forestry and wood products industries have migrated their training and skills recognition activities away from qualifications – a consequence of which is declining enrolment and completion figures – towards training in stand-alone units of competency and skills sets. The primacy of qualification-related data, however, serves to under-represent utilisation of the competency standards by industry.

Industry is thus seeking to interrogate the extent to which the competency standards are utilised by workplaces, as well as the relationships between training providers and industry operators. Across most sectors and job roles, industry has few opportunities for pre-employment, institution-based training delivery or full qualification pathways. The strategic direction proposed by industry is to develop consistent assessment instruments.

Skill priorities in this year's Skills Forecast relate to the National Heavy Vehicle Regulator's (NHVR) Master Industry Code of Practice[4] for log haulage operator job roles and review of the Certificates II and III in Timber Merchandising. These skill priorities relate to existing, rather than emerging, job roles in the industry. It should be noted that the Secretariat is undertaking additional research, in conjunction with the IRCs, on the identified priorities, with the intention of presenting Cases for Change in the near future.

[3] See https://www.fwpa.com.au
[4] https://www.nhvr.gov.au/safety-accreditation-compliance/industry-codes-of-practice/master-industry-code-of-practice

Forest Management and Harvesting Industry Reference Committee

The Forest Management and Harvesting Industry Reference Committee (IRC) is responsible for overseeing the development of industry units of competency, skill sets and qualifications relative to the following sectors:

- Forest Growing and Management
- Harvesting and Haulage

Table 1: IRC Membership as at 30 March 2019

Name	Organisation or Area of expertise
Stacey Gardiner (Chair)	Australian Forest Contractors Association
Bill Paul	Vic Forests
Craig Hallam	Arboriculture Australia
Position Vacant	Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU)
Robin Austen	Forest Products Commission
To be announced	Forestry Corporation of NSW
Craig Patmore	Forestry Tasmania
Martin Crevatin	PF Olsen
To be announced	Skills Advisory Council NT
Alan Rossouw	One Forty One
Tim Morrissey	Victorian Association of Forest Industries

Timber Processing Industry Reference Committee

The Timber and Wood Processing Industry Reference Committee (IRC) is responsible for overseeing the development of industry units of competency, skill sets and qualifications relative to the following sectors:

- Sawmilling and Processing industry
- Sawdoctoring

Table 2: IRC Membership as at 30 March 2019

Name	Organisation or Area of expertise
Dave Gover (Chair)	Engineered Wood Products Association of Australia
Victor Violante	Australian Forest Products Association
Denise Campbell-Burns	Construction, Forestry, Maritime, Mining and Energy Union
Robin Austen	Forest Commission
Maree McCaskill	Timber NSW
Clarissa Brandt	Timber QLD
To be Announced	Victorian Association of Forest Industries
Position Vacant	Expertise in a sub sector of Timber Processing

Timber Building Solutions Industry Reference Committee

The Timber Building Solutions Industry Reference Committee (IRC) has responsibility for overseeing the development of units of competency, skill sets and qualifications relative to the following sectors:

- Timber Merchandising
- Timber Manufactured Products
- Timber Truss and Frame

Table 3: IRC Membership as at 30 March 2019

Name	Organisation or Area of expertise
Dave Gover (Chair)	Engineered Wood Products Association of Australia.
Denise Campbell-Burns	Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU)
Phil Ladson	Frame and Truss Manufacturers Association
Steve Cunningham	Timber and Building Materials Association
Richard Hill	Timber Merchants Association
Position Vacant	Expertise in one or more of the following sub sectors of Timber Building Solutions

PROPOSED SCHEDULE OF WORK 2019–2022

Forest Management and Harvesting IRC

2019-2020	**Project 1: National Heavy Vehicle Regulator (NHVR) Master Industry Code of Practice - Log Haulage Operators** This project is to investigate the skills implications and training requirements resulting from the National Heavy Vehicle Regulator's Master Industry Code of Practice, and the subsidiary, industry-specific code of practice for harvesting and haulage operations (which is currently in draft form and out for consultation). The code of practice and specific responsibilities for roles, especially operators, will be reviewed and highlighted in any recommended changes to competency standards. The project will liaise closely with the Transport IRC. The Secretariat is, on advice from the IRC, undertaking more detailed analysis of the requirements of the draft Code of Practice and its implications for skills development, formation and recognition. This will likely result in a Case for Change being presented before the end of June 2019. We note this would have implications for 'Project 2: Log Haulage Operators – Code of Practice Adoption', detailed in the 2020-2021 priorities. **Project 2: Assessment Instruments** The Forest Management and Harvesting IRC supports the proposal from the Timber Building Solutions and Timber Processing IRCs for an assessment instrument development project.
2020-2021	**Project 1: Safety Leadership in remote forestry and related operations** This project is to interrogate industries' unique requirements for safety leadership and risk compliance management. It will identify the nature and risks of operating in remote areas according to variables such as terrain, harvesting and removal characteristics, the impact of extreme weather (e.g. fire season and high rainfall) on operational safety, and interactions with multiple industry partners (e.g. arborists, State Emergency Services, local landholders and Councils). The increasing impact of severe weather events across seasons requires diverse, context-dependent preparation and response skills and strategies. A Case for Change may be submitted in 2019-2020 based on industry analysis and stakeholder engagement. **Project 2: Log Haulage Operators – Code of Practice Adoption** The Log Haulage Operator Code of Practice (being developed under the NHVR's Master Industry Code of Practice) may impact on units of competency relating to the transportation of logs and wood and forestry products. There are already significant policies regarding log restraints, and more are anticipated. These have work function, process and skill needs implications, suggesting that new units of competency will be required.
2021-2022	**Project 1: Forest certification impact on work functions and skill requirements** This project is to assess the impact of the Forest Certification Scheme and Responsible Wood programme across job clusters in terms of work functions and Training Package gaps. Analyses will include consideration of the legal requirements for the transportation and trade of forest products, a social impact study, and evaluation of the consequences for managing forest ecosystem services.
2022-2023	**Project 1: TBA** No project has been identified at this time.

Timber and Wood Processing IRC

2019-2020	**Project 1: Assessment Instruments** This project is to encourage and support industry's use of the Training Package. Uptake of industry standards as workplace standards, engaging with training providers in an assessment-only mode, requires that the assessment tool is as standardised as the competency standard itself. This approach offers a strategic pathway for both employers and training providers to recognise learner outcomes. An additional outcome would be the proper recognition of industry's use and regard for skills standards and training, which is currently under-represented because of a reliance upon qualification enrolment and completion data. This project will be conducted in partnership with the Timber Building Solutions IRC.
2020-2021	**Project 1: Review of Sawmilling and Processing job roles and qualifications** This project is to review Certificates II to IV in Sawmilling and Processing to identify better enrolment pathways, skill sets and connections with specific job roles. Industry has experienced disjuncture between the competency standards used in the workplace and the role of training providers, including enrolment and completion mechanisms and data collection. In the two decades since these qualifications were reviewed, relevant occupations and work functions have changed significantly. This project will in part be informed by the 2019-2020 'Assessment Instruments' project detailed above. **Project 2: National Construction Code (NCC) compliance responsibilities** Recent changes to the National Construction Code (NCC), allowing timber buildings up to a height of 25m (approximately eight storeys), creates new product obligations, some of which will have work function and skills development implications that will be reviewed here.
2021-2022	**Project 1: Timber product development and supply chain innovation** This project is subject to industry consultation conducted during the AISC cross-sector project, 'Supply Chain'. In principle, this priority covers skills for supporting product development in timber processing and for improving performance in product supply chain operations. Specific skills requirements will be determined through industry consultation, and by assessing the impact of cross-sector 'Supply Chain' standards in the context of this industry.
2022-2023	**Project 1: Bioenergy, co-generation and biochar** This project is in response to the emergence of renewable energy strategies by industry. In principle, it covers skills requirements for supporting biomass-based energy developments, where the feedstock is derived from woody biomass and other agricultural plant residues. Specific skills requirements will be determined through industry consultation and technological and commercial demand.

Timber Building Solutions IRC

2019-2020	**Project 1: Assessment Instruments** This project is to encourage and support industry's use of the Training Package. Uptake of industry standards as workplace standards, engaging with training providers in an assessment-only mode, requires that the assessment tool be as standardised as the competency standard itself. This approach offers a strategic pathway for both employers and training providers to recognise learner outcomes. An additional objective concerns the proper recognition of industry's use and support of skills standards and training, which is currently under-represented because of a reliance upon qualification enrolment and completion data. This project will be conducted in partnership with the Timber and Wood Processing IRC. **Project 2: Review of Certificates II and III in Timber Merchandising** This project is to review the Certificates II and III in Timber Merchandising. These qualifications include imported core units that have been deleted or superseded with non-equivalent units. Industry is also identifying the consequences of changing work functions on job roles and skills requirements. Workers require current knowledge of an ever-changing range of products, including evolving window and door designs and some cellular products being sold through merchants. Likewise, they require knowledge of how to work with growing timber volumes and an increasingly complex domestic market with an abundance of imported timber. These conditions highlight the need for a review of job roles and skills.
2020-2021	**Project 1: Assessment Instruments – Implementation Support** This is a proposed extension of the 2019-2020 'Assessment Instruments' project, with the objective of building upon the earlier project's work to establish an assessment-based model of competency attainment/skill set completions for the mutual benefit of workplaces and training organisations. Monitoring the outcomes of the 2019-2020 project will guide industry in determining the next steps and priorities for this strategy.
2021-2022	**Project 1: Cladding and fire safety** This project aims to investigate the consequences of building cladding and fire safety guidelines changes for industry, work functions and job roles. Industry anticipates that some flammable cladding products will be replaced by more resilient timber products. There will be a range of technical implications, including for timber treatment, fixing systems and the like. The project will proceed by assessing the impact of cladding and fire safety changes on manufacturing and retail job roles.
2022-2023	**Project 1: TBA** No project has been identified at this time.

SECTOR OVERVIEW

Introduction

The Forest and Wood Products industry comprises two main sectors, 'forestry' and 'timber processing and products'.

Forestry consists of two sub-sectors:

- forest growing and management; and
- harvesting and haulage.

The forest growing and management sub-sector encompasses businesses that manage commercial plantation estates, native forests and farm forests principally for the production of wood and wood fibre. Additional activities include the establishment of estates, access roads and management of fire breaks. Commercial forestry estate management is undertaken on behalf of state and territory governments and private forest owners.

The harvesting and haulage sub-sector comprises enterprises that harvest forests for timber products and pulpwood, rough-hewn products (mine timbers, posts and railway sleepers) and firewood. Forest harvest enterprises are usually commissioned by forest management companies (public and private). This sub-sector also includes businesses that haul or transport logs and other forest products, produce woodchips in the field or gather forest biomass.

The Timber Processing and Products sector comprises four sub-sectors:

- sawmilling and processing;
- timber manufactured products;
- wood panel and board production; and
- timber merchandising.

The sawmilling and processing sub-sector encompasses primary processing activities that transform tree logs into a range of products using sawing, peeling and chipping processes.

The timber manufactured products sub-sector sources timber from sawmills and other upstream timber processing enterprises to manufacture wooden structural components and pre-fabricated timber building systems for the construction market (in addition to a variety of wood products for other purposes).

The wood panel and board production sub-sector includes enterprises that manufacture wood panel products from wood chips, sawdust, wood shavings, slabwood or off-cuts. It also incorporates the manufacture of the various products from logs or sawn timber; for example, laminations of timber (Glulam and I-Beam) from veneer and sawn timber.

The Timber Merchandising sub-sector operates via two major channels:

- retail and trade merchants selling and providing advice to the public, DIY market, and builders; and
- wholesalers, manufacturers, importers and exporters that sell, import and/or export large volumes of hardwood and softwood products and distribute them through the merchant sector or directly to the building industry.

Businesses

The forest and wood products industries are a significant contributor to rural and regional economies as most business is concentrated in areas with industrial plantations.

In 2018, FWP-related businesses contributed $7.0 billion to Australian gross domestic product (GDP), with a revenue (sales turnover) of $22.6 billion[5].

Table 4: Industry snapshot

Title	Revenue	IVA[6]	Exports	Imports	Wages	Domestic Demand[7]
Forestry and Logging	$4.5bn	$1.7bn	$647m	$128.9m	$665.8m	$4bn
Forestry Support Services	$772.2m	$364.9m	$0	$0	$277.7m	$772.2m
Log Sawmilling	$1.6bn	$479.8m	$90.6m	$174.7m	$265m	$1.6bn
Wood Chipping	$1.4bn	$364.4m	$1.1bn	$6.6m	$69.5m	$363.3m
Timber Resawing and Dressing	$1.9bn	$526.3m	$15.4m	$499.4m	$380.3m	$2.4bn
Fabricated Wood Manufacturing	$1.3bn	$356.2m	$72.5m	$557m	$227m	$1.8bn
Prefabricated Wooden Building Manufacturing	$278m	$80.8m	$2.5m	$0	$37.7m	$275.5m
Wooden Structural Component Manufacturing	$5.7bn	$2.1bn	$13.8m	$106.9m	$1.2bn	$5.8bn
Pallets and Other Wood Product Manufacturing	$750.1m	$294.7m	$28.9m	$626.9m	$191.2m	$1.3bn
Timber Wholesaling	$4.3bn	$619.9m	$0	$0	$392m	$4.3bn

Source: IBISWorld Industry Wizard

Growth in Australia's forestry sector is contingent upon on key domestic and international markets and usually follows the economic cycle[8]. Demand drivers for wood products come largely from log sawmilling companies, wooden structural component manufacturing and residential building construction. The volume of wood harvested each year is indicative of industry performance, and the rate of growth is projected to decline in 2019 due to lowered demand for logging services and log sales. However, this is usually offset to some degree by increases in the price of timber[9].

Australian state and territory governments commission various forest conservation and forest growing and harvesting activities through large state forestry business enterprises or agencies (most of which are vertically integrated). There were 12,382 forest and wood product businesses operating at the end of the financial year in 2017 (see Table 5 below), over half of these were 'non-employing'. Overall, there were 424 fewer businesses than were trading one year previously. The largest contraction was in 'forestry', with 452 fewer businesses. The 'wooden structural fitting and component manufacturing' industry, however, expanded by 132 businesses.

[5] IBISWorld Industry Wizard
[6] IVA (industry value added): The measure of the contribution by businesses in each industry to gross domestic product (GDP).
[7] Domestic demand: a measure of total consumption of an industry's goods and services within this country.
[8] ABARES, 2018, Industry performance, viewed January 2019, <http://www.agriculture.gov.au/abares/research-topics/forests/forest-wood-products-statistics/industry-performance#income--and-value-added-201617>
[9] IBISWorld, 2018, A0300 Forestry and Logging in Australia Industry Report

Forestry and logging businesses are concentrated in geographic zones with high and reliable rainfall to maintain plantations[10]. The majority (60 per cent) of forest and wood products industry businesses are located in New South Wales and Victoria (see Figure 1). Tasmanian businesses are over-represented compared to the state's proportion of the national labour force due to its extensive forest cover and the numerous enterprises that operate on small plantations. Wooden structural fitting and component manufacturing businesses are similarly clustered in the eastern states, especially on the coast, where high housing and population growth drives demand[11].

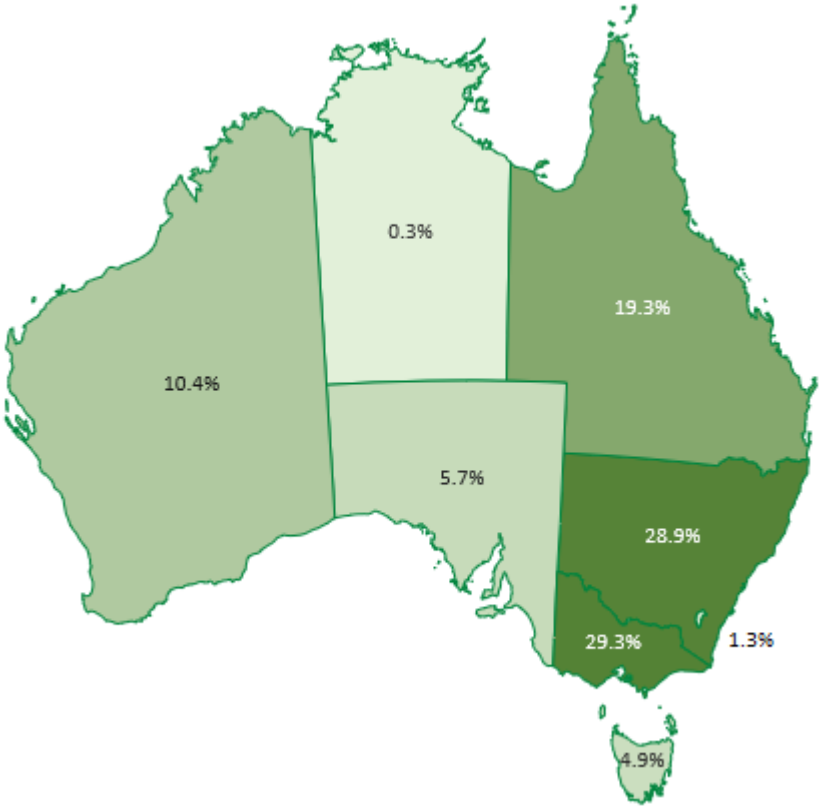
Table 5: Count and size businesses

	Business Size			
ANZSIC industry title (four-digit level)	**Non-Employing Businesses**	**Small Businesses (1-19 Employees)**	**Medium Businesses (20-199 Employees)**	**Large Businesses (200+ Employees)**
Forestry	2,789	295	35	3
Logging	708	582	38	0
Forestry Support Services	594	297	38	3
Log Sawmilling	322	285	52	3
Wood Chipping	30	27	7	0
Timber Resawing and Dressing	102	116	24	7
Prefabricated Wooden Building Manufacturing	52	51	5	0
Wooden Structural Fitting and Component Manufacturing	1,573	2,204	213	7
Veneer and Plywood Manufacturing	10	22	4	0
Reconstituted Wood Product Manufacturing	33	48	10	0
Other Wood Product Manufacturing n.e.c.	356	340	44	0
Timber Wholesaling	456	512	82	3
Total	**7,025**	**4,779**	**552**	**26**

Source: 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017

[10] IBISWorld, 2018, A0300 Forestry and Logging in Australia Industry Report, viewed January 2019
[11] IBISWorld, 2018, C1492 Wooden Structural Component Manufacturing in Australia Industry Report, viewed January 2019

Figure 1: Forest and wood product business locations



Source:
IBISWorld
Industry Wizard

Industry Job Roles

Industry job roles related to the *FWP Training Package* are as follows:

Table 6: Industry job roles

Occupation	Description
Forestry Worker	Forestry Workers operate in a variety of forestry and plantation settings, undertaking maintenance and fire control duties, where they may treat weeds, conduct erosion and sediment control, clear trees and collect and process seeds.
Nursery Worker (Forestry)	Nursery Workers work in a forest nursery, propagating and caring for plants.
Forestry Supervisor	Forestry Supervisors lead teams in establishing and revegetating or regenerating forests. Work includes tree growing and maintenance, pest control, stock assessment and fire control.
Arborist	Arborists grow and maintain trees and advise on tree growth and care. Their work includes climbing, pruning, felling, complex tree removal, and installing bracing. Those with higher qualifications write reports on tree growth, condition and treatment.
Nursery Technician (Forestry)	Nursery Technicians work in forest nurseries, undertaking breeding and propagation, tree growing and maintenance. Other jobs may include planting, weed control, pruning and pest management.

Harvesting Technician	Harvesting Technicians work in forest harvesting crews, operating a wide range of mechanical harvesting equipment and preparing logs for transportation. Other duties may include construction of roads and log-landings, plant and equipment operation, harvesting, stump removal and segregating or sorting logs.
Bulldozer Operator	Bulldozer Operators drive bulldozers and operate attachments to prepare building sites, remove obstructions, move mining overburden and perform similar earthmoving tasks in a variety of construction and mining industries.
Rigger	Riggers assemble and install rigging gear such as cables, ropes, pulleys and winches to lift, lower, move or position machinery, structural steel or other heavy objects.
Production Worker (Timber)	Production Workers in the timber sawmilling industry assist in the processing of softwood or hardwood timber. They may grade, stack and pack timber in a sawmill. They may also support and guide timber being sawn; trim and cut logs using a chainsaw; and operate wheel loaders and forklifts.
Saw Technician	Saw technicians, also described as saw maker, saw doctor operate in the sawmilling and processing sector
Timber Manufacturing Worker	Timber Manufacturing Workers help with the processing of timber and manufacturing of timber products such as fencing materials, doors, windows, crates and pallets. They may assist in cutting timber and help assemble wood products.
Kiln Operator (Timber)	Kiln Operators in the timber industry dry hardwoods and/or softwoods in traditional or solar assisted kilns. They select timber preservation techniques, prepare and apply chemicals, operate the timber drying kilns and perform troubleshooting operations.
Forestry Technician	Forestry Technicians supervise a variety of forest maintenance operations. These may include planting, commercial thinning, pest and weed control, pruning, felling trees, fire management and construction of roads.
Log Truck Driver	Log Truck Drivers shift forestry logs by driving 4-wheel drive, heavy rigid or heavy combination vehicles, often on unsealed roads. They are skilled at performing complex driving operations, including towing and recovering vehicles. They also monitor or coordinate equipment maintenance and repair.
Front-end Loader Operator	Front-end Loader Operators drive and control front-end loaders to lift and transport bulk materials and to load trucks or railcars.
Timber Manufacturing Worker	Timber Manufacturing Workers help with the processing of timber and manufacturing of timber products such as fencing materials, doors, windows, crates and pallets. They may assist in cutting timber and help assemble wood products.
Timber Grader	Timber graders examine dressed or rough-sawn timber and classify it according to quality and size.
Production Technician (Timber)	Production Technicians (Timber) operate a range of sawmilling equipment to convert logs into usable timber. They may undertake operations such as selecting types or grades of timber, sawing timber, producing hardwood or softwood chips, kiln drying, and conducting end matching and finger jointing operations.
Production Technician (Panel and Board)	Production Technicians (Panel and Board) work as operators in wood panel production. They laminate and veneer board surfaces; prepare resin and additives; plane and sand panels; maintain caul plates and screens; dry material; blend and test binding mixes; and cut material using CNC machining and processing centres.
Production Worker (Panel and Board)	Production Workers help Panel and Board Production Technicians to prepare wood panels and boards. They may prepare wood chips to make board products, dress boards and timber, surface treat raw board, cut panels to profile, and band edges of panels as part of the finishing process.

Production Worker (Wood Veneer)	Production Workers help Veneer Production Technicians in wood panel production. Work may include producing veneer, machining panels, assembling products, and cutting panels to profile.
Board Production Technician	Board Production Technicians work as operators in wood panel production. They machine panels; grade, sort and mark materials; laminate boards; assemble products, and chip or flake wood.
Production Assistant (Timber Truss and Frame)	Production Assistants help with the manufacture of timber roof trusses and wall frames. They may work on warehouse operations by stacking, tallying and storing material, processing orders and dispatching products. They may also work in production operations, assessing timber, using hand held tools, and handling timber and materials.
Production Worker (Panel and Board)	Production Workers help Panel and Board Production Technicians to prepare wood panels and boards. They may prepare wood chips to make board products, dress boards and timber, surface treat raw board, cut panels to profile, and band edges of panels as part of the finishing process.
Production Technician (Panel and Board)	Production Technicians (Panel and Board) work as operators in wood panel production. They laminate and veneer board surfaces; prepare resin and additives; plane and sand panels; maintain caul plates and screens; dry material; blend and test binding mixes; and cut material using CNC machining and processing centres.
Sales Assistant	Sales Assistants interact with customers, perform stock control and housekeeping duties, operate point of sale equipment and balance the register.
Customer service assistant	Assists in addressing the needs of customers; promotion of programs, services and facilities; and responds to conflict and customer complaints.

Source: training.gov.au

Stakeholders

Industry maintains extensive consultation and engagement strategies at regional, state and territory and national levels. With both vertically-integrated and horizontal business models, intra-sectoral engagement is extensive within the supply chain of wood solutions, with further interactions across building, energy and other industry pathways.

Table 7: Stakeholders

Industry Sector Associations	
Australian Forest Products Association (AFPA)	National
Timber Communities Australia (TCA)	National
Timber NSW	NSW
Timber Queensland Ltd	QLD
Forest Industries Association of Tasmania (FIAT)	TAS
Victorian Association of Forest Industries (VAFI)	VIC
Forest Industries Federation WA (FIFWA)	WA
Industry Sub-sector Associations	
Forest Growing and Management	
Australian Forest Growers (AFG)	National
Harvesting and Haulage	
Australian Forest Contractors Association (AFCA)	National
Tasmanian Forest Contractors Association (TFCA)	TAS
Sawmilling and Processing	
Timber Preservers Association of Australia (TPAA)	National
Tasmanian Sawmillers Association (TSA)	TAS
Timber Manufactured Products	
Frame & Truss Manufacturers Association of Australia (FTMA)	National
Glued Laminated Timber Association of Australia (GLTAA)	National
Wood Panel and Board Production	
Engineered Wood Products Association of Australasia (EWPAA)	National & Pacific
Timber Veneer Association of Australia	National
Timber Merchandising	
Timber & Building Materials Association (TABMA)	National
Timber Merchants Association (TMA)	VIC
Associations of other Industry-Related Sectors	
Australian Pulp and Paper Industry Technical Association (APPITA)	National & New Zealand
Australian Furniture Association (AFA)	National
Australian Shop & Office Fitting Industry Association (ASOFIA)	National
Australian Window Association (AWA)	National

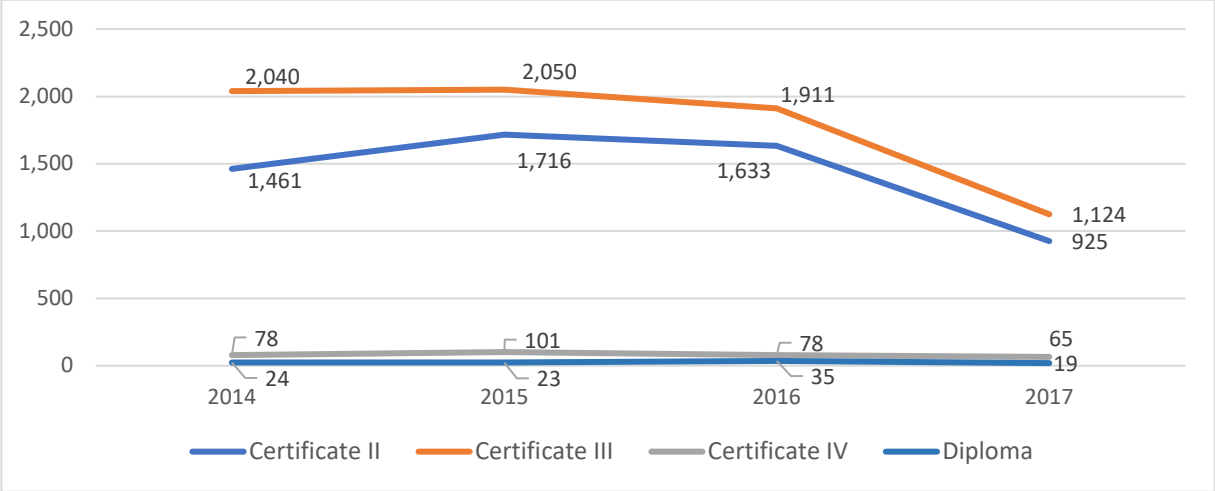
Australian Woodworking Industry Suppliers Association (AWISA)	National
Australian Cabinet & Furniture Association	National
Furniture Cabinets Joinery Alliance (FCJA)	National
AWA – AGGA Limited	National
Picture Framers Guild Australia (PFGA)	National
Cabinet Makers Association Inc. (CMA) of WA	WA
Industry Networks	
Forest Industry Council (Southern NSW) Inc.	NSW
Professional Associations	
Institute of Foresters Australia (IFA)	National
Arboriculture Australia	National
Industry Standards Bodies	
Responsible Wood Certification Scheme (formerly known as Australian Forestry Standard Ltd)	National
Forest Stewardship Council (FSC) Australia	National
Employee Representative Organisations	
CFMMEU Forestry and Furnishing Products Division	National
Australian Workers' Union (AWU)	National
Australian Council of Trade Unions (ACTU)	National
Industry R&D Services Bodies	
Forest and Wood Products Australia Ltd (FWPA)	National
Industry Services Bodies	
ForestWorks Ltd	National
Timber Trade Industrial Association (TTIA)	National
Timber Development Association NSW	NSW
Council Associations	
National Timber Councils Association (NTCA)	National
Timber Towns Victoria (TTV)	VIC
Training Organisations including RTO's	
Australian Timber Training Association	National
State and Territory Industry Training Advisory Bodies	

Training Package Overview

As at February 2019, there were 449 registered training organisations (RTOs) approved to deliver FWP Training Package components.[12]

There have been more than 13,000 enrolments across all qualifications since the start of 2014 (see APPENDIX 1 for detailed training package participation details). However, enrolments at every AQF level are decreasing (and there have been no enrolments in the Certificate I or Advanced Diploma qualifications).

Figure 2: Program enrolments by AQF level



Source: NCVER TVA program enrolments 2014-2017

The forest and wood products industry invests in skills development on an ad hoc basis according to specific local contexts and requirements. Some job roles require that qualifications be gained prior to employment, such as nursery workers; however, most employers provide training at the outset or during the course of employment, and to upskill the workforce as required (for example, when new technology is implemented).

Significantly, national standards for training and assessment are utilised by many businesses to design informal or non-accredited training. While helpful in equipping employees with essential skills, including adherence to industry codes of practice, these training activities are not captured in national vocational education and training data collection.

The types of training facilitated by Registered Training Organisations, in-house staff and external providers are quantified in the following 'Socio-economic impacts of the forest industry' reports by Forest & Wood Products Australia (2018) for:

- Victoria
    - https://www.fwpa.com.au/images/OtherReports/Vic_Report_FINAL.pdf (pages 50-54, especially Table 23)
- Tasmania
    - https://www.fwpa.com.au/images/OtherReports/Socio_economic_impacts_of_the_forest_industry_TAS.pdf (pages 44-47, especially Table 24)

[12] https://training.gov.au/Training/Details/FWP

These reports indicate that, in both states, industry-specific and specialised training is undertaken with RTOs.

Industry Trends: Challenges and Opportunities

The Australian forest and wood products sector operates in a dynamic environment shaped by a range of socio-economic factors, technological developments, environmental challenges and policy frameworks. The variables that drive industry have flow-on effects that generate further opportunities in and between sectors, impacting on:

- demand for harvest and wood production, which has never been higher;
- investment and employment creation;
- VET activity and the components into which people enrol (for example, participation in stand-alone units of competency and skills sets instead of qualifications).

These factors relate to industry growth challenges and opportunities, as discussed below.

Increased global population and urbanisation

As the global population continues to grow so too will demand for wood products. China is aiming to increase green buildings' share of all new construction from two to 50 per cent by 2020, which will require and include upgrades to construction building materials and construction codes.[13]

Challenges

- Existing wood supply chains will require structural changes to enable better use of all parts of the tree or forest resource and generate a maximum value recovery.
- New investments will be needed to expand the productive forest estate in strategic regions such as those with high dependency on forest industries.
- New plantations will continue to face increased competition for agricultural land and water use that are also essential for food production.

Ageing population and career values

Attracting and recruiting new employees to the industry is becoming increasingly complex. Young, skilled workers are looking to businesses that perform active roles in the personal and professional development of employees, offer digital workplaces and flexible working conditions.

Challenges

- Recruiting, training and managing a skilled workforce are essential and evolving aspects of increasingly digitised workplaces, which, for an industry dominated by small- and medium-sized enterprises, will require innovative planning.
- The industry currently employs approximately 200 Wood Machinists/Saw Technicians; however, in light of an ageing workforce and pressures to recruit the next generation of skilled employees, how industry engages with training and training organisations will require review.
- The Regional Institute of Australia[14] has identified that in regional areas there is population churn, with people moving out of the workforce. For an industry working across metropolitan and regional

[13] https://www.edgebuildings.com/wp-content/uploads/2017/09/China-Green-Building-Market-Intelligence-EXPORT.pdf
[14] http://www.regionalaustralia.org.au/home/2019/02/2019-intergovernmental-shared-inquiry-program/

areas, understanding local employment and regional competition are significant factors in considering skills demands and planning.

Domestic market

Currently, industry meets over 80 per cent of Australian demand for softwood roundwood, and over 90 per cent of sawn hardwood. Sawn softwood remains in demand as the material of choice for light timber framing. The construction trend for multiple-storey buildings drives a growing demand for new-engineered wood products such as LVL and I-Joist.[15] Hardwood sawnwood demand is affected by reduced log availability. Logs from commercial plantations and relatively small volumes of sawn product are also exported to China.

Australia's wood chip production is supplied to local reconstituted wood panel manufacturers and global markets, mainly China and Japan. Domestic reconstituted wood panel production meets over 90 per cent of local demand for particleboard (PB) and over 80 per cent of medium-density fibreboard (MDF).

Domestic plywood production meets only 25 per cent of local demand. Some volumes of softwood and hardwood peeler logs and veneers are exported.

Challenges

- Investment in the softwood processing sector may be limited by uncertainties surrounding the future supply of forest resources. If the log supply to emerging economies, especially China, continues, there will be less sawlog supply for domestic wood processors.
- The hardwood sawmilling and upstream hardwood manufacturing sectors are increasingly challenged by reducing log supplies as more native forests (previously reserved for wood production) are transitioned to forest reserves, while the supply from hardwood plantations is limited and not suitable for all ranges of product.

Products with emerging markets

Demand for solid engineered wood products, including Cross Laminated Timber (CLT) and Glulam and bioenergy products such as biogas and wood pellets, is growing in Australia and globally. Industry participation in such emerging markets offers opportunities for investment, innovation and entrepreneurship, and facilitates higher returns from lower-quality logs, sawnwood, wood residues and biomass.

CLT has gained considerable interest globally as it enables architects and engineers to use completely different methods to design and construct tall and large buildings. Most CLT used for tall buildings in Australia have been imported from Austria and Germany. Our domestic market is expected to grow as all Australian states and territories have adopted the *National Construction Code 2019 (NCC)*, which now permits timber structural elements in mid-rise buildings up to eight storeys high. XLAM Australia is the first CLT plant to operate and influence Australia's timber building components market.

Nearly 33 per cent of the total global bioenergy sector is in Europe, 29 per cent in the Asia-Pacific region, and almost 20 per cent in North America[16]. Australia generates considerable volumes of wood processing and forest harvest residue that could be used to develop the bioenergy sector, which currently consists of small bioenergy plants for heating and generating electricity.

[15] Margules Groome Consulting, Q2 2017, Newsletter, Game Changer China.
[16] FWPA Megatrends.

Challenges

- The availability of future log supply is in doubt due to the lack of new plantation developments. This raises concerns for potential investors, who look to develop new production capacities for products with emerging markets.
- An increase in domestic CLT production and consumption may alter local markets by reducing demand for traditional products.
- National and state-based policies must be developed to enable wood residue from existing wood processing operations to become available to the energy sector and biochemical production.

Timber knowledge expectations in the retail sector

The influence of the individual consumer on the forest and wood products industry has been limited, with the requirements of architects, builders/developers, large retail chains and green building-rating schemes driving demand for certified products. According to research by FWPA[17], individual customers' awareness of both AFS (now known as Responsible Wood) and FSC certification is low, but consumers claim that they are more likely to buy certified products.

Challenges

- Customer behaviour in the digital age drives digital strategies. The need to increase the speed of service delivery and respond to customer demand and market changes creates pressure across timber retailing and the supply chain to gain digital marketing skills and digital customer service capabilities.
- The breadth of timber and timber-related products across the domestic and import markets requires that merchandising staff maintain current product knowledge over a range of platforms.

Transformative technologies

A range of advanced technologies in biotechnology, geospatial technology, robotics and automation is being integrated into operations of leading forestry, transport, logistics and wood products companies. Adoption of these technologies will benefit industry by improving tree characteristics, forest growth rates, log utilisation, process management, pest management, species' climate adaptability, and general value-add and productivity.

Advanced technologies with significant implications for current and future commercial forest management and harvesting include:

- Biotechnology: clonal propagation, marker-aided selection and breeding, genetic engineering and genomics.
- Geospatial technologies: remote sensors, drone technology (UAVs), wearable and mobile technologies/apps, and new generation satellite imagery technologies.
- Robotics and automation: automatic (X-Ray) log measuring systems, on-board computers with wireless data transfer, and remote-controlled felling (HiVision by Hiab).

Self-driving vehicles may also have the potential to transform commercial forest practices over time[18].

Advanced technologies in the timber and wood processing sector are being adopted; for example, specialised sawmilling X-ray (or infrared, ultrasound) scanning technologies that are used for optimising

[17] https://www.fwpa.com.au/resources/reports.html
[18] <https://delivering-tomorrow.com/wp-content/uploads/2015/08/dhl_self_driving_vehicles.pdf>.

cutting pattern of logs, computer-controlled systems with applications for log and timber transfer, drying or packaging (among other processes), Computer Numerical Control (CNC) manufacturing tools, and inventory management software systems. Computer-aided design and manufacturing (CAD/CAM) technologies and CNC robotics are also applied in the design and manufacture of engineered solid wood products and standard and modular pre-fabricated walls, floors and roof trusses.

Challenges

- Capital investment in the industry is fragmented and focusses on upgrading existing technology[19]. Challenges impeding technology adoption in the industry include unfamiliarity with the potential value of advanced technologies, the economic and business environment (including leadership and capital investment), and the skills and capabilities within an organisation.

Digitisation

Based on a report by Accenture, forest and wood products companies worldwide lag behind many other industries in taking advantage of digital technologies. Most have a growing interest in digital transformation but take a cautious 'wait-and-see' approach. Efforts by industry operators to digitise are characterised by fragmented trials, as opposed to broader approaches to realising technologies' potential.[20]

Challenges

- Implementation of digital approaches requires strategies to evolve existing operations into new business models, requiring leadership support and the development of digital skills and capabilities within an organisation.

Sustainability actions

The Australian state and territory governments have renewed their commitment to support Regional Forest Agreements (RFAs) in the long term. Renewed Agreements provide an ongoing framework for the industry to implement effective forest conservation, forest management and forest industry practices, and support the long-term stability of the local forest and processing sectors. In 2017, the Tasmanian RFA was extended for the next two decades and the Victorian Government is currently (2019) progressing the consultation phase of the process.

Two sustainability schemes are operational in Australia: the international and draft Australian Forest Stewardship Council (FSC) and the Responsible Wood Certification Scheme. Eleven local government associations and councils around Australia and New Zealand implement wood encouragement policies (WEP) to drive the construction sector towards using sustainable timber products.

Climatic weather shifts

Global warming, through climate variability and extreme weather conditions, has various implications for the industry and its value chain. Opportunities for industry to reduce the impact of climate change on future forest productivity and resource supply include increasing the application and coordination of biotechnology and implementing 'best practice' tree breeding, site selection and forest management.

Forestry companies undertake significant roles in forest fire prevention and management, interacting closely with emergency services. Following large-scale wildfires in eastern Victorian public forests between 2002 and 2009, however, VicForests incorporated the effects of fire on the resource supply into its outlook

[19] <http://www.fwpa.com.au/statistics-count-newsletter/1403-fwpa-australian-timber-industry-investmentreview.html>.
[20] <https://www.accenture.com/us-en/blogs/blogs-forest-products-tracking-digital-transformation?c=glb_forestproductstexacttarget_10031236:emc_1017&emc=21917766:emc-102717>.

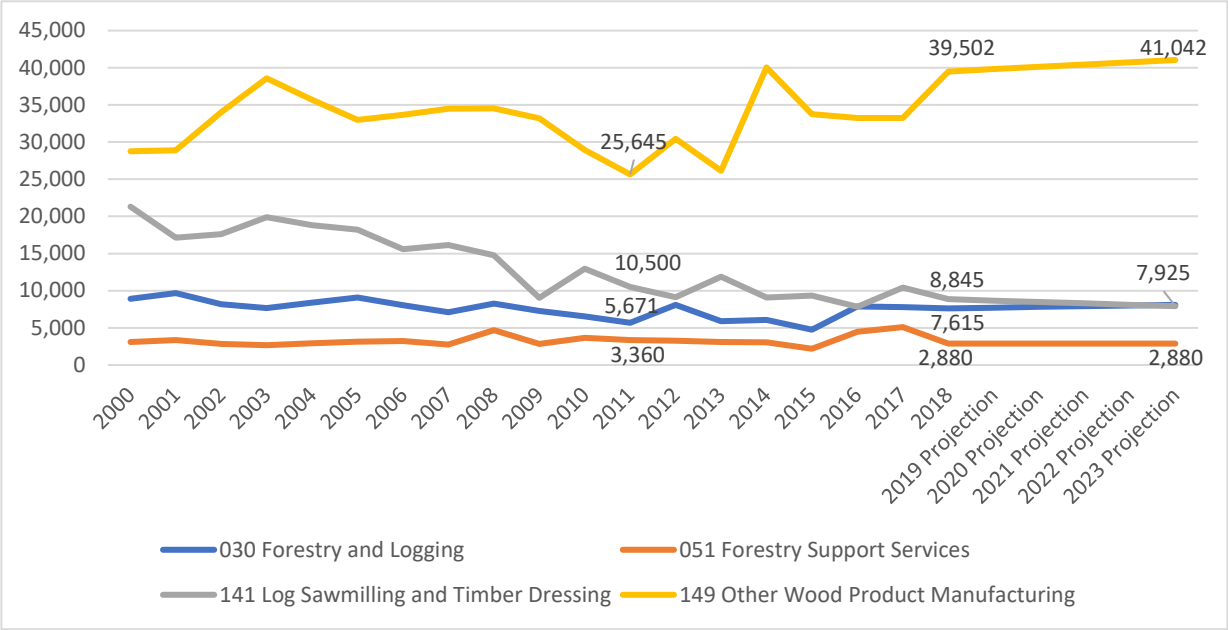
projections. A shortage of sawlog supply is also expected in Western Australia over the next 10–15 years due to the significant bushfires during 2015 and 2016.

EMPLOYMENT & SKILLS OUTLOOK OVERVIEW

Employment

Total employment in the forest and wood products industries continue to recover following a record low[21] in 2011, when there was sector-wide rationalisation. Now, at 58,842 – not including the many jobs that are sustained directly and indirectly by industry[22,23] – there are over 30 per cent more people employed than in 2011 (albeit there are fewer people employed in 'Log Sawmilling and Timber Dressing' and 'Forestry Support Services' – see Figure 3).

Figure 3: Employment levels and projections to 2023



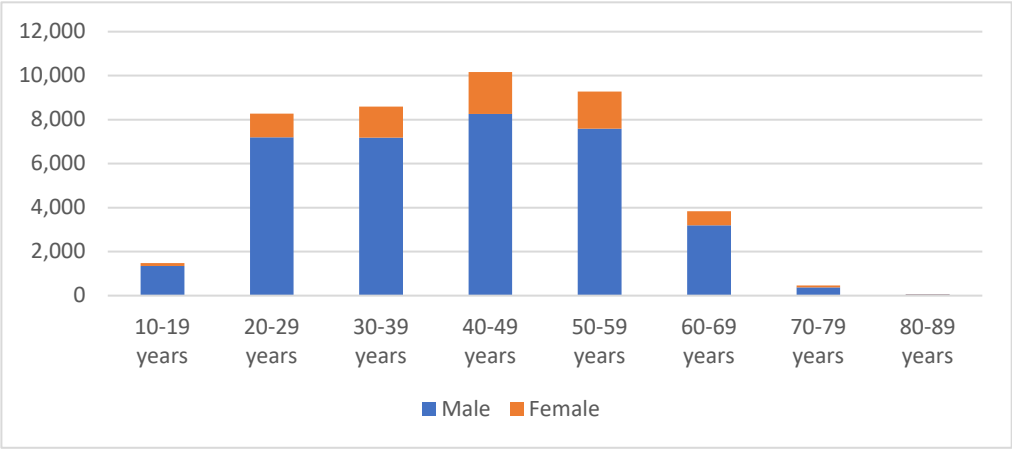
Source: a) Australian Bureau of Statistics - 6291.0.55.003 - EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards; b) Labour Market Information Portal, 2018 Industry projections - five years to May 2023 (% growth projected)

By 2023, total industry employment is projected to grow by almost two per cent (despite a projected ten per cent contraction in 'Log Sawmilling and Timber Dressing'). This modest growth is in the context of an aging

[21] ABS, 2018, 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, Aug 2018, EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards (Pivot Table)
[22] Australian Forest Products Association estimate that industry directly supports 80,000 jobs as well as a further 40,000 jobs in downstream value-adding, such as the frame and truss sector (Australian Forest Products Association, 2015, Plantations: The Missing Piece of the Puzzle, p.18).
[23] The ANZSIC group '333 Timber and Hardware Goods Wholesaling' has been omitted from the figures here presented because, while it includes the class '3331 Timber Wholesaling', most employed people in this group are in the class '3339 Other Hardware Goods Wholesaling' (which excludes timber-related wholesaling). At the time of the 2016 Census of Population and Housing, however, there were around 4,600 people employed in timber wholesaling. The data likewise excludes log haulage drivers (which are classed under '4610 Road Freight Transport') and timber retailers (which are classed under '4231 Hardware and Building Supplies Retailing'), and their employment figures cannot be disentangled from the broader classes to which they belong.

labour force, of which almost one-third of employees are over the age of 50 years[24] (compared to 23 per cent in 2006[25]).

Figure 4: Industry age groups and sex



Source: ABS, 2016 Census - Employment, Income and Education

The percentage of women employed in the industry is low compared with the overall women's workforce participation. A key industry strategy is the Women in Forest and Timber Network, which was responsible more than 100 women from across Australia's forest industries gathering in Canberra for International Women's Day 2019, with the theme of *Balance for Better.*

Industry Priority Skills

This section identifies the priority skills needs in the forest and wood products industry over the next four years (2019-2022), as established by the IRCs through an analysis of new and estimated future demands placed upon the industry.

Skills shortages, identified through regional socio-economic studies[26] and research published during 2018 on the state of Tasmanian, Victorian and Queensland industry[27], focus on the growing demand for workers with specialised skills, such as specialist engineers, scientists and mechanics, and mobile and fixed-plant operators. Industry has also indicated the need for workers with high-level financial, middle management and information and communication technology (ICT) skills. Recruiting skilled managers and professional staff, transport workers, finance managers and heavy machinery operators is also problematic for many regional businesses.

[24] ABS, 2016 Census - Employment, Income and Education
[25] ABS, 2006 Census - Labour Force
[26] Schirmer, J., Gibbs, D., Mylek, M., Magnusson, A. and Morison, J., 2017, Socio-economic impacts of the softwood plantation industry in the South West Slopes and Bombala region, NSW. <http://www.crownland.nsw.gov.au/__data/assets/pdf_file/0005/721724/socio-economic-impacts-of-the-softwood-plantation-industry.pdf>.
[27] See https://www.fwpa.com.au

KEY DRIVERS FOR CHANGE AND PROPOSED RESPONSES

Regulated industry occupations

Regulated occupations indicate legal or industry requirements for the work to be performed. Employees are required to register with, and obtain a licence to practice from, a professional association or occupational licensing authority.

The forest and wood products industry includes a wide range of regulated occupations that are not industry-specific. These include electricians, plumbers and mobile equipment, crane and forklift operators.

Operators working in Copper Chromium Arsenate (CCA) timber treatment plants are required to hold either a CCA Commercial Operator Licence or a CCA Agricultural Chemical User Permit[28], consistent with the type of business in which they operate.

A range of industry-specific operations, particularly in forest harvesting, are recognised by work health and safety authorities as high-risk. However, there are no regulated occupational licencing requirements for these operations. Industry requires suitable training for all harvesting machine operators to undertake their work functions and satisfy obligations and liabilities under national work health and safety regulations. Essential skills requirements are established by industry and verified by FOLS (port**fol**io of **s**kills) Skills Verification Program[29], which is managed by ForestWorks.

Forest managers in several states require a FOLS to verify their skills (e.g. nationally-recognised training) and industry currency. FOLS offers businesses a streamlined system to manage the skills of employees and improve safety in the workplace, especially for those engaged in high-risk activities, such as tree felling, harvesting and haulage. Indeed, employers are required to provide evidence through FOLS that employees are 'qualified' to operate tree felling and harvesting equipment; for example, chainsaws, bulldozers and excavators, skid steer loaders, mobile chippers and splitters, and a range of trucks and vehicles.

A Forestry Better Business Program[30] has also been established to recognise professional businesses operating to high standards in the forest industry. Forestry contracting businesses can use this online program to store and share information with forest managers and to demonstrate that they adhere to current industry standards, acts and regulations.

Generic Skills

The three IRCs have provided a consolidated response to ordering the thirteen generic skills identified by the Department of Education and Training (see Appendix 3). The top three priorities were deemed to be:

- Technology use and application skills;
- Environmental and Sustainability skills; and
- Language, Literacy and Numeracy (LLN) skills.

[28] Agriculture Victoria, 2018, Commercial Operator Licence, viewed January 2019, <http://agriculture.vic.gov.au/agriculture/farm-management/chemical-use/agricultural-chemical-use/licenses-permits-and-forms/commercial-operator-licence>
[29] ForestWorks, 2018, FOLS Skills Verification Program, viewed January 2019 <http://www.forestworks.com.au/fols-skills-verification-program/>
[30] ForestWorks, 2018, Forestry Better Business Program, viewed January 2019 <http://www.forestworks.com.au/services/forestry-better-business-program/>

Industry remains cognisant of these skills in the projects they identified as priorities. They impact across sectors and job roles, particularly in light of the consequences of ‘big data’ for future activities, responsibilities and skills development.

2019-2020 PROJECT DETAILS

Forest Management and Harvesting IRC

Project Title

National Heavy Vehicle Regulator (NHVR) Master Industry Code of Practice - Log Haulage Operators

Description

This project will investigate the skill implications and training requirements resulting from the National Heavy Vehicle Regulator Master Industry Code of Practice for log haulage.

On 1 October 2018, the Heavy Vehicle National Law (HVNL)[31] was amended to stipulate that every party in the heavy vehicle transport supply chain has a duty to ensure the safety of their transport activities[32].

The chain of custody and specific responsibilities for roles, especially operators, will be reviewed and highlighted in any recommended changes to competency standards relating to timber and forest products haulage. The Forest Management and Harvesting IRC will liaise closely with the Transport IRC.

Rationale

We propose that this project begin in 2019 to ensure that industry tracks changing responsibilities and has adequate time to review relevant industry-specific and cross-industry competency standards. The log haulage sector continues to engage closely with wider industry and maintains a strong focus on safety and interacting with the communities in which it operates.

Addressing the Minister's Priorities

Priority: More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

Up-to-date information will be provided to training providers as the industry reviews relevant qualifications and consults on challenges for adoption of the code.

Priority: The training system better supports individuals to move more easily between related occupations

The job roles relating to this code and the adoption of current legislative demands will support an individual to move easily between related occupations, particularly in regional areas where they may be seeking work in another industry requiring a high level of operational knowledge.

Priority: Foster greater recognition of skill sets

This project may identify a skill set demand.

Consultation Plan

The Forest Management and Harvesting IRC will oversee the plan and has identified that it will approach the Transport IRC. The project will proceed with reference to the timelines of the National Transport Commission (NTC) consultation process, which is seeking industry views between February 2019 and February 2020. Both the Australian Forest Contractors Association (AFCA) and the Tasmanian Forest

[31] https://www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

Contractors Association (TFCA) will drive this project consultation. In addition, skills requirements will be established by industry and verified by the FOLS Skills Verification Program, especially for those engaged in high-risk activities, such as harvesting and haulage.

Scope of Project Overview

Overall timing: 18 months from delivery of signed Activity Order

Table 8: Key activities and timing

Key Activity	Timing
Participation in National Transport Commission consultations	to February 2020
Consideration of NTC findings and recommendations that are specific to industry haulage contractors	to April 2020
Review of competencies as an initial scoping process with industry stakeholders	to March 2020
Public consultation and interaction with cross industry and sector groups	three months
Review of mapped qualifications and competencies	June 2020
Equity Review, Validation and Quality Assurance, final consultation for STAs	three months
Approval of Case for Endorsement to IRC and submission to AISC	one month

Summary of Components

This project relates to the *FWP20216 Certificate II in Harvesting and Haulage* and *FWP30216 Certificate III in Harvesting and Haulage.*

Timber and Wood Processing IRC and Timber Building Solutions IRC Joint Project

Project Title

Assessment Instruments

Description

This project represents an industry-led strategy to formally clarify and support industry's use of the Training Package. Uptake of industry standards as workplace standards, engaging with training providers in an assessment-only mode, requires that the assessment tool is as standardised as the competency standard itself. This approach offers a strategic pathway for both employers and training providers to recognise learner outcomes. An additional outcome would be the proper recognition of industry's use and regard for skills standards and training, which is currently under-represented because of a reliance upon *qualification* enrolment and completion data at the expense of other methods or components of training.

This project will be closely supported by the Forest Management and Harvesting IRC.

Rationale

The pressure on workplaces in regional areas to both attract and retain skilled workers increases with industry's escalating engagement with big data, equipment optimisation and expanding product ranges, all of which occurs within the high-risk operating environments of plantations, native forests, mills and processing factories.

To encourage uptake of formal training and assessment within the Forestry and Wood Products Industry, standardised assessment instruments should be developed.

This two-year project would commence with an analysis of the relevant competency standards, skills sets and qualifications to determine priorities for assessment instrument development. This would be followed by the development of assessment instruments, which will involve extensive consultation prior to approval being sought.

Enrolments and completions under the *FWP Training Package* are declining. One reason is because of industry's focus on workplace-based induction and skills development.

Employers and RTOs regularly report their extensive training activities directly to the *Timber and Wood Processing* and *Timber Building Solutions* IRCs, *ForestWorks* and *Skills Impact*. However, these are only reflected in formal data collection when workers commence with a qualification enrolment and conclude with a qualification completion.

As with training, assessment activities are primarily conducted on-the-job so as to meet compliance obligations and offer first-hand experience in high-risk working environments. This contextual learning is (generally) reflected in the Training Package competency standards, yet workplace-based training that bypasses the National Training System is rarely eligible for public funding.

However, assessments, notably around compliance, are regularly undertaken by RTOs, which are guided by Training Package assessment requirements, but without the support of specific assessment instruments or tools.

Assessment instruments would ensure standardised and formal recognition of industry and personal skills development. Currently, training often occurs prior to contact with RTOs due to the time-sensitivity and importance of skills development in high-risk work environments. RTOs, then, are sometimes only engaged

for their capacity to formally assess a learner, thus their method and subject of assessment may not be appropriate to, or consistent with, the employees' activities and learning (despite their adherence to competency standards). The creation of standardised assessment instruments would improve industry confidence in formal assessment and streamline interactions with RTOs.

If assessment tools are *not* developed, workplace-based training will not necessarily impart a holistic foundation of skills and knowledge to the learner, with implications for their future ability to move between occupations. Furthermore, assessment may not be timely to their learning nor be assessed by one RTO within a skill set or qualification pathway.

Addressing the Minister's Priorities

Priority: More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

This project aims to provide an improved mechanism that links workplace learning, assessment and recognition through the National Training System.

Priority: The training system better supports individuals to move more easily between related occupations

The project provides learners with a feasible route to building their competencies and a pathway to one or more qualifications.

Priority: Foster greater recognition of skill sets

The credentialing of skills and knowledge will drive learners to attain skill sets in the short term and, beyond that, pursue full qualifications if appropriate.

Consultation Plan

This project will be jointly managed by the *Timber and Wood Processing* and *Timber Building Solutions* IRCs. The *Forest Management and Harvesting* IRC supports the project and will contribute to the cross-industry strategy. An advisory group will be established in response to the IRC strategic priorities, and these will be circulated for comment. The group will include industry and RTO representatives.

ForestWorks has discussed the basis of this project extensively with industry over many years and, in recent weeks, the Australian Timber Trainers Association (ATTA). ATTA members work across the forestry and wood products industry and there are some qualifications for which only ATTA members have scope. ATTA considers that developing standardised assessment instruments would significantly boost enrolments, completions and recognition of industry and individual training endeavours, both through credentialing and data collection.

It is timely that a formal strategy to connect learner, workplace and RTO training and assessment requirements is developed. This project proposes that a tier of assessment instruments and an evaluation process linking this to National Training System data collection is included within the project parameters.

Scope of Project Overview

The objectives of the project will be determined by industry through an initial scoping process. The project will establish guidelines for identifying which units require assessment instruments to be developed, incorporating analyses of enrolment data, industry priorities and pathways for learners who have not received formal training.

Table 9: Key activities and timing

Key Activity	Timing
IRC to identify strategic priority of assessment instruments to be developed	1 month
Industry and RTO consultation period	2 months
Establishment of a Technical Working Group, membership to include industry and RTOs	1 month
Draft assessment materials, including identified trial sites	15 months
Consultation and sign-off	7 months

Timber Building Solutions IRC

Project Title

Review of *FWP20616 Certificate II in Timber Merchandising*[33] and *FWP30616 Certificate III in Timber Merchandising*[34]

Description

These qualifications include imported core units that have been deleted or superseded with non-equivalent units. Industry is also identifying the consequences of changing work functions on job roles and skills requirements. Workers require current knowledge of an ever-changing range of products, including evolving window and door designs and some cellular products being sold through merchants. Likewise, they require knowledge of how to work with growing timber volumes and an increasingly complex domestic market with an abundance of imported timber. These conditions highlight the need for a review of job roles and skills.

Rationale

Industry and RTOs have identified that the unit *SIRXCCS202 Interact with customers* has been deleted from its parent training package with no equivalent unit being released. There are other such units, hence a review of these two Timber Merchandising qualifications is now required.

Addressing the Minister's Priorities

Priority: Obsolete qualifications removed from the system

This project will work with industry to identify the ongoing currency of these two qualifications and assess the most appropriate pathways. This may lead to one qualification being removed or the development of a skill set.

Priority: More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices

This project will deliver to training providers a reviewed range of competencies and qualification pathways that reflect the evolving diversity of timber products across the domestic commercial market. Interaction with the building industry, with DIY activity and social media driving product use and awareness, requires increasingly robust product knowledge in this sector. This relates to consumer queries on sustainable supply chains, involving both local and imported materials.

Priority: The training system better supports individuals to move more easily between related occupations

This project will facilitate broad industry skills training. Learners will be assisted in developing transferable skills and knowledge that can translate to a range of retail roles and occupations. This is particularly significant for regional employment.

Priority: Foster greater recognition of skill sets

This project will consider skill sets.

[33] https://training.gov.au/Training/Details/FWP20616
[34] https://training.gov.au/Training/Details/FWP30616

Consultation Plan

The *Timber Building Solutions* IRC will lead this project. National and state-based industry associations will participate in an industry scoping workshop, after which a Technical Advisory Group will be established. Consultations will be undertaken with timber businesses in the areas of building, wholesale and retail.

Scope of Project Overview

Overall Project Timing: from delivery of signed Activity Order, 18 months to AISC submission

Table 10: Key activities and timing

Key Activity	Timing
IRC Consultation and engagement strategy agreed	one month
Review of competencies as an initial scoping process with industry stakeholders	one month
Public consultation and interaction with cross industry and sector groups	three months
Redrafted qualification structure and competency units for review by Technical Reference Group	six months
Equity Review, Validation and Quality Assurance, final consultation for STAs	three months
Approval of Case for Endorsement to IRC and submission to AISC	one month

IRC SIGN-OFF

This IRC Skills Forecast and Proposed Schedule of Work was agreed as the result of a properly constituted IRC decision.

Signed for and on behalf of the **Forest Management and Harvesting IRC** by its appointed Chair,

Stacey Gardiner	Signature of Chair Date: 28 April 2019

Signed for and on behalf of the **Timber Processing IRC** by its appointed Chair,

Dave Gover	Signature of Chair Date: 28 April 2019

Signed for and on behalf of the **Timber Building Solutions IRC** by its appointed Chair,

Dave Gover	Signature of Chair Date: 28 April 2019

APPENDIX 1: ADDITIONAL FWP TRAINING PACKAGE QUALIFICATIONS DETAILS

The training package for the forest and wood products sector is *FWP Forest and Wood Products*. The *FWP Training Package* is comprised of 25 qualifications, 31 skill sets and 328 units of competency.

Table 11: FWP qualification enrolments

Current Qualification Code*	Qualification Name	2014	2015	2016	2017	Total
FWP10116	Certificate I in Forest and Forest Products	0	0	0	0	**0**
FWP20116	Certificate II in Forest Growing and Management	999	959	1,004	559	**3,521**
FWP20216	Certificate II in Harvesting and Haulage	245	396	252	106	**999**
FWP20316	Certificate II in Sawmilling and Processing	180	168	163	48	**559**
FWP20416	Certificate II in Wood Panel Products	0	0	0	0	**0**
FWP20516	Certificate II in Timber Manufactured Products	12	35	17	68	**132**
FWP20616	Certificate II in Timber Merchandising	25	158	197	144	**524**
FWP20716	Certificate II in Timber Truss and Frame Design and Manufacture	0	0	0	0	**0**
FWP30116	Certificate III in Forest Growing and Management	810	637	468	312	**2,227**
FWP30216	Certificate III in Harvesting and Haulage	970	1,038	1,042	482	**3,532**
FWP30316	Certificate III in Sawmilling and Processing	76	159	117	88	**440**
FWP30416	Certificate III in Wood Panel Products	0	0	0	0	**0**
FWP30516	Certificate III in Timber Manufactured Products	39	27	21	9	**96**
FWP30616	Certificate III in Timber Merchandising	39	65	109	71	**284**
FWP30716	Certificate III in Sawdoctoring	20	31	42	38	**131**
FWP30816	Certificate III in Woodmachining	44	43	41	46	**174**
FWP30916	Certificate III in Timber Truss and Frame Design and Manufacture	42	50	71	70	**233**
FWP40116	Certificate IV in Forest Operations	36	70	43	47	**196**
FWP40216	Certificate IV in Timber Processing	17	11	20	11	**59**
FWP40316	Certificate IV in Timber Truss and Frame Manufacture	21	20	2	4	**47**
FWP40416	Certificate IV in Timber Truss and Frame Design	4	0	13	3	**20**
FWP50116	Diploma of Forest and Forest Products	15	17	35	19	**86**
FWP50216	Diploma of Timber Truss and Frame Manufacture	0	0	0	0	**0**
FWP50316	Diploma of Timber Truss and Frame Design	9	6	0	0	**15**
FWP60116	Advanced Diploma of Forest Industry Sustainability	0	0	0	0	**0**
Total		**3,603**	**3,890**	**3,657**	**2,125**	**13,275**

* Data includes qualifications that are superseded by, and equivalent to, the current qualification

Source: NCVER TVA program enrolments 2014-2017

Table 12: FWP qualification completions

Current Qualification Code*	Qualification Name	2014	2015	2016	2017	Total
FWP10116	Certificate I in Forest and Forest Products	0	0	0	0	**0**
FWP20116	Certificate II in Forest Growing and Management	191	36	41	27	**295**
FWP20216	Certificate II in Harvesting and Haulage	2	42	25	0	**69**
FWP20316	Certificate II in Sawmilling and Processing	13	21	3	0	**37**
FWP20416	Certificate II in Wood Panel Products	0	0	0	0	**0**
FWP20516	Certificate II in Timber Manufactured Products	3	15	7	16	**41**
FWP20616	Certificate II in Timber Merchandising	4	0	0	0	**4**
FWP20716	Certificate II in Timber Truss and Frame Design and Manufacture	0	0	0	0	**0**
FWP30116	Certificate III in Forest Growing and Management	117	32	43	17	**209**
FWP30216	Certificate III in Harvesting and Haulage	71	95	87	79	**332**
FWP30316	Certificate III in Sawmilling and Processing	18	22	35	12	**87**
FWP30416	Certificate III in Wood Panel Products	0	0	0	0	**0**
FWP30516	Certificate III in Timber Manufactured Products	24	22	5	0	**51**
FWP30616	Certificate III in Timber Merchandising	20	6	24	12	**62**
FWP30716	Certificate III in Sawdoctoring	3	5	8	12	**28**
FWP30816	Certificate III in Woodmachining	9	6	10	15	**40**
FWP30916	Certificate III in Timber Truss and Frame Design and Manufacture	18	8	21	23	**70**
FWP40116	Certificate IV in Forest Operations	22	55	11	14	**102**
FWP40216	Certificate IV in Timber Processing	6	4	3	0	**13**
FWP40316	Certificate IV in Timber Truss and Frame Manufacture	6	14	0	0	**20**
FWP40416	Certificate IV in Timber Truss and Frame Design	3	0	0	3	**6**
FWP50116	Diploma of Forest and Forest Products	10	10	10	0	**30**
FWP50216	Diploma of Timber Truss and Frame Manufacture	0	0	0	0	**0**
FWP50316	Diploma of Timber Truss and Frame Design	0	2	0	0	**2**
FWP60116	Advanced Diploma of Forest Industry Sustainability	0	0	0	0	**0**
Total		**540**	**395**	**333**	**230**	**1,498**

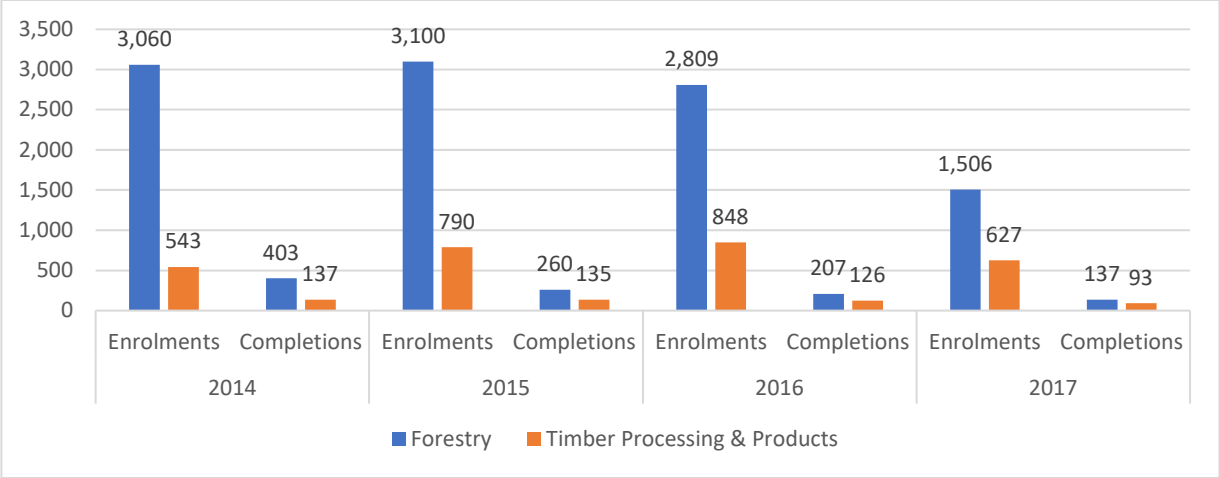
* Data includes qualifications that are superseded by, and equivalent to, the current qualification

Source: NCVER TVA program completions 2014-2017

In 2017, Forestry qualifications[35] accounted for 71 per cent of enrolments, with Timber Processing and Products qualifications making up the remaining 29 per cent (see Figure 5). This, however, is in the context of Forestry enrolments dropping by 46 per cent compared with 2016 figures.

[35] The Forestry cluster consists of qualifications in Forest Growing and Management, Harvesting and Haulage, Forest Operations and Forest Industry Sustainability. The Timber Processing & Products cluster consists of qualifications in Forest and Forest Products, Sawmilling and Processing, Wood Panel Products, Timber Manufactured Products, Timber Merchandising, Timber Truss and Frame Design and Manufacture, Sawdoctoring, Woodmachining, Timber Processing, Timber Truss and Frame Design, and Timber Truss and Frame Manufacture.

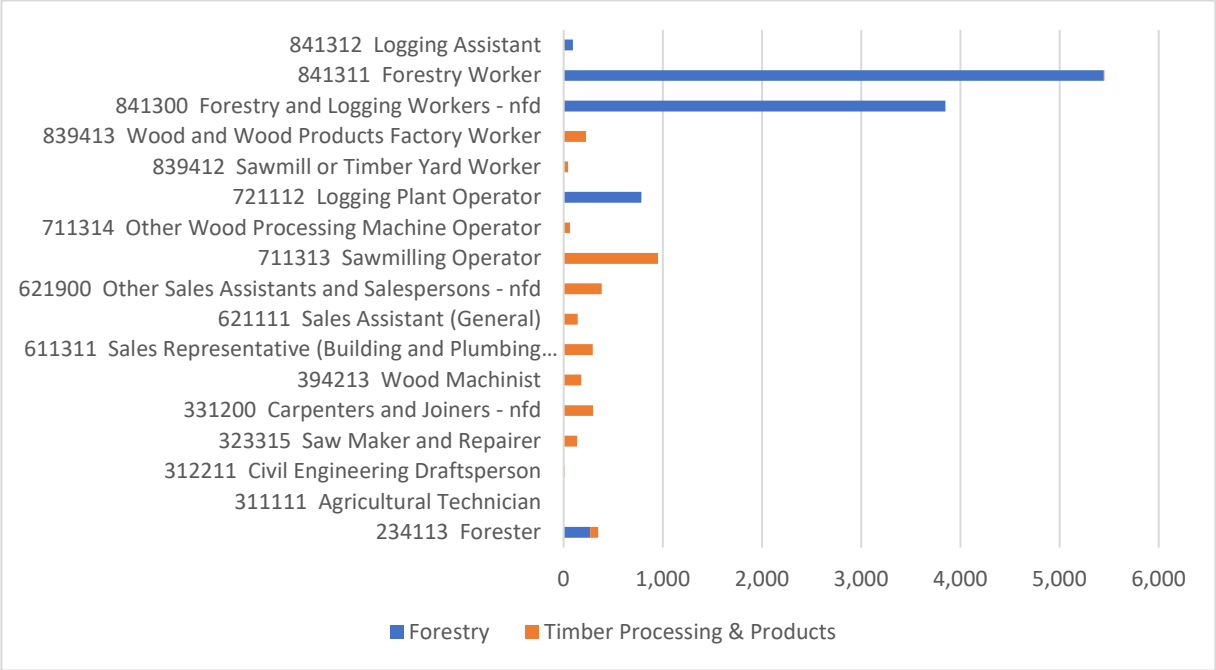
Figure 5: Enrolments & Completions by Qualification Cluster



Sources: a) NCVER VOCSTATS, TVA program enrolments 2014-2017; a) NCVER VOCSTATS, TVA program completions 2014-2017

In 2017, the *Certificate II in Forest Growing and Management* and *Certificate III in Harvesting and Haulage* made up 26 and 23 per cent of FWP Training Package enrolments respectively. These Forestry-cluster qualifications are intended to lead to the occupations 'Forestry Worker' and 'Forestry and Logging Worker'. For Timber Processing and Products-related qualifications, enrolments were greatest in the certificate II and III levels of 'Sawmilling and Processing' and 'Timber Merchandising', for which the intended occupations are principally 'Sawmilling Operator' and sales representative/assistant roles.

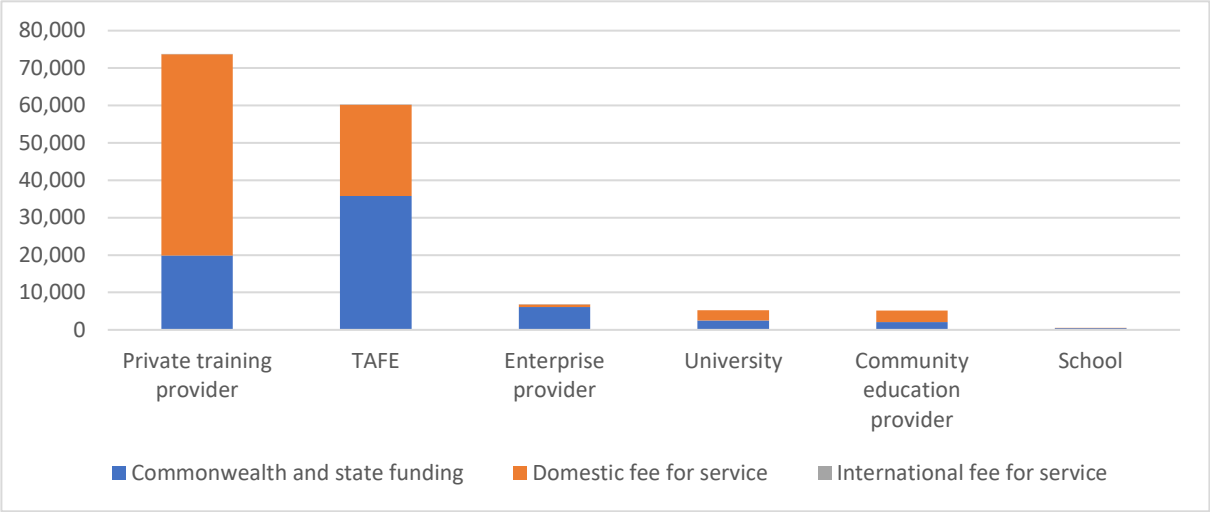
Figure 6: Qualification occupations by enrolments, 2014-2017



Source: NCVER VOCSTATS, TVA program enrolments 2014-2017

Around two-thirds of FWP program training was delivered by private training providers (RTOs) between 2014 and 2017, with TAFEs accounting for a further 30 per cent. During that period, 73 per cent of subjects delivered at RTOs were through domestic fee-for-service arrangements (with the rest government-funded), while the greatest proportion (59 per cent) of subject enrolments at TAFEs were government-funded (see Figure 7). Overall, 56 per cent of subject enrolments were domestic fee-for-service.

Figure 7: Subject Enrolments by Provider Type & Funding, 2014-2017



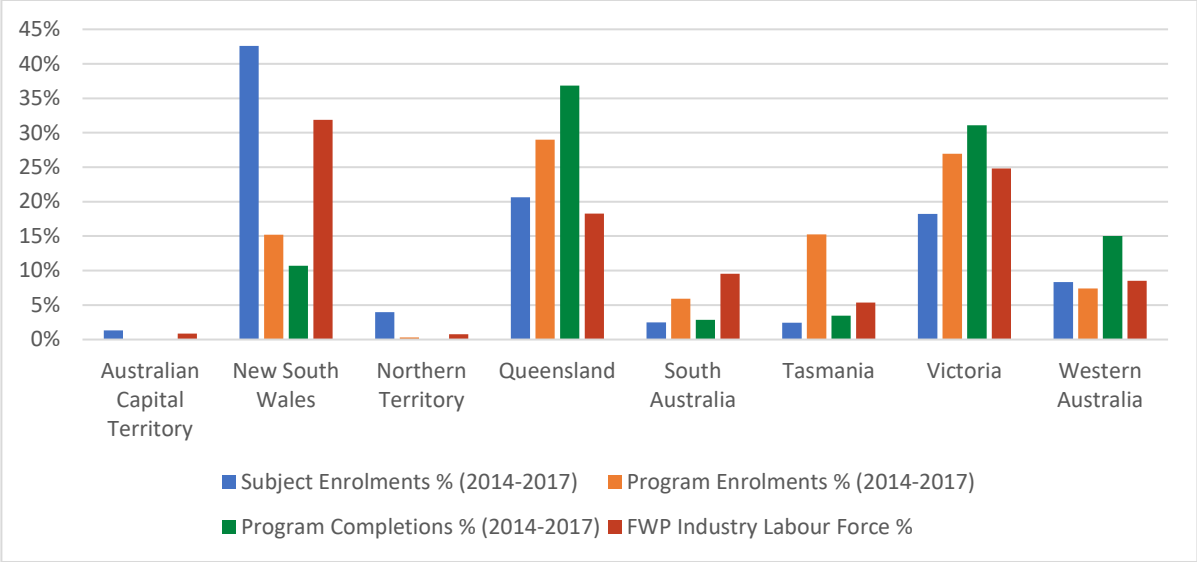
Source: NCVER VOCSTATS, TVA subject enrolments 2014-2017

Between 2014 and 2017, 29 per cent (3,842) of students who enrolled in FWP programs were in Queensland (despite a 44 per cent drop in enrolments between 2016 and 2017). Victoria had the second greatest number of program enrolments (3,573) in that period, including 40 per cent (859) of all enrolments in 2017.

Relative to states' proportions of the forest and wood product industry-related labour force, learners in Australian Capital Territory, Northern Territory and New South Wales have tended to enrol in *subjects* over programs (see Figure 8)[36]. In comparison, Queensland, South Australia, Victoria and Tasmania-based training records proportionally greater enrolments in FWP *programs*.

[36] In the years 2014 to 2017, Australian Capital Territory has recorded zero program enrolments, but 1,986 subject enrolments; Northern Territory recorded a rate of 148 subject enrolments for every one program enrolment; and New South Wales recorded a rate of 33 subject enrolments for every one program enrolment.

Figure 8: State proportions of enrolments, completions and the FWP-related labour force

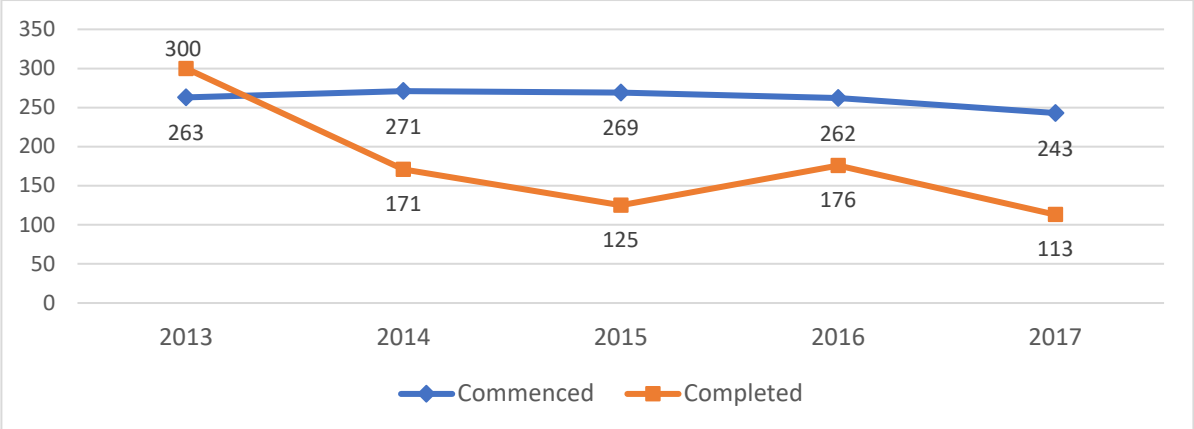


Sources: a) NCVER VOCSTATS, TVA subject enrolments 2014-2017; b) NCVER VOCSTATS, TVA program enrolments 2014-2017; c) NCVER VOCSTATS, TVA program completions, 2014-2017; d) Australian Bureau of Statistics - 6291.0.55.003 - EQ06 - Employed persons by Industry group of main job (ANZSIC), Sex, State and Territory, November 1984 onwards.

Most states' proportions of apprenticeship and traineeship commencements mirror their proportions of program enrolments; however, for two states the pattern is reversed: between 2013 and 2017, New South Wales accounted for on-third of all traineeships (compared to only 15 per cent or program enrolments), while Queensland recorded only 16 per cent of traineeships despite its 29 per cent share of program enrolments.

Generally, while apprenticeship and traineeship commencements have remained constant, completions have declined since 2013 (see Figure 9).

Figure 9: Apprentice and Trainee commencements and completions, 2013-2017



Source: SAS Visual Analytics Viewer

The following table displays FWP unit enrolments, thus demonstrating industry and cross-sector demand for workplace training. The list relates to current *FWP Training Package* units; however, enrolment data for current units includes enrolments in superseded units (where the unit name is the same), including from the superseded *FPI Training Package*.

Table 13: Unit enrolments

Unit Name	2014	2015	2016	2017	Total
Administer first aid procedures	0	0	2	0	**2**
Align sawing production systems	5	6	19	4	**34**
Apply basic first aid	0	0	0	0	**0**
Apply biodiversity protection principles	33	16	91	58	**198**
Apply principles of blade design to sawing procedures	30	33	43	32	**138**
Apply silvicultural principles	32	17	86	60	**195**
Apply wood and timber product knowledge	23	61	79	107	**270**
Assemble materials using nail plates	4	0	0	0	**4**
Assemble products	2	31	42	80	**155**
Assemble timber wall frames	11	8	16	16	**51**
Assess and maintain cutter performance	18	20	29	18	**85**
Assess and maintain saw performance	13	27	47	34	**121**
Assess product feasibility of designs	0	1	0	0	**1**
Assess timber for manufacturing potential	9	7	28	24	**68**
Assess wood chips	0	0	10	0	**10**
Band edges of panels	2	0	0	0	**2**
Break down logs	11	13	15	8	**47**
Build and maintain community relationships	184	162	168	98	**612**
Build and maintain timber stacks	0	6	3	8	**17**
Chip or flake wood	3	0	0	0	**3**
Collect seed	1,177	1,037	1,176	607	**3,997**
Collect, treat and store seed	8	0	0	0	**8**
Communicate and interact effectively in the workplace	462	485	651	514	**2,112**
Comply with soil and water protection	63	56	428	157	**704**
Conduct a forest site assessment	4	25	0	8	**37**
Conduct a pests and diseases assessment	2	0	0	4	**6**
Conduct a wood volume and yield assessment	14	4	3	0	**21**
Conduct excavator operations with grabs	138	274	342	289	**1,043**
Conduct feller buncher operations	55	103	116	88	**362**
Conduct forestry operations using crawler tractor	38	84	85	47	**254**
Conduct forwarder operations	103	124	148	143	**518**
Conduct loader operations	90	160	196	189	**635**
Conduct mechanical processor operations	43	71	81	47	**242**
Conduct mechanically assisted tree falling operations	16	66	32	6	**120**
Conduct mobile splitting operations	39	26	43	0	**108**

Conduct quality and product care procedures	183	336	307	385	**1,211**
Conduct seed collecting operations	0	0	0	0	**0**
Conduct skidder operations	86	187	204	187	**664**
Construct and maintain forest roads and tracks	3	0	12	0	**15**
Construct prototypes and samples	4	2	2	3	**11**
Convert timber	17	8	19	14	**58**
Convert timber residue into products for further use	2	0	0	0	**2**
Coordinate and monitor the wood chip stockpile	0	0	0	0	**0**
Coordinate log debarking operations	4	2	0	0	**6**
Coordinate log recovery (hook tender)	0	3	7	3	**13**
Coordinate plantation tending operations	2	6	12	0	**20**
Coordinate stand nutrition	3	3	7	0	**13**
Coordinate stem improvement	0	5	0	3	**8**
Coordinate stock control procedures	19	19	42	10	**90**
Coordinate timber drying operations	2	2	1	3	**8**
Create drawings using computer aided design systems	14	28	28	22	**92**
Cross cut materials with a fixed saw	10	24	3	0	**37**
Cross cut materials with a hand-held chainsaw	8	6	2	0	**16**
Cut material to length and angles	6	2	16	11	**35**
Cut material to profile	19	15	14	14	**62**
Cut material to shape using a saw	12	33	21	57	**123**
Cut material using CNC sizing machines	6	3	15	20	**44**
Cut material using high speed optimiser	13	6	5	7	**31**
Cut material with a pole saw	357	316	204	8	**885**
Cut materials with a hand-held chainsaw	1,852	2,076	3,257	2,114	**9,299**
Cut panels	0	0	0	0	**0**
Cut, sort and set cuttings	0	0	10	0	**10**
Design harvesting plans	1	5	4	0	**10**
Design log landings and snig tracks	14	42	17	27	**100**
Design plantations	3	0	0	0	**3**
Design timber structures	0	6	14	13	**33**
De-stack seasoning racks	6	3	11	1	**21**
Develop a native forest regeneration plan	2	0	0	0	**2**
Develop biohazard contingency plans	0	0	0	0	**0**
Diagnose and calculate production costs	11	6	1	2	**20**
Dismantle, transport and assemble hand portable sawmill	28	25	20	0	**73**
Dock boards with mechanical feed	11	5	3	6	**25**
Dock material to length	18	49	44	85	**196**
Dress boards and timber	21	16	17	39	**93**
Dress boards using multi-headed machines	20	25	24	35	**104**
Dry hardwood	2	1	10	3	**16**

Dry material	0	0	0	5	**5**
Dry softwood	3	0	6	2	**11**
Estimate and cost job	22	27	23	14	**86**
Evaluate fire potential and prevention	212	247	298	319	**1,076**
Extract seed	79	36	5	13	**133**
Fall trees manually (advanced)	350	426	451	451	**1,678**
Fall trees manually (basic)	1,984	2,252	2,722	2,024	**8,982**
Fall trees manually (intermediate)	1,473	1,777	1,770	1,199	**6,219**
File and set saws	12	31	22	12	**77**
Finish products	0	0	0	0	**0**
Follow cultural heritage requirements	19	21	71	84	**195**
Follow environmental care procedures	223	377	834	569	**2,003**
Follow fire prevention procedures	79	85	145	107	**416**
Follow OHS policies and procedures	1,307	2,103	3,254	334	**6,998**
Follow WHS policies and procedures	0	0	29	1,583	**1,612**
Generate and transfer complex computer-aided drawings and specifications	0	3	0	0	**3**
Grade and mark logs	30	48	38	117	**233**
Grade hardwood sawn and milled products	8	11	7	4	**30**
Grade heavy structural/engineered products	0	0	0	0	**0**
Grade, sort and mark material	15	25	46	16	**102**
Grade, sort and mark materials	0	0	1	7	**8**
Hand sharpen knives and blades	24	50	34	33	**141**
Hard face saw teeth	0	0	4	0	**4**
Harvest trees manually (advanced)	191	113	115	96	**515**
Harvest trees manually (intermediate)	194	100	116	94	**504**
Hook up felled logs using cables (choker)	2	7	5	0	**14**
Implement a forest establishment plan	3	2	0	0	**5**
Implement environmentally sustainable work practices in the work area/work site	6	47	49	96	**198**
Implement Forestry Chain of Custody certification system	7	2	8	0	**17**
Implement harvesting plans	16	45	17	34	**112**
Implement safety, health and environment policies and procedures	297	403	379	483	**1,562**
Implement sustainability in the workplace	0	19	6	0	**25**
Implement sustainable forestry practices	4	9	11	0	**24**
Install and commission CNC software	3	0	0	0	**3**
Interpret and use aerial photographs for forest management	0	0	0	0	**0**
Interpret designs to prepare timber floor system drawings and documents using computers	0	2	2	0	**4**
Interpret designs to prepare timber roof truss drawings and documents using computers	0	7	9	5	**21**

Interpret designs to prepare timber wall frame drawings and documents using computers	0	4	7	9	**20**
Join band saw blades	6	18	28	3	**55**
Lay up timber roof trusses	20	11	17	24	**72**
Level and tension circular saws	6	23	28	10	**67**
Machine material	15	22	16	40	**93**
Machine material using CNC machining and processing centres	18	16	19	11	**64**
Maintain and contribute to energy efficiency	0	0	6	0	**6**
Maintain chainsaws	3,964	4,873	5,764	5,198	**19,799**
Maintain frame saw blades	0	0	1	0	**1**
Maintain quality and product care	44	100	84	115	**343**
Maintain sawdoctoring tools	9	26	27	15	**77**
Maintain wide band saw blades	3	25	25	5	**58**
Manage coupe planning	5	4	0	0	**9**
Manage product design	2	5	0	0	**7**
Manage road construction and maintenance	4	1	0	0	**5**
Manage seed collection	53	41	55	38	**187**
Manage stand health	4	3	0	2	**9**
Manage tending operations in a native forest	0	0	0	0	**0**
Manage tree harvesting to minimise environmental impact	0	4	10	0	**14**
Manufacture cutting tools	13	22	25	27	**87**
Manufacture using joinery machines	8	3	0	0	**11**
Measure trees	10	11	13	16	**50**
Mechanically stress grade timber	7	0	0	0	**7**
Monitor and review forestry operations	28	50	27	27	**132**
Monitor log recovery (rigging slinger)	4	5	4	0	**13**
Monitor quality and product care procedures	31	56	39	30	**156**
Monitor regeneration rates	10	2	4	0	**16**
Monitor safety, health and environment policies and procedures	115	127	85	54	**381**
Navigate in forest areas	11	6	14	4	**35**
Navigate in remote or trackless areas	329	174	265	241	**1,009**
Operate 4x4 vehicle	188	233	470	130	**1,021**
Operate a four wheel drive in a towing situation	85	38	17	22	**162**
Operate a four wheel drive on unsealed roads	956	1,046	1,724	1,784	**5,510**
Operate a heavy production mobile chipper	2	35	22	22	**81**
Operate a mobile chipper/mulcher	678	1,055	1,336	1,190	**4,259**
Operate a pole saw	1,279	1,604	2,241	1,674	**6,798**
Operate a portable sawmill	28	27	16	0	**71**
Operate a single grip harvester	57	67	81	101	**306**
Operate a truss press	22	13	22	26	**83**

Operate automated stacking equipment	14	16	12	7	**49**
Operate heat plant	0	0	8	0	**8**
Operate steam boiler	3	0	3	7	**13**
Operate yarder	5	5	2	0	**12**
Organise enterprise maintenance programs	0	2	6	0	**8**
Pack products	24	16	4	12	**56**
Patrol forest	1	0	0	2	**3**
Perform complex 4x4 operations	526	729	1,052	1,330	**3,637**
Perform landing duties (chaser)	4	2	4	0	**10**
Plan a quarry	0	0	0	0	**0**
Plan and coordinate fire salvage operations	0	2	0	0	**2**
Plan and coordinate heat plant operations	3	0	0	0	**3**
Plan and coordinate product assembly	3	3	7	6	**19**
Plan and implement non-commercial thinning operations	0	3	0	5	**8**
Plan and manage an inventory program	0	0	4	0	**4**
Plan and monitor board conversion	0	3	0	0	**3**
Plan and monitor equipment maintenance	114	104	159	153	**530**
Plan and monitor saw log operations	2	3	11	0	**16**
Plan and monitor timber treatment plant operations	2	2	0	0	**4**
Plan production	8	3	0	0	**11**
Plant trees by hand	10	12	15	9	**46**
Prepare a tender	3	0	0	0	**3**
Prepare and advise on a broad range of timber floor system details using computers	1	0	0	0	**1**
Prepare and advise on a broad range of timber roof truss details using computers	0	2	6	8	**16**
Prepare and advise on a broad range of timber wall frame details using computers	0	0	4	5	**9**
Prepare and interpret sketches and drawings	31	41	41	40	**153**
Prepare for timber treatment operations	0	3	4	0	**7**
Prepare timber to meet import/export compliance requirements	0	0	0	2	**2**
Process orders and despatch products	0	1	18	18	**37**
Process seed	0	0	0	0	**0**
Produce sawn green boards	33	47	31	23	**134**
Produce templates	19	19	22	24	**84**
Profile saw blanks	0	0	7	0	**7**
Promote the carbon benefits of wood products	12	16	3	0	**31**
Prune trees	55	41	44	40	**180**
Quote and interpret from computerised timber manufactured product plans	1	8	3	9	**21**
Quote and interpret from manufactured timber product plans	0	1	1	9	**11**
Rack material	0	15	4	2	**21**

Read and interpret maps	11	10	3	0	**24**
Read and interpret timber truss, floor and/or frame fabrication plans	10	14	18	23	**65**
Receive and measure logs	2	0	1	0	**3**
Recondition band mill wheels	3	5	20	13	**41**
Recondition guides	6	7	16	14	**43**
Recover four wheel drive vehicles	586	689	1,254	1,261	**3,790**
Rehabilitate tracks, quarries and landings	68	54	64	49	**235**
Replace saws, blades and guides	44	44	64	52	**204**
Replace stellite tips	8	17	23	8	**56**
Replace tungsten tips	15	16	23	13	**67**
Resaw boards and timber	34	51	55	108	**248**
Saw flitches and cants	5	26	20	19	**70**
Saw logs using CNC optimising systems	2	1	0	0	**3**
Schedule and coordinate load shifting	0	0	3	0	**3**
Segregate and sort logs	8	54	49	49	**160**
Select and saw logs in multi-species operations	0	0	2	2	**4**
Select timber for forestry operations	32	33	31	30	**126**
Select timber preservation techniques	3	0	0	0	**3**
Select trees for tending operations	8	17	12	11	**48**
Set up timber floor trusses	5	0	2	3	**10**
Set up, operate and maintain end matching operations	0	0	4	0	**4**
Set up, operate and maintain finger jointing operations	1	0	2	0	**3**
Sharpen and align blades and knives	28	36	38	29	**131**
Sharpen band saws	7	24	25	7	**63**
Sharpen circular saws	33	68	21	12	**134**
Sharpen cutting tools	21	30	34	34	**119**
Sharpen tipped circular saws	16	14	24	11	**65**
Shift forestry logs using trucks	4	0	1	0	**5**
Sort boards manually	30	39	8	7	**84**
Sort boards mechanically	9	14	5	0	**28**
Stack and bind material	26	24	0	0	**50**
Store materials	3	8	0	0	**11**
Swage and shape saw blades	3	14	21	3	**41**
Tail out materials	37	102	39	80	**258**
Take off material quantities	27	23	26	26	**102**
Tally material	12	8	5	4	**29**
Test heavy structural/engineered products	0	0	0	0	**0**
Test strength of joints	0	0	0	0	**0**
Transport forestry logs using trucks	55	84	204	162	**505**
Transport forestry produce using trucks	0	13	16	0	**29**

Treat timber	3	6	14	12	**35**
Trim and cross cut felled trees	1,388	1,130	1,222	419	**4,159**
Trim and cut felled trees	6,016	7,396	9,047	8,139	**30,598**
Trim and cut harvested trees	340	199	230	186	**955**
Undertake brushcutting operations	170	96	103	207	**576**
Use hand-held tools	227	190	58	95	**570**
Utilise burning for natural and cultural resource management	1	0	0	0	**1**
Visually assess materials	68	135	142	127	**472**
Visually stress grade cypress	0	0	2	0	**2**
Visually stress grade hardwood	26	26	51	26	**129**
Visually stress grade softwood	60	197	88	122	**467**
Weigh loads	0	5	3	2	**10**
Work effectively in the forest and forest products industry	409	480	614	543	**2,046**

Source: NCVER VOCSTATS, TVA subject enrolments 2014-2017

APPENDIX 2: INDUSTRY REGULATIONS AND STANDARDS

Australian forest and wood products industry operates under a high level of regulation.

Environmental protection

Australia's public native forests, including those held in nature conservation reserves and those available for wood production, are governed and managed under national and state/territory regulatory frameworks and management plans (many of which are prescribed in legislation) relating to the conservation and sustainable management of forests.

There are three significant pieces of legislation at the federal level that support the conservation and sustainable management of public native forests, and over 30 pieces of legislation at the state and territory level. Federal legislation includes:

- Environmental Protection and Biodiversity Conservation Act 1999
- Regional Forest Agreement Act 2002
- Illegal Logging Prohibition Act 2012.

Management of forests on private land is also regulated under various native vegetation Acts. State and territory government forestry legislation includes:

- Forestry Act 2012 (NSW)
- Forestry Act 1959 (QLD)
- Forest Act 1950 (SA)
- South Australian Forestry Corporation Act 2000 (SA)
- Forest Management Act 2013 (TAS)
- Forestry (Rebuilding the Forest Industry) Act 2014 (TAS)
- Forest Act 1958 (VIC)
- Victorian Plantations Corporation (Amendment) Act 1998 (VIC)
- Sustainable Forests (Timber) Act 2004
- Forests Act 1918 (WA).

Federal and state and territory government environmental and heritage protection legislation includes:

- Environment Protection and Biodiversity Conservation Act 1999 (Cwth)
- The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cwth)
- Environmental Protection Act 1994 (QLD)
- Nature Conservation Act 1992 (QLD)
- Aboriginal Cultural Heritage Act 2003 (QLD)
- Conservation and Land Management Act 1984 (QLD)
- Protection of the Environment Operations Act 1997 (NSW)
- Biodiversity Conservation Act 2016 (NSW)
- Environment Protection Act 1993 (SA)

- Natural Resources Management Act 2004 (SA)
- Aboriginal Heritage Act 1988 (SA)
- Environmental Management and Pollution Control Act 1994 (TAS)
- Aboriginal Heritage Act 1975 (TAS)
- Environmental Protection Act 1970 (VIC)
- Catchment and Land Protection Act 1994 (VIC)
- Flora and Fauna Guarantee Act 1988 (VIC)
- Wildlife Act 1975 (VIC)
- Aboriginal Heritage Act 2006 (VIC)
- Environmental Protection Act 1986 (WA)
- Biodiversity Conservation Act 2016 (WA)
- Conservation and Land Management Act 1984 (WA)
- Aboriginal Heritage Act 1972 (WA).

Major non-legislative policies and strategies that guide the sustainable forest management of Australia's forest also include:

- National Forestry Policy Statement 1992 (Cwth)
- Plantations for Australia: the 2020 Vision (Cwth)
- National Indigenous Forestry Strategy 2005 (Cwth)
- Australia's Biodiversity Conservation Strategy 2010-2030 (Cwth)
- Australia's strategy for the National Reserve System 2009-2030 (Cwth)
- Farm Forestry National Action Statement 2005 (Cwth)
- The Australian Forestry Standard for Forest Management (AS 4708:2013) (Cwth)
- FSC Australia – Forest Stewardship Standard (AFSS) (Draft) (Cwth)
- ACT Nature Conservation Strategy 2013-23 (ACT)
- ACT Lowland Woodland Conservation Strategy (Action Plan No.27) (ACT)
- Forest NSW Forest Management Policy (NSW)
- Farm Forestry Strategy for NSW 2003 (NSW)
- Industry Development Plan 2013-2017 (NT)
- Territory 2030 Strategic Plan 2009 (NT)
- Forest Management Policy Statement (QLD)
- Queensland Timber Plantation Strategy 2020 (QLD)
- Building Nature's Resilience: A Biodiversity Strategy for Queensland (QLD)
- The Queensland Forest and Timber Industry Plan (QLD)
- Forest Industry Strategy: Vision 2050 Strategic Directions 2011-2016 (SA)
- ForestrySA Policy for Sustainable Forest Management (SA)
- No Species Loss: A Nature Conservation Strategy for South Australia 2007-2017 (SA)

- Permanent Native Forest Estate Policy (TAS)
- Forestry Tasmania's Sustainable Forest Management Policy (TAS)
- Sustainability Charter for Victoria's State Forests (VIC)
- Ecologically Sustainable Forest Management Policy (VIC)
- Forest Products Commission Forest Management Policy (WA).

In addition, the industry operates under the guidance and implementation of codes of practice, guidance materials and standards for sustainable forest management of wood production forests. As shown below, the codes and other types of guidance documents cover a range of industry matters and vary in their legal status and jurisdiction coverage:

- Forest planning
- Forest access and roading
- Operating heavy vehicles
- Managing work health and safety (WHS) risks in forest harvesting
- Sawmilling and timber operations
- Timber preservation
- Conservation of non-wood values
- Pest, weed and fire management
- Harvesting of non-wood forest products.

Work health and safety

Safety is a major driver for industry training. The activities of most significant concern regarding safety are within the forest growing and management and harvesting and haulage sectors, due to the high use of mobile machinery and the nature of the working environment.

Within all six industry sectors, the areas of high risk and high compliance requirements include:

- Manual tree falling
- Operation of mobile machinery and equipment in the forest terrain
- Loading and unloading log trucks
- Load restraints
- Stacking timber
- Cable logging
- Fatigue management
- Manual handling
- Forklift in motion/ transporting goods
- Chemical hazards
- Other chainsaw or pole saw activities
- Slips, trips, falls.

Industry producers and wholesalers are required to meet work health and safety requirements of applicable Commonwealth, state or territory legislation and regulations, Safe Work Australia guidelines, and organisational safety policies and procedures.
National work and safety guidelines, developed by Safe Work Australia and the industry, for managing risks in forestry operations include:

- Guide to growing and managing Forests (2013)
- Guide to managing risks of loading, transporting and unloading logs (2014)
- Guide to managing risks of in-field processing forest products (2014)
- Guide to managing risks of timber harvesting operations (2014)
- Guide to managing risk of plant and equipment for forestry operations (2014)
- Guide to managing risks of general hazards in forestry operations (2017)
- Guide to managing risks of log landing (2014)
- Guide to managing risks of log extraction (2014)
- Guide to managing risks of coupe and harvesting site access and preparation (2014)
- Guide to managing risks of tree trimming and removal work (2016)
- Forestry operations guidance material (2014)
- General guide for managing risks in forestry operations (2014).

Wholesalers must comply with the *Competition and Consumer Act 2010*, which covers relationships between all parties within the supply chain (including wholesalers, manufacturers, retailers and consumers) and promotes fair-trading among these parties.

Industry standards

The industry implements two voluntary forest certification schemes, the Responsible Wood Certification Scheme and the Forest Stewardship Council Scheme (FSC), which typically require more stringent forest management practices than the legislation alone. Forest management standards and chain-of-custody standards frame both schemes.

APPENDIX 3: INDUSTRY PRIORITY FOR GENERIC SKILLS

The Industry Reference Committees were consulted on ranking the generic skills priorities for industry from a list provided by the Department of Education and Training. The following table provides industry ranking by priority.

Table 14: Industry priorities for generic skills

Rank	Generic Skill
1	**Technology use and application skills** Ability to create and/or use of technical means understand their interrelation with life, society, and the environment. Ability to understand and apply scientific or industrial processes, inventions, methods, etc. Ability to deal with increasing mechanisation and automation and computerisation. Ability to do work from mobile devices rather than from paper.
2	**Environmental and Sustainability skills** Ability to focus on problem-solving and the development of applied solutions to environmental issues and resource pressures at local, national and international levels.
3	**Language, Literacy and Numeracy (LLN) skills** Foundation skills of literacy and numeracy.
4	**Design mindset/Thinking critically/Systems thinking/Problem-solving skills** Ability to adapt products to rapidly shifting consumer tastes and trends. Ability to determine the deeper meaning or significance of what is being expressed via technology. Ability to understand how things that are regarded as systems influence one another within a complete entity, or larger system. Ability to think holistically.
5	**Communication/Collaboration including virtual collaboration/Social intelligence skills** Ability to understand and apply the principles of creating more value for customers with fewer resources (lean manufacturing) and collaborative skills. Ability to critically assess and develop content that uses new media forms and leverage these media for persuasive communications. Ability to connect with others deeply and directly, to sense and stimulate reactions and desired interactions.
6	**Science, Technology, Engineering and Maths (STEM) skills** Sciences, mathematics and scientific literacy.
7	**Learning agility/Information literacy/Intellectual autonomy and self-management skills** Ability to identify a need for information. Ability to identify, locate, evaluate, and effectively use and cite the information. Ability to discriminate and filter information for importance. Ability to do more with less.

	Ability to quickly develop a working knowledge of new systems to fulfil the expectations of a job. Ability to work without direct leadership and independently.
8	**Managerial/Leadership skills**
	Ability to effectively communicate with all functional areas of the organisation. Ability to represent and develop tasks and work processes for desired outcomes. Ability to oversee processes, guide initiatives and steer employees toward achievement of goals.
9	**Data analysis skills**
	Ability to translate vast amounts of data into abstract concepts and understand data-based reasoning.Ability to use data effectively to improve programs, processes and business outcomes. Ability to work with large amounts of data: facts, figures, number crunching, analysing results.
10	**Customer service/Marketing skills**
	Ability to interact with another human being, whether helping them find, choose or buy something. Ability to supply customers' wants and needs both via face-to-face interactions or digital technology. Ability to manage online sales and marketing. Ability to understand and manage digital products.
11	**Financial skills**
	Ability to understand and apply core financial literacy concepts and metrics, streamlining processes such as budgeting, forecasting, and reporting, and stepping up compliance. Ability to manage costs and resources, and drive efficiency.
12	**Entrepreneurial skills**
	Ability to take any idea, whether it be a product and service, and turn that concept into reality and not only bring it to market but make it a viable product and/or service. Ability to focus on the very next step to get closer to the ultimate goal. Ability to weather the ups and downs of any business. Ability to sell ideas, products or services to customers, investors or employees etc.
13	**Other generic skills**