frontier economics

Forestry transition and regional employment

A report for the World Wide Fund for Nature - Australia | 6 December 2024

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Executive Summary

This report, commissioned by WWF-Australia and prepared by Frontier Economics, explores pathways to transition out of public native forest logging in New South Wales (NSW) that have the potential to maintain regional employment levels over the medium to long term. This report does not consider the case for ending public native forest logging in NSW. It explores economic transition pathways assuming that this decision had been made.

Public native forest logging is a small part of the NSW forestry sector and regional economies

The broader forestry sector and regional economies in NSW are significant and diverse. Public native forest logging now represents a small share of these economies in terms of employment. However, despite the relatively small employment contribution public native forestry makes, the businesses and jobs are highly valued in the regional economies.

The dramatic reduction in the economic contribution of public native forest logging has been driven by a range of factors including the Regional Forest Agreements implementing sustainable wood supply. We estimate that direct employment in public native forest logging in NSW to be in the order of 1,070 across the state (made up of Northern, Southern and Western region employments levels at 590, 332, and up to 150 employees, respectively).[1] This reflects the fact that that the public NFL sector has been in a state of transition for some time, as have the regional economies where this activity is most concentrated.

Even in the absence of a government decision to end native forest logging it is likely that this part of the industry, and its current employment levels, will continue to decline. The public native forest logging sector faces a range of challenges including a reduction in wood supply, climate risks, the establishment of new conservation estates, competition from softwood products, and a substitution of native hardwood for plantation hardwood in international markets.

More substantial and sustainable elements of the industry would remain and have potential for growth if this element of the industry no longer continued.

Structural adjustment interventions could support the forestry sector to transition

Within this context, this report considers a set of complementary and strategic structural adjustment interventions targeted to building resilience in the NSW hardwood supply chain, assuming that there is a transition out of public native forest logging.

The three interventions, which are aimed at supporting sustainable employment levels, are:

- **Developing alternative sources of hardwood supply**: The potential to offset the reduction in hardwood supply is explored to address both short- and long-term demand. This includes an expansion of public hardwood plantations, private forest resource, and importation of resource. There are opportunities to incentivise investment in hardwood plantations and agroforestry to provide for medium to longer term volume and security of supply.
- **Innovative manufacturing and processing**: A future sustainable hardwood processing sector would be very different to the industry that exists today, in terms of:

[1] Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

  - The variety of the products produced, which would likely comprise of more composite products e.g. using lower-grade hardwoods for construction and appearance grade products, and
  - The sophistication of the wood processing technology and processes.

  This means there is a requirement and opportunities for reinvestment in the processing sector. Coordination across the forestry industry to invest and take advantage of these opportunities, as is occurring in other areas of Australia, could be supported and de-risked by governments.

- **Conservation and restoration**: Transitioning approximately 2 million hectares of forests previously allocated for public NFL into protected areas would necessitate new efforts in forest management and restoration. The scale of the task to restore NSW's degraded forests is uncertain, though likely to be high. Delivering these environmental benefits will require new roles in forest management and restoration.

Implementing these changes would involve co-dependencies and are subject to risk in both timing and outcomes. Across the medium to longer term, these interventions could both improve the surety and volume of wood supply and provide a basis for investment in new manufacturing. These developments could be mutually reinforcing and provide a foundation for further industrial growth and employment.

These initiatives have the potential to support sustainable employment outcomes over the medium to long term

To provide a perspective on this, Frontier Economics estimated the direct employment potential that could be supported by a successful but conservative version of these structural adjustment interventions. We estimate that around 1,200 positions in NSW could be supported over the medium to longer term including:

- Over 80 FTEs to maintain 66,000 hectares of new and 34,000 hectares of existing hardwood plantations,
- Over 550 FTEs in hardwood manufacture, sustained by plantation, private, and import resource with the potential for additional growth as hardwood plantations mature, and
- Over 550 FTEs to manage and restore the 2 million hectares of additional protected forest areas.

These state level estimates are not forecasts; they are instead designed to illustrate the scale of the structural adjustment required to support ongoing employment in NSW's hardwood sector.

The economic impacts will differ between NSW regional economies

At the regional level, this report finds that a cessation of public native forest logging would manifest differently across NSW's regional economies. To explore this, Frontier Economics analysed two regions that have a relatively material public native forest logging footprint:

- Bega Valley Shire: We observe that over recent decades the transition away from public native forest logging has to a material extent already occurred. Public native forest logging in the region is now almost entirely focused on the chipping of pulplogs for export, with sawmilling activity having largely exited the region. The regional economy appears to have shown the capacity to adapt to these changes over time.
- Port Macquarie-Hastings: We observe that public native forest logging predominately supports sawmilling activity, with native forest resource complemented to some extent by

hardwood plantations. The region's economic diversification and historic growth profile suggest it is well placed to adapt to change.

In both of these regions, forestry related employment is a relatively small component of the broader employment profile, with employment tending to contribute around 0.5% for Wood Product Manufacturing in both local government areas, and between 0.2% and 0.8% for Forestry and Logging in Port Macquarie Hastings and Bega Valley, respectively. Employment in public native forest logging is a subset of this broader measure of forestry employment.

Government will have a role to play in ensuring an equitable and efficient transition out of public native forest logging for these communities and businesses if this decision is made.

We recommend further analysis

In the event a decision to end public native forest logging is made, it is recommended that government progress the three interventions explored in this report to an economic feasibility assessment. This work will act to reduce uncertainty in the feasibility, timing, and potential outcomes that these interventions could deliver for the hardwood sector and the impacted regional economies.

2 Context and purpose

2.1 Project context

Despite the relatively small and declining economic contribution public native forest logging (NFL) makes in NSW, the businesses and jobs are highly valued in the regional economies. In securing support for a cessation of public NFL, a key task is to provide assurance to communities that a transition does not represent a fundamental threat to the communities' social and economic foundations.

These same communities will tend to have economies which are geared towards primary industries and related manufacturing. An equitable and efficient transition out of native forest logging will in part require re-purposing existing regional competitive advantages to provide new sources of regional employment.

Against this backdrop, WWF-Australia has asked Frontier Economics to provide analysis and advice to support a 'no net jobs lost' transition out of public NFL in NSW.[2]

2.2 Transition support to enhance regional outcomes

An efficient and equitable structural adjustment package out of public NFL can act as a means to build regional economic employment and resilience. To explore this point, this report seeks to explore three key matters:

- The spatial economic characteristics of the public NFL sector in NSW,
- Regional economic characteristics and competitive advantages, including in land, timber-related expertise and supporting industries that could be leveraged for new opportunities, and
- Whether the phase out of public NFL and transition toward alternative economic opportunities could result in greater regional employment opportunities.

This report is structured as follows:

- Section 3 describes the spatial economic characteristics and likely employment profile of public NFL activity in NSW,
- Section 4 outlines a simple framework for considering the uneven impact a cessation of public NFL could have and identifies interventions that could build regional economic resilience and employment, and
- Sections 5 and 6 focus on the Bega Valley Shire and Port Macquarie Hastings regional economies and public native forestry sectors. This section then considers how our range of initiatives could potentially translate to the region.
- Section 7 discusses the findings and implications of this analysis, including the role of government, and recommended future areas of analysis.

Where possible, this report was supported by stakeholder engagement with a limited group of industry participants, timber sector stakeholders, NGOs and local community members.

[2] This project builds on earlier work undertaken for WWF-Australia: Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

3 Public NFL in NSW

Public NFL in NSW is operated by the state-owned company Forestry Corporation of New South Wales (FCNSW). It is the largest wood supplier in the state, operating a large softwood plantation estate, a smaller hardwood plantation estate, and conducts NFL in NSW's state forests.

This section outlines:

- The spatial overview of the public NFL sector,
- Trends in the public NFL sector over time,
- Estimates of direct employment in public NFL.

In line with reductions in wood supply, the employment contribution of public NFL has fallen to modest levels. Notwithstanding this, the footprint of the sector varies across the state with pockets of concentration. We have previously estimated that direct employment in public NFL to be in the order of 1,070 across the state (made up of northern, southern and western region employments levels at 590, 332, and up to 150 employees, respectively).[3]

3.1 A spatial overview of the public NFL sector

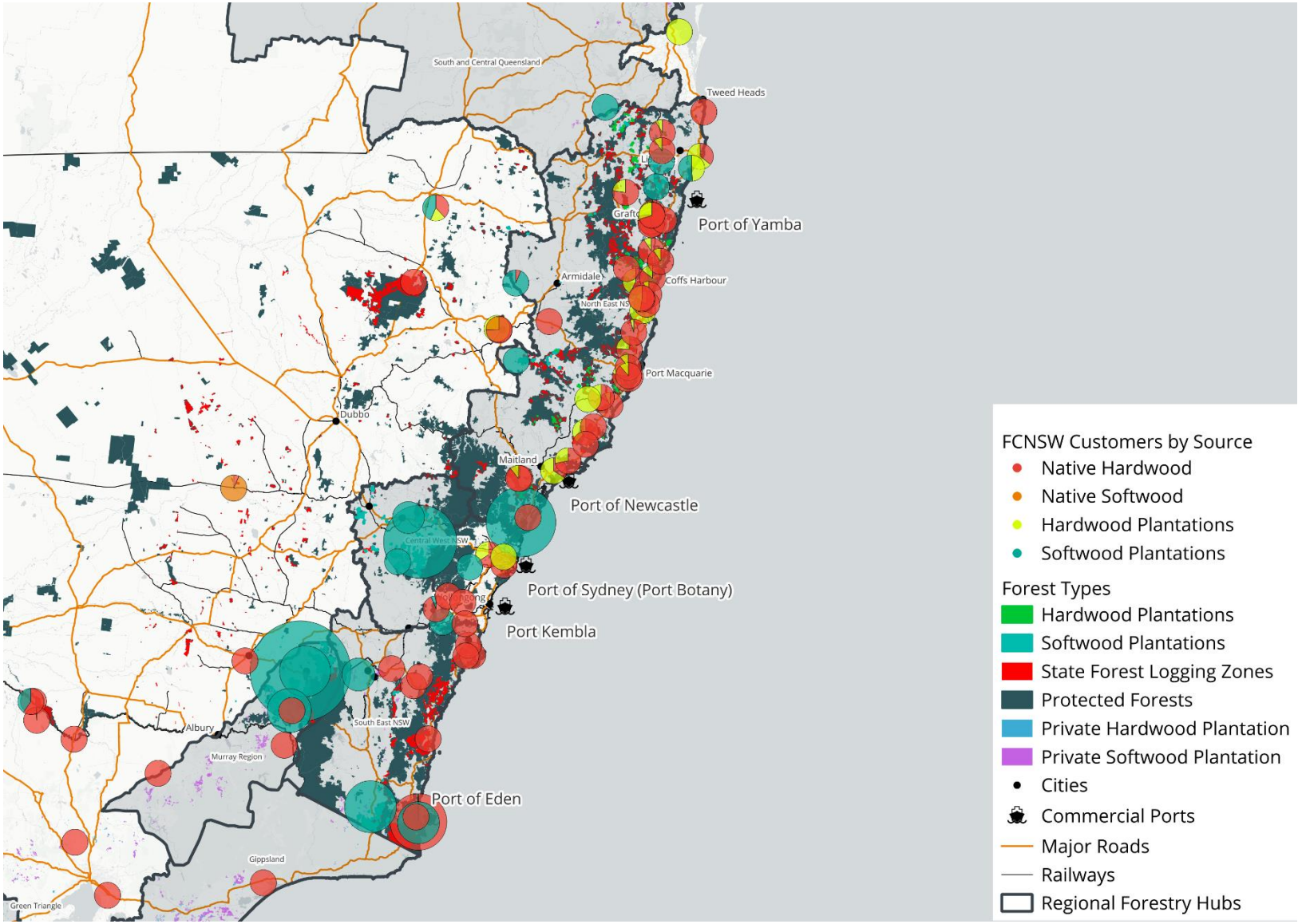
The public NFL sector is spread across NSW, with areas of concentration in the far south and north coasts of NSW. FCNSW manages around 1.8 million hectares of public native forests, around 800,000 ha of which is available for hardwood production and the remaining 1 million ha managed for environmental conservation and other values.[4] FCNSW also holds around 34,000 ha of hardwood timber plantations in northeast NSW.

A spatial representation of the public NFL sector is presented in Figure 1. The figure contains information on state forest logging zones and FCNSW's customers, with detail on the size and nature of customer demand serviced by FCNSW. Figure 1 also presents data on FCNSW's hardwood and softwood plantation resources, and partial information on the location of potential private native forestry resource in the state's northeast.

[3] Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

[4] FCNSW 2023, *Annual Report 2022-23*, https://www.forestrycorporation.com.au/about/pubs/corporate/annual-report/forestry-corporation-of-nsw-annual-report-2022-23

Figure 1: Map of public logging activity in NSW



Source: Frontier Economics Analysis of FCNSW, ABARES and NSW Spatial Portal dataset, see appendix B for map region definitions.

Location of NSW's state forests and plantation resources

The public NFL sector can be geographically split in different ways, one of which being by Regional Forestry Hubs (RFH). The RFHs were established under the federal *National Forestry Industry Plan 2018*, with each RFH representing concentrations of industrial activity including significant wood supply resources, processing and manufacturing facilities and domestic and international transport links:[5]

- The Northeast RFH: Spans the east coast from the Central Coast to Tweed Heads, characterised by an estimated 838,000 hectares of State Forest, with 366,000 hectares available for timber supply,[6] this region largely supplies hardwood sawlogs to a widely dispersed customer base,
- The Central Western RFH: Located across areas of the Central Tablelands and Southern Tableland. Industrial activity is centred on plantation resource, with some pockets of public NFL. The hub has approximately 89,757 ha of plantations, 70,871 ha (or 79%) of which are managed by FCNSW,[7]
- The Southeast RFH: Spans the south coast of NSW from Nowra to the Victorian boarder. The Hub covers an estimated 415,000 ha of State Forest, with significant pockets of activity in the Queanbeyan-Palerang and Bega Valley Shire LGAs with 79% of FCNSWs yield from this region being pulplogs,[8] and
- The Murray Region RFH: Split across NSW and Victoria, supplied by a large softwood plantation estate, with the majority of NSW industry activity being clustered around Tumut in the Snowy Valleys LGAs.

Location and size of FCNSW's customers

Based on public reporting, FCNSW provides hardwood and softwood supply to approximately 86 customers in NSW.[9] [10] Of these customers, at most 53 are estimated to be hardwood sawmills.[11] By count, the majority of these customers are located in the Northeast RFH (53%), followed by the Southeast RFH (19%) and Central Western RFH (21%). FCNSW supplies a small number of customers located within Greater Sydney (3%).[12]

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5 Australian Government Department of Agriculture, Fisheries and Forestry (2023). Regional Forestry Hubs. Accessed July 2024 from https://www.agriculture.gov.au/agriculture-land/forestry/regional-forestry-hubs#new-south-wales

6 North East NSW Forestry Hub. Native Forests. (Accessed May 2024 from https://nenswforestryhub.com.au/forest-resources/native-forests)

7 Greenwood strategy (2022). Development of a spatial database. Report prepares for the Central West NSW Forestry Hub. https://cwfh.com.au/downloads/CWFH001_Final_Report_20220125.pdf

8 In the Eden and South Coast regions ~197,000 cubic meters of pulp log were harvested in FY23, and ~250,000 cubic meters were harvested across all wood types. So, 79% of yield in the region was pulp logs. From FCNSW (2023). Our customers. Sustainability Report 2022-23. https://app.powerbi.com/view?r=eyJrIjoiYWM4OTc5MTItZTRkNC00YzI1LTg3MjMtZjk4MGIzNjZkMzdmIiwidCI6IjdlODcyMjA5LWY3MGItNDU3OC1hNzk5LTA4YTdjZjAzODI3NSJ9

9 FCNSW (2023). Our customers. Sustainability Report 2022-23. Noting that this is not a comprehensive collection of timber customers in NSW, nor a representation of each customer's entire supply.

10 FCNSW does not distinguish between different customer categories within their data. Whilst are aware that many customers will not be sawmills, such as paper manufacturing plants, the majority of these customers will be sawmills.

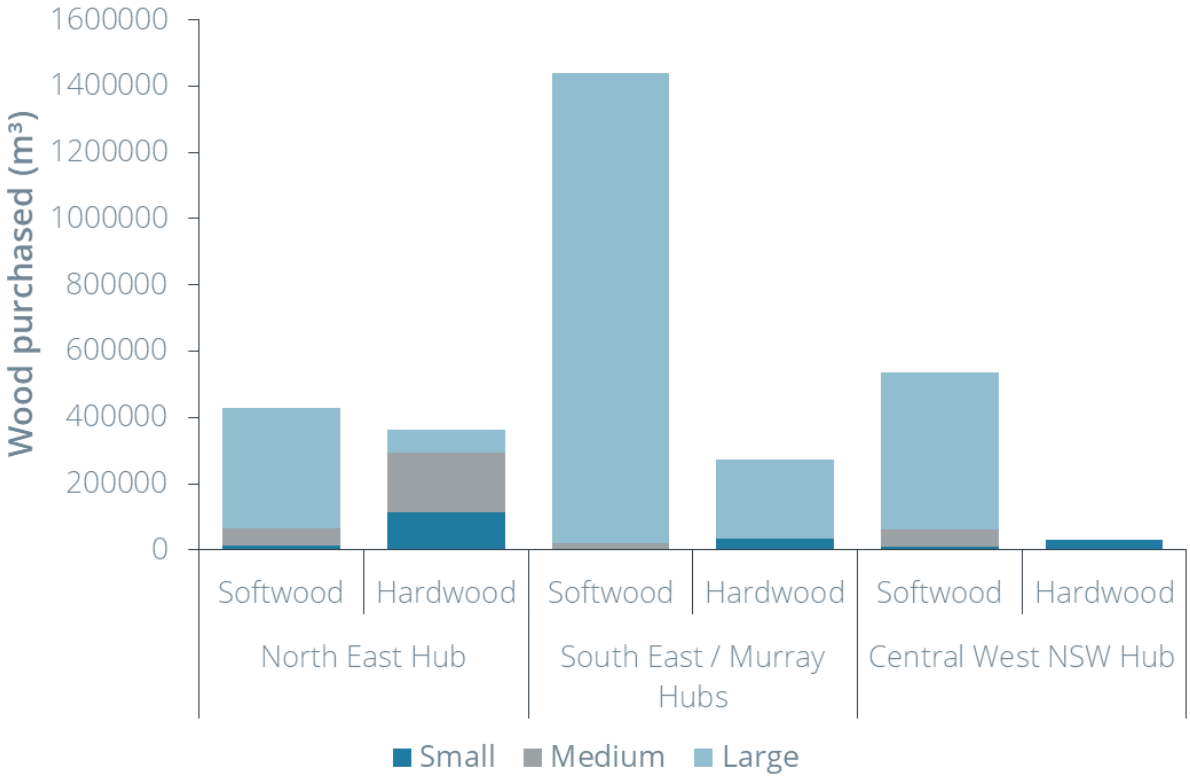
11 National Wood Processing Survey 2021-22, ABARES, published October 2024, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

12 The Greater Sydney region contains approximately 3 hardwood customers, all with an annual operating capacity of less than 15,000m^3.

Hardwood mills tend to be smaller and more dispersed across the state than softwood mills.[13] This is likely driven by transportation costs, the natural geographic dispersion of native forests, the hardwood sector facing increasing restrictions on NFL over time, and relatively high variability in the quality or suitability of hardwood sawlogs. Further, given those hardwood mills that produce higher-value appearance-grade sawnwood products, there may be less economic pressures to operate at scale, compared to softwood mills and the markets they supply, in order to remain competitive.[14]

Reported volumes of supply to FCNSW's customers are presented in Figure 2.

Figure 2: Demand for FCNSW's hardwood resource, by Regional Forestry Hub and customer size (2022-23)



Source: FCNSW (2023), Our customers, Sustainability Report 2022-23. Note: Small customers are categorised to take < 3,000 m3 of wood in FY23, Medium between 3,000 and 15,000 m3, and large customers purchased more than 15,000m3.

Customer features across the RFHs, includes:

- Northeast Regional Hub (~46 customers): Characterised by a relatively large number of customers with smaller annual demand. 41 customers are supplied hardwood, with 80% being supplied less than 15,000m^3 per annum, likely across public NFL and plantation

[13] Across the period 1999-2000 to 2016-17, ABARES notes a declining number of hardwood and softwood sawmills across Australia. In the softwood sector, this was due to consolidation, with a 73% reduction in processing facilities (from 279 to 75) occurring alongside a 27% increase in production. In comparison, the hardwood sector declined to a more significant degree (from over 800 participants to 182) but this occurred alongside a reduction in the yield of hardwood sawlogs over time. See: ABARES, *Snapshot of Australia's forest industry*, https://www.agriculture.gov.au/abares/products/insights/snapshot-of-australias-forest-industry#mill-consolidation-in-the-softwood-sector (accessed 16/10/2024).

[14] ABARES 2020, *Productivity and efficiency of the Australian sawmilling industry*, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1030542/0

sources. Of the softwood customers, one large customer[15] is supplied over 300,000m^3 annually with the remaining four receiving less than 45,000m^3 annually.

- Southeast RFH (~16 customers): Mostly made up of relatively small hardwood customers (93% took less than 15,000m^3 in 2023). Demand is dominated by the Eden timber processing facility, Allied Natural Wood Exports (produces wood chips, sawlogs, and briquettes), and consuming more than 100,000m^3 per annum. The vast majority of supply to Allied Natural Wood Exports is pulplogs,[16] primarily manufactured into woodchip for export. Of the three softwood customers, two demand in excess of 100,000m^3 per annum.
- Murray RFH (~5 customers): There are two relatively small hardwood customers in the region, likely sawmills. The three softwood customers are Visy's papermill and AKD softwoods sawmill in Tumut, and the Hyne timber mill in Tumbarumba, who process large volumes of softwood to manufacture paper and building products.
- Central Western RFH (~21 customers): A relatively small source of hardwood demand, with 13 hardwood customers demanding less than 15,000m^3 per annum. Four out of nine softwood customers demand in excess of 100,000m^3 per annum.

We note that, in FY2023, average demand across all of FCNSW's hardwood customers was 8,851m^3 across all product types,[17] significantly less than the 125,051m^3 of average demand by softwood customers.

3.2 Trends in public NFL supply

Public NFL supply has been in decline for some time, reflecting a long history of regulatory reform seeking to put the sector on a more sustainable footing and, more recently, the 2019-20 bushfires. Uncertainty in native forest hardwood supply likely acts as a disincentive for new investment for many market participants. Future hardwood demand is also uncertain, with changing consumer preferences supporting growth in the softwood sector.

Public NFL supply has declined over time

The public NFL sector has a long history in NSW, with NFL activity being subject to stricter forest management regulations over time in attempts to transition the sector, including to sustainable levels of wood supply (Box 1).

Recent trends in public native and plantation hardwood harvest, by product group, is shown in Figure 3. Sawlog are used to manufacture veneer, plywood and sawn timber while pulplogs are those which do not meet sawlog quality specifications and are designated to produce pulpwood[18] (i.e., mostly chipped and exported for paper production overseas). Salvage includes lower quality timber from trees burnt as a result of bushfire or sections of trees that are not suitable for other uses.

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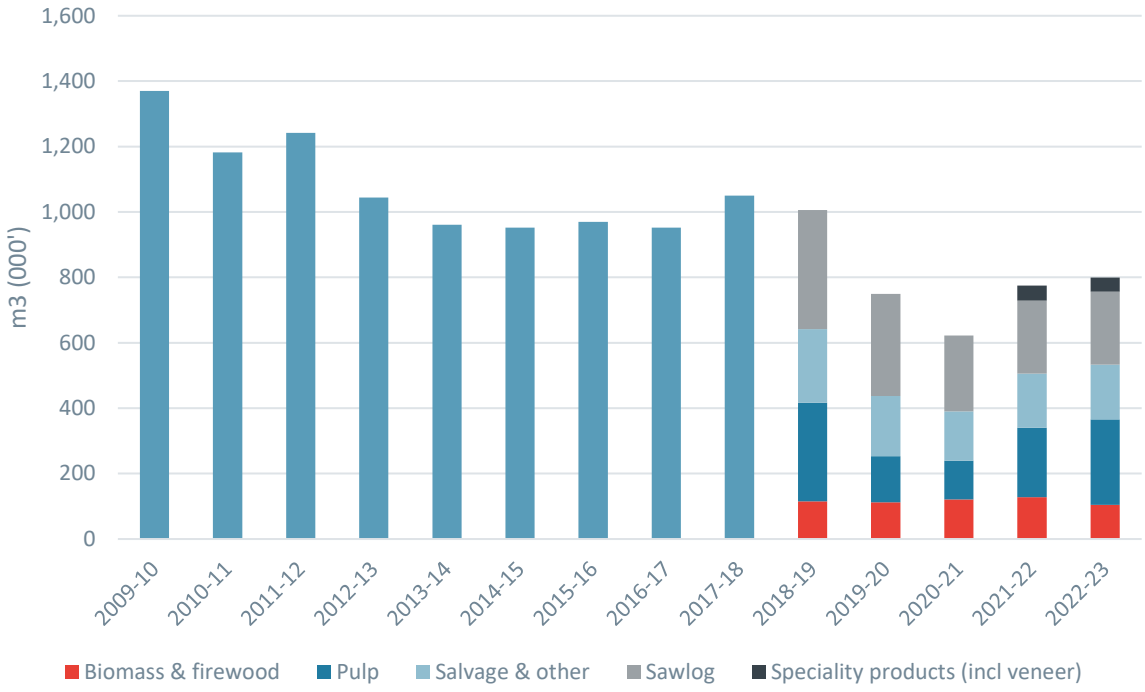
15 From analysis of FCNSW (2023). Our customers. Sustainability Report 2022-23. This customer appears to be BORG, a vertically integrated forestry and wood products producer.

16 76% of pulpwood produced by FCNSW in the CIFOA is harvested in the Eden subregion, with 12.2 tonnes of low quality or pulpwood harvested in this region for each cubic meter of high-quality log, far higher than 1.34, 4.25, and 1.28 tonnes per cubic meter for the Upper North East, Southern and Lower North East updates respectively. Per FCNSW 2022-23 sustainability report, Biomaterials report.

17 Using wood volumes provided in metres cubed from, Our Customers, FCNSW Sustainability Report 2023. With customers defined as softwood or hardwood depending on what resource they receive more of. These volumes are not broken down explicitly into wood types such as sawlogs or pulpwood.

18 ABARES 2024, *Australian forest and wood product statistics production to 2022-23*, July, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0

Figure 3: Hardwood production in NSW (public NFL and hardwood plantation)



Source: FCNSW Sustainability Reports.

Total hardwood harvested has fallen from just under 1.4 million cubic metres (m^3) in 2009-10, to approximately 800,000 m^3 in 2022-23. Of the hardwood harvested in 2022-23, around 33% was turned into pulp, 28% sawlog, 13% biomass and firewood, 5% speciality products, and 21% salvage and other. These recent trends are characteristic of a longer-term decline in volumes. For example, in 2002-03 the public hardwood harvest was a little over 2 million m^3 (around 1.9 m^3 being public NFL).[19]

FCNSW's harvestable forests are yielding relatively less sawlog than they have done historically, reflecting the changing nature of the standing resource.[20] Approximately 80% of harvested volume growth since FY21 has been in pulplogs, which increased by 142,721 m^3.

[19] *ABARES, Forest and wood product statistics, 2022-23, https://www.agriculture.gov.au/abares/research-topics/forests/forest-economics/forest-wood-products-statistics*

[20] The changing composition of the timber resource may be the result of substantial wildfires in the Eden region that occurred in the 1980's. FCNSW reports that these forests that regenerated have smaller and more uniform diameters than the large mixed trees harvested from the forests over the last twenty years (resulting in new equipment being required to process this resource). See, FCNSW 2019, *Eden Wood Supply Agreement – statement*, https://www.forestrycorporation.com.au/about/releases/2019/eden-wsa-statement (accessed 26/09/2024).

Box 1: Public NFL and a tightening regulatory environment

The 1970s and 1980s were characterised by an emergence of community concern regarding the management of public forests.[21] [22] This resulted in a greater policy emphasis on reducing public NFL to sustainable levels while creating reserve systems – for example, in 1982, the NSW Government made a decision to halt rainforest logging in the state resulting in the transfer of approximately 120,000 ha of State Forest and related lands to national parks and nature reserves.[23] In hindsight, this Rain Forest Decision has been described as 'the turning point' toward growing restrictions on public NFL.[24]

Forests available for harvest were subsequently reduced via a series of agreements and interventions such as the 1992 South East Forests Agreement, the 1998 North East Forests Agreement, and conversion of state forests to national parks (such as the protection of more than 100,000 hectares of river red gum on the Riverina-Murray region from NFL in 2010).

Between 1999 and 2000, Regional Forest Agreements (RFAs) were struck between the Commonwealth and NSW governments, covering the Eden, North East and Southern RFA areas. These RFAs again sought to better balance the economic, social and environmental use of the forests while also providing certainty for industry.

In 2018, NSW's RFAs were subsequently varied and further reduced the extent of public native forests available for harvesting. The current RFAs are set to be in place until at least 2039 and include a five-year rolling review and extension mechanism. Further to this, FCNSW's ability to harvest and supply native timber was substantially impacted by the 2019-20 bushfires with some recovery of volumes in the last two years.

This multi-decade trend toward decreasing levels of sustainable resource have likely influenced investment incentives for hardwood mills, other industry participants, and their sources of finance.

Future risks to future native hardwood supply

Uncertainty in level and availability of future native hardwood supply is likely to provide a disincentive for many market participants to make new investments. This is consistent with the sentiment recorded in the ABARES' *National Wood Processing Survey 2021-22* in which 80% of NSW respondents cited hardwood supply as an issue. Further, 15% of respondents also cited access to capital (from a bank or board) as an issue, indirectly linked to uncertainty around supply.[25]

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21 Public Accounts Committee of the forty-ninth Parliament 1990, *Inquiry pursuant to Section 57(1) of the Public Finance and Audit Act 1983, concerning the Forestry Commission*, https://www.parliament.nsw.gov.au/ladocs/inquiries/2717/The%20Forestry%20Commission.pdf

22 Carron, L. T. (1985). *A history of forestry in Australia.* Australia: Australian National University Press, p. 41, https://openresearch-repository.anu.edu.au/bitstream/1885/114759/2/b16120644.pdf

23 Glascott, J. (2022) 'From the archives, 1982: Conservationists win the rainforest battle', *The Sydney Morning Herald*, 26 October, https://www.smh.com.au/environment/conservation/from-the-archives-1982-conservationists-win-the-rainforest-battle-20221017-p5bqgk.html; Pugh, D. (2022) 'Saving North East NSW's rainforests, 40 years on', 19 October, https://www.echo.net.au/2022/10/saving-north-east-nsws-rainforests-40-years-on/#:~:text=When%20logging%20moved%20to%20Mount,was%20required%20before%20logging%20rainforest.

24 Loxton, E., Schirmer, J., Kanowski, P., Dargavel, J., 2012. Cumulative social impacts in northern NSW: forest policy 1980–2010, https://www.foresthistory.org.au/2010_conference_papers/Loxton%20Paper.pdf

25 ABARES 2024, *ABARES National Wood Processing Survey 2021-22*, p. 10, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

Future native hardwood supply is likely to be driven by a range of factors including:

- Public hardwood plantations: FCNSW's historical plantation investments in the north, which are approaching maturity. These hardwood plantations were established around 2000 with the intention of providing high quality sawlogs, allowing for a partial offset of public NFL supply.[26] FCNSW holds 34,000 hectares of hardwood plantations with concentrations in the Bellingen, Clarence Valley, Coffs Harbour, Kyogle, Mid-Coast, Port Macquarie-Hastings and Tenterfield LGAs,
- Private hardwood supply: Supply of hardwood resource held on private lands along the east coast of NSW. The *ABAREs National Wood Processing Survey 2021-22* reports around 30% of hardwood sawlogs in NSW are sourced from private sources,[27]
- The changing composition of public NFL resource: Within FCNSW's southern division, the supply of sawlogs are becoming smaller in diameter due to changes in the composition of the harvestable state forest following historic bushfires.[28] This has driven change in the region's industrial activity. The largest timber mill in Eden closed in 2020, citing an inability to economically process these smaller sawlogs[29] and there is a growth in pulp log volumes that are processed into wood chips for export.
- Establishment of new conservation areas: The Great Koala National Park will remove supply in the north coast as the intention is to incorporate 175,000 hectares of state forests (which is 43% of the net harvestable area of the North Coast Region of 408,500 hectares).[30] This is expected to have an impact on the total quantity of native hardwood timber harvested across the north coast region and the corresponding loss of scale is likely to cause some mills to cease operation.[31]
- Climate risks: Many forested regions in NSW have a history of bushfire and flood, which will continue to present a risk to public NFL supply. The impact of the 2019-20 bushfires substantially reduced public native forest hardwood supply.[32]

While subjective, these factors collectively suggest a net downside risk to future public NFL supply across the medium to long term, even in a scenario of ongoing public NFL.[33]

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26 FCNSW Northern Supply Audit 2011, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0009/439416/Yield-Forecasts_hardwood-plantations.pdf

27 ABARES 2024, *ABARES National Wood Processing Survey 2021-22*, p. 10, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

28 https://www.forestrycorporation.com.au/about/releases/2019/eden-wsa-statement

29 Blue Ridge hardwoods lost its FCNSW WSA in 2019, it was then passed on to AWNE, who have developed additional processing facilities near their woodchip export plant 30 minutes from Eden. https://aboutregional.com.au/eden-timber-jobs-in-limbo-as-change-takes-hold/287424/ and https://www.forestrycorporation.com.au/about/releases/2019/eden-wsa-statement

30 It is likely that the establishment of the Great Koala National Park on the NSW Mid North Coast will result in either the cancellation, amendment or non-renewal of WSAs across the NSW North Coast supply zone.

31 The University of Newcastle, Hunter Research Foundation Centre, 2021. Great Koala National Park economic impact analysis and environmental assessment, http://hdl.handle.net/1959.13/1482919 ;

32 FCNSW, *Timber volumes and modelling*, https://www.forestrycorporation.com.au/sustainability/the-story-of-forestry/timber-volumes-and-modelling (viewed 5/11/2024).

33 IPART notes that shorter WSA periods may be appropriate for economic of environmental reasons in order to reduce the risk that future changes in wood supply impose unforeseen costs on the industry and taxpayers. See, IPART 2021, Review of Forestry Corporation's native timber harvesting and haulage costs 1 July 2016 – 30 June 2019, p. 27, https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Final-Report-Review-of-Forestry-Corporation-s-native-timber-harvesting-and-haulage-costs-for-2016-2019.PDF

Growing and shifting demand for timber products

In general, demand for timber is expected to grow as it is a generally sustainable material with a wide range of applications. Demand growth is derived from a range of factors including sawlogs for housing construction, and demand for manufactured products including paper, fibreboards and laminated timber products.

Demand growth is primarily being experienced in the softwood sector, with numerous sources noting the challenge for NSWs softwood industry to meet current and projected demand:

- ABARES forecast an Australia wide potential shortfall in softwood sawn timber of 2.6 million m^3 by 2050 if no additional plantations are established. This would require almost 200,000 additional hectares of softwood plantations, a ~25% increase on the current estate.[34]
- Downstream producers in the South West Slopes and Bombala region of NSW have demand that exceeds the output of the current plantation estate, making further investment in this highly integrated wood product manufacturing region difficult.[35]

As a result, imports of sawn softwood timber have increased over the past decade due to domestic shortages in supply, with these volumes varying annually due to fluctuations in dwelling commencements and domestic supply considerations (Figure 4(B), Import Quantity).

Whilst softwood demand grows, downstream markets appear to be substituting away from hardwood resource were feasible, potentially in part a response to greater scrutiny on the environmental impact of NFL.[36] This can be seen most acutely through the substitution of hardwood sawnwood production for softwood sawnwood production, largely for use in housing construction (sourced from domestic softwood plantations established largely over the period 1960–1990) (Figure 4).

Over recent decades wood-based panels such as particle board, medium-density fibreboard (MDF) and plywood have made inroads into domestic markets. Australian imports of these products have grown rapidly – the quantity of wood-based panels growing by over a factor of four between 1997 and 2022.[37] Australian import trends are in line with expectations that global demand for wood-based panels will continue to grow strongly.[38] The Food and Agriculture Organisation expects that demand for veneer/plywood and particle/fibre board could double and increase 72%, respectively, between 2020 and 2050.[39]

We note that FCNSW's softwood business is much larger than its hardwood business, both in terms of volumes and earnings. FCNSW has established more softwood plantations in recent years (See Attachment A).

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34 ABARES, Economic potential for new plantation establishment in Australia outlook to 2050, https://www.agriculture.gov.au/abares/research-topics/forests/forest-economics/forest-economic-research/new-plantation-establishment-in-australia#key-findings (viewed 10/10/2024).

35 https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/721724/socio-economic-impacts-of-the-softwood-plantation-industry.pdf

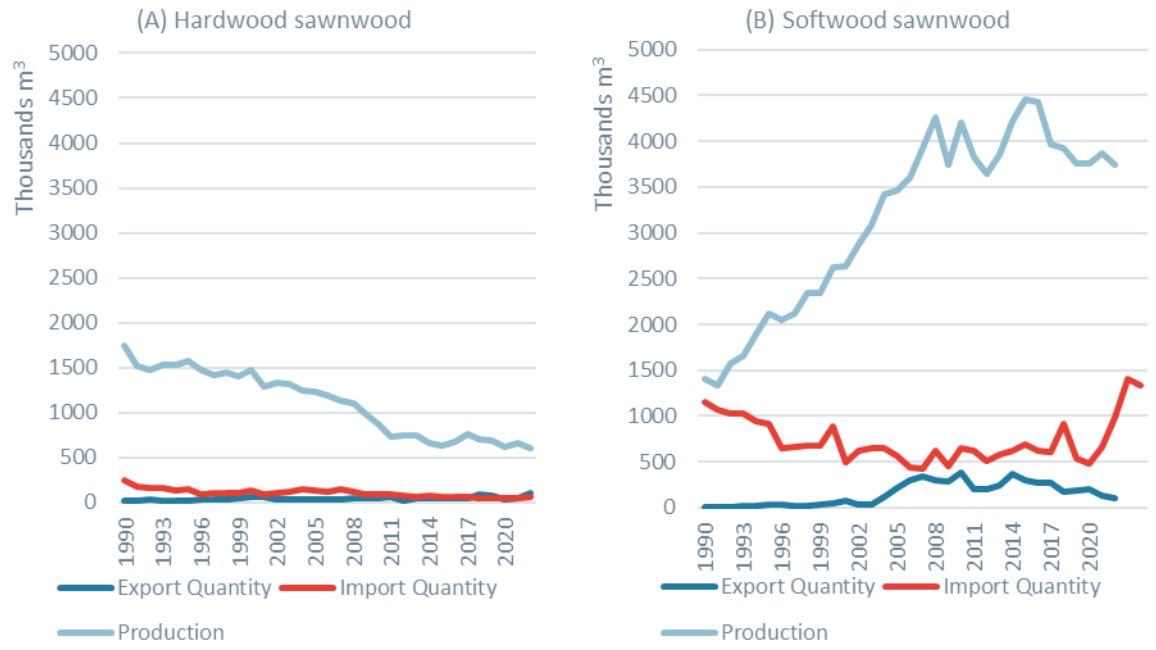
36 IBIS World 2024, *Forestry and Logging in Australia - Market Size, Industry Analysis, Trends and Forecasts (2024-2029)*, accessed 1 August 2024, https://www.ibisworld.com/au/industry/forestry-logging/695/#IndustryStatisticsAndTrends

37 Food and Agriculture Organization of the United Nations (2024), *FAOSTAT Forestry Production and Trade*, accessed 13 August 2024, https://www.fao.org/wood-energy/search/detail/en/c/1305532/

38 Australian Government Department of Agriculture 2024, *Australian forest and wood product statistics Production to 2022-23*, July, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0

39 Food and Agriculture Organization of the United Nations 2022, *Global forest sector outlook to 2050*, https://www.fao.org/family-farming/detail/en/c/1633694/

Figure 4: The domestic sawnwood market is substituting for native hardwood



Source: Food and Agriculture Organisation of the United Nations (2024), FAO Statistics on Forestry Production and Trade, accessed 12 August 2024, https://www.fao.org/wood-energy/search/detail/en/c/1305532/

In contrast to softwood sawnwood, predominantly used in construction, hardwood sawnwood is mainly used in high-value appearance applications such as flooring, decking, veneer, and furniture. [40] ABAREs notes the difficulties in measuring consumer preferences for appearance products but does consider that changing consumer perceptions about the native hardwood industry will affect future demand. [41]

Other substitutions away from public NFL-sourced timber are also occurring, such as the substitution of hardwood timber electricity poles for composite poles.[42] Essential Energy, whose network covers 95% of NSW, is undertaking a program to replace timber poles with flame-retardant composite poles, that are also resistant to termites, to mitigate climate-related bushfire risks.[43]

Demand for hardwood pulplog faces competition from growing plantation resource. Australian hardwood exports are almost entirely through woodchip exports that supply the Asian paper manufacturing industry, in Victoria and South Australia this supply comes from private investment in hardwood plantations, however within NSW no plantations have been grown for this purpose, and large-scale woodchip export occurs at the Eden woodchip mill using public NFL

40 ABARES forecasts no growth in hardwood demand and notes the potential for demand to decrease due to public perceptions of the resource. ABARES, *Economic potential for new plantation establishment in Australia,* p.45, https://www.agriculture.gov.au/sites/default/files/abares/documents/PlantationEstablishmentOutlook2050_v1.0.0.pdf

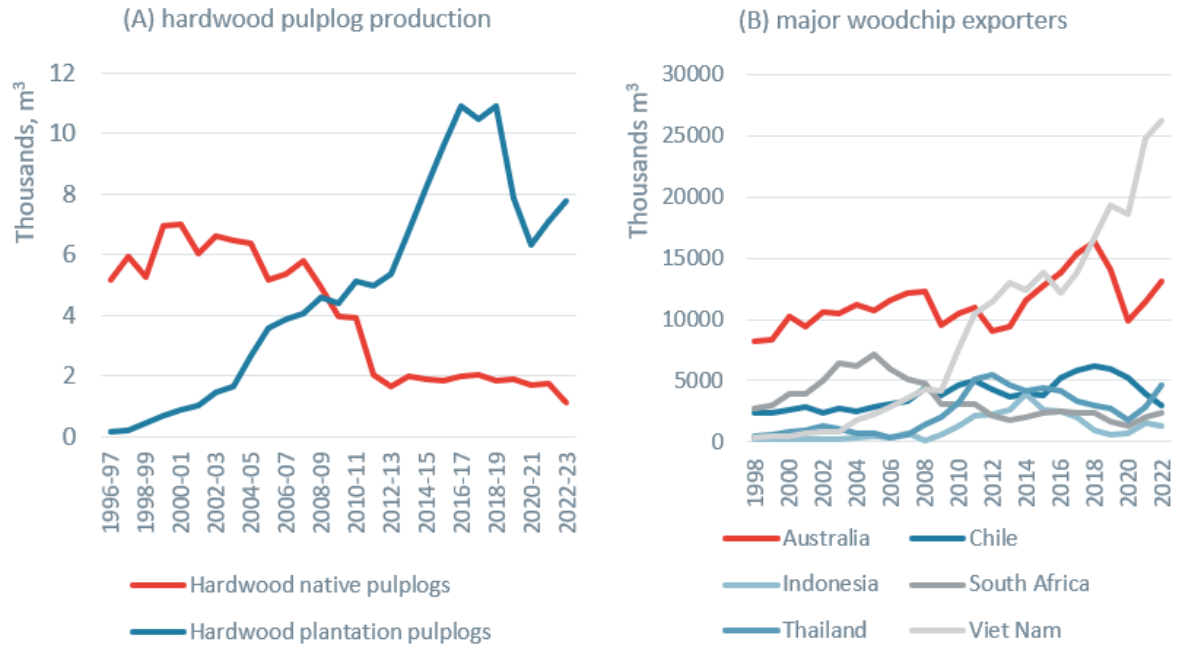
41 ABARES forecasts no growth in hardwood demand, and notes the potential for demand to decrease due to public perceptions of the resource. ABARES, *Economic potential for new plantation establishment in Australia,* p.45, https://www.agriculture.gov.au/sites/default/files/abares/documents/PlantationEstablishmentOutlook2050_v1.0.0.pdf

42 Ferrier, T (2024), Timber industry battles shift to man-made power poles, The new daily, 11 August, accessed 12 August, https://www.thenewdaily.com.au/news/2024/08/11/timber-industry-power-poles

43 Essential Energy 2023, *Planning for the future Essential Energy 2024-29 Regulatory Proposal,* p. 7, https://www.aer.gov.au/documents/essential-energy-2024-29-regulatory-proposal-jan23

resource.[44] Future demand from this market is uncertain, with Australian woodchip exports likely to face growing pressure from Vietnam, which now supplies almost 60% of the hardwood woodchip trade in the Asia Pacific.[45]

Figure 5: Declining Australian native woodchips, growth in international plantation woodchips



Source: ABARES (2024), Australian forest and wood products statistics, https://www.agriculture.gov.au/abares/research-topics/forests/forest-economics/forest-wood-products-statistics, accessed 12 August 2024; Food and Agriculture Organisation of the United Nations (2024), FAO Statistics on Forestry Production and Trade, accessed 12 August 2024, https://www.fao.org/wood-energy/search/detail/en/c/1305532/

3.3 Public NFL direct employment

The NSW public native forestry industry supports a relatively small number of direct Full Time Employees (FTEs) with concentrations of activity close to the largest native forest resource areas.

In 2022, when we last examined the employment numbers associated with the public native forestry industry we estimated that direct employment was in the order of 1,070 employees.[46] This estimate includes FCNSW staff, harvest and haulage contractor staff and primary processors (hardwood mills and chipping). Frontier Economics' estimates of direct public NFL employment are summarised in Table 1.

[44] The woodchip export facility in Eden has a WSA for 290,000 tonnes of pulplog per annum., expiring in 2033. This represents over 75% of FCNSWs hardwood pulpwood production in FY23 (FCNSW sustainability report 2022-23). IPART, Forestry Corporations Benchmarking report 2016-19, https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Forestry-Corporations-Benchmarking-Report.PDF

[45] Australian Government Department of Agriculture 2024, *Australian forest and wood product statistics Production to 2022-23*, July, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0 ; Margules Groome 2024, *Forest Sector Outlook: Quarterly Edition 2024-Q1*, Global Consulting Alliance.

[46] For further details behind these estimates, see: Frontier Economics 2022, Transition support for the NSW native forest sector, A report for the World Wide Fund for Nature Australia, 21 May, p. 21.

Table 1: Direct native NFL employment is around 1,070 employees across NSW

Area	Estimated number of direct public NFL employees (approximate)	Description
South Coast IFOA region	332	Covers FCNSW staff, harvest and haulage contractor staff and primary processors (hardwood forest mills and chipping).
North Coast IFOA region	590	As above
Western IFOA region	150	As above; based on Frontier Economics analysis.
Total	1,070	

Source: NRC 2021, Advice on Coastal IFOA operations post-2019-20 wildfires, Final Report, June; Frontier Economics analysis.

These estimates are based on detailed, primary data from the NSW Natural Resources Commission reported in the wake of the 2019-20 bushfires and triangulated with data from a wide variety of sources including FCNSW, the NSW Independent Pricing and Regulatory Tribunal (IPART) and their forestry consultants, answers to Parliamentary questions, and reporting by the NSW government on Regional Forest Agreement outcomes.[47] This bottom up approach differs to other approaches commonly employed (Box 2).

Employment in the wider forestry sector, as reported in the 2021 Census, is reported in Table 2. Public NFL employment is a subset of these industries which also measure employment in softwood and private hardwood. Roughly, employment in public NFL might represent around 7% of broader forestry related employment across the state.

Table 2: Direct NFL employment in the wider NSW forestry industry context

Region	Forestry and Logging	Wood Product Man.	Pulp and paper man.	Total Employment	Public NFL Estimate
NSW	1686	9055	3869	14,615	1072

Source: Frontier Economics analysis of ABS 2021 Census data; Frontier Economics estimate of direct public NFL employment.

[47] We re-examined sources reporting on direct employment to understand if there have been substantial changes to these direct employment numbers. We consider the estimates are fit-for-purpose for the purposes of this report. This analysis is contained in: Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

Box 2: The use of input-output multipliers

Frontier Economics' bottom-up estimates differ to some other estimates of direct (and indirect) public NFL employment in the public domain which appear to be often, at least in part, based on input-output or (I-O) multiplier analysis.[48]

I-O analysis is a common approach, but care should be taken in interpreting its results. The methodology relies on observed and assumed interdependencies and linkages between industries, households, and government in and between the regions of interest. It aims to model the direct and indirect impacts of a change in the economy.

I-O analysis is sensitive to user input assumptions and has well-known methodological limitations that can sometimes limit its usefulness to policymakers, most significantly a lack of supply-side constraints which tend to overstate modelled employment (i.e., an assumption that extra output in one area won't reduce resources for other activities).[49] The ABS states that:[50]

> *While I-O multipliers may be useful as summary statistics to assist in understanding the degree to which an industry is integrated into the economy, their inherent shortcomings make them inappropriate for economic impact analysis.*

I-O employment estimates should generally be characterised as 'jobs supported' and not necessarily interpreted as jobs 'created by' a change.[51] Often reported indirect employment impacts (i.e., flow on employment impacts as a result of the direct impacts of a change) are useful to understand adjustment pressures in the economy, but may not be a good indicator of the ultimate prospects of a regional economy following a change.[52]

I-O analysis should, at a minimum, report its input assumptions to allow for transparent interpretation.

48 For example, EY 2023, *Economic contribution Study of the NSW hardwood timber industry*, https://nenswforestryhub.com.au/upload/documents/reports/articles/230219220855_NSWHardwoodTimberIndustry-EconomicContributionStudy-Final-20Feb2023.pdf (accessed 24/10/2024); EY 2019, *The economic impact of the cancellation of NSW North Coast Wood Supply Agreements due to the creation of the Great Koala National Park*, https://ausfpa.com.au/wp-content/uploads/2021/02/EY-Economic-Impact-Analysis-for-AFPA.pdf (accessed 24/10/2024).

49 For a brief discussion, see: Australian Government Productivity Commission 2013, *On input-output tables: uses and abuses*, https://www.pc.gov.au/research/supporting/input-output-tables/input-output-tables.pdf.

50 ABS, *Using I-O tables for analysis*, https://www.abs.gov.au/statistics/detailed-methodology-information/concepts-sources-methods/australian-system-national-accounts-concepts-sources-and-methods/2020-21/chapter-22-input-output-tables/using-i-o-tables-analysis (accessed 24/10/2024).

51 NSW Treasury 2020, *Input-output multipliers (employment) – user guide*, https://www.treasury.nsw.gov.au/sites/default/files/2020-09/CEE%20IO%20User%20Guide%20-%20290920%20%28Web%20Final%29.pdf

52 The Productivity Commission provides the example of the regional adjustment experience of the La Trobe Valley following reform to the electricity generation industry. In criticising the reform, some stakeholders claimed that 'every job lost in the industry led to the loss of a further 2.6 jobs in the wider regional economy', however, after approximately 3900 jobs were lost between 1991 and 1996 employment in the La Trobe Valley increased by 1200 in 2001 and a further 4100 in 2011. In this example, a multiplier analysis did not provide an accurate projection of the region's future after a change. See, Australian Government Productivity Commission 2013, *On input-output tables: uses and abuses*, p. 8-9, https://www.pc.gov.au/research/supporting/input-output-tables/input-output-tables.pdf.

4 Economic transition

Given a decision to cease public NFL, a package of structural adjustment could be implemented by government aimed at facilitating a fair and efficient transition.

4.1 Economic resilience and employment

The public NFL sector has been in a state of transition for some time as publicly provided native wood supply has fallen to more sustainable levels. In summarising the major changes in Australia's forests since 1992, The Australian Government ABARES noted in 2008 that:[53]

> *Job losses in the native forest industries have been compensated by employment in new hardwood plantations, maturing softwood plantations and new manufacturing based on plantation wood. Forestry and logging employment remained at about 11,000 and total employment in forestry, logging and manufacturing at 80,000–90,000 over the period 1999–2000 to 2006-7*

Notwithstanding this observation, the decision to cease public NFL in NSW would have an uneven impact across NSW's regional economies, as outlined in Section 3. There are at least two dimensions that the impact of a transition out of public NFL can be understood at the regional economy level (Figure 6):[54]

- Severity of the impact: The relative magnitude of the regional economic impact caused by a decision to end public NFL. The change would be more severe the larger the public NFL sector is (potentially measured in terms of employment), the less foreseeable the cessation was by market participants, and its pervasiveness across the economy, and
- Capacity to adapt: Whether or not the regional economy has the sufficient means to respond and recover from a cessation of public NFL. While not directly observable, this is influenced by factors such as regional economic diversification, labour market skilling, connectivity to markets, and socio-economic well-being. A region's capacity to adapt is not directly observable.

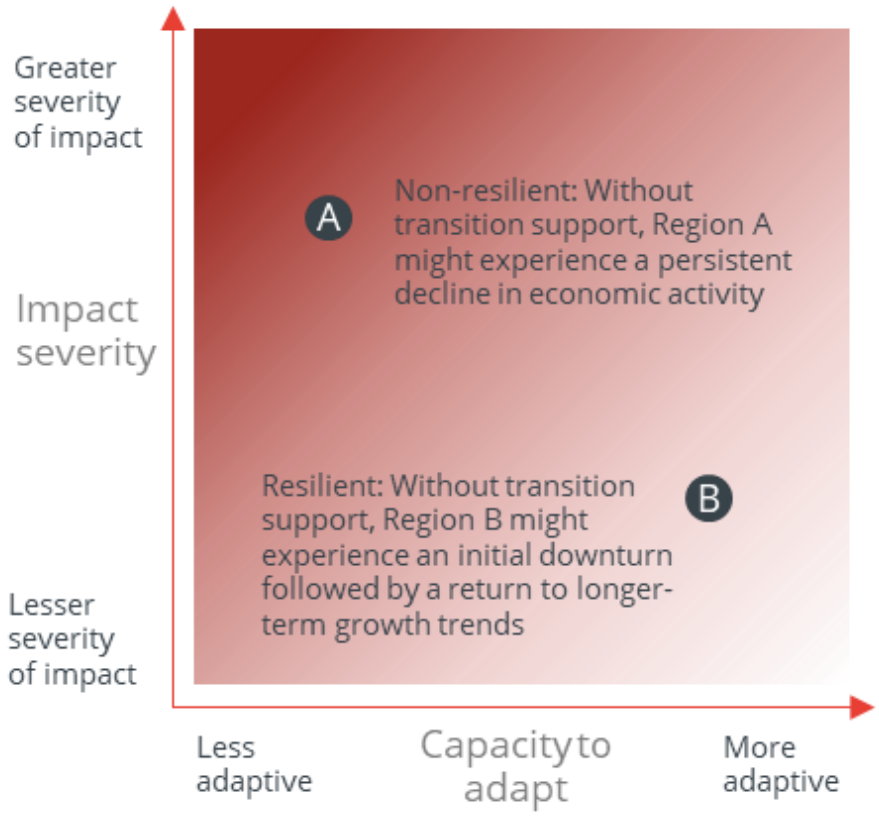
In general, changes that are more severe and impact regional economies with less capacity to adapt may require more transitional support (Figure 6). This does not imply that impacted employees, especially with transferable skills, would be unable to find new employment in the

[53] Australian Government 2008, *The changing face of Australia's forests a summary of major changes in Australia's forests since 1992,* https://www.agriculture.gov.au/sites/default/files/documents/ChangingfaceofAustraliasforests_20080404_v1.0.0.pdf

[54] Australian Government Productivity Commission December 2017, Transitioning Regional Economies Productivity Commission Study Report, available at: https://www.pc.gov.au/inquiries/completed/transitioningregions/report/transitioning-regions-report.pdf

absence of transitional support over time. [55] That is, some employees would be likely to find their skills match to newly advertised jobs in the same location and occupation class.[56]

Figure 6: The nature of the transition out of public NFL



Source: Adapted from Australian Government Productivity Commission; Frontier Economics.

The historic cessation of public NFL in the West Coast of New Zealand illustrates the importance of a region's ability to adapt to change and suggests a potential role for government to proactively support economic transition (Box 3).

[55] We note an analysis by Mandala which analysed the hypothetical closure of a coal mine in New England and considered how long it would take impacted workers to find new jobs based on their occupations, and whether they would relocate or not. In summary, the analysis found that around 30% of impacted employees would find a job within the region in the first year, growing to 52% and 98% if they could relocate within NSW or Australia, respectively. The analysis considered how many workers were employed at the coal mine by occupation class, which it compared to data on job advertisements to understand how long it would take employees to find new jobs regionally, within NSW, and across Australia. See, Mandala 2023, *The Net Zero Transition: how hard will it be for workers in coal mines to find new jobs?* 21 August, https://www.pc.gov.au/__data/assets/pdf_file/0006/382182/sub009-competition-analysis-attachment3.pdf

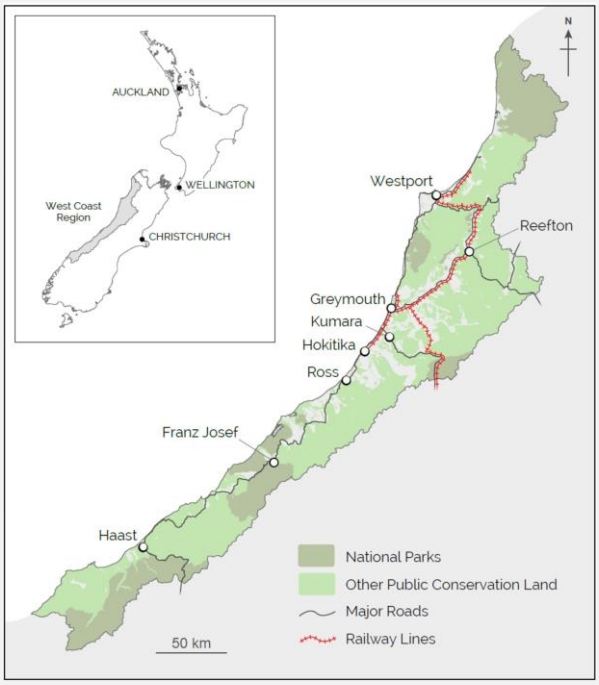
[56] Mackey, W. (2024). *Labour market matching across skills and regions in Australia*. Treasury Round Up, March. https://treasury.gov.au/sites/default/files/2024-03/p2024-495252-01-labour-market.pdf

Box 3 : Lessons from the West Coast of New Zealand's South Island

The ban on NFL in New Zealand had a significant impact on the West Coast. This experience lends support to proactive economic transition support to mitigate the risk of regional economic decline in the face of structural trends away from public NFL.

Historically, the West Coast was highly dependent on resource extraction for its economic wellbeing, primarily timber harvesting and coal mining. However, beginning in the 1980s rising environmental concerns led to incremental and increasing restrictions being placed by government on public NFL, with corresponding employment loss. These trends ultimately culminated in a nationwide ban on public NFL in the year 2000. At this time, 83% of the West Coast's surface area was placed into the conservation estate.

This impact to the regional economy was relatively severe, and the economy was arguably not geared to adapt to the change. A $120 million package was provided by the New Zealand Government some of which used to fund attempts at economic diversification (e.g., an ice cream factory and a cranberry farm). After the failure of these investments, a conservative approach was then adopted geared to managing the fund's cash base and distributing interest via community grants (e.g., sports grants).



Ultimately, the transition package does not appear to have been as effective as it could have been in supporting the West Coast adapt to the cessation of public NFL.

In hindsight, the long-term structural trend toward conservation was clear, but it was not obvious to local communities at the time. Indeed, 'for forestry interests, sustainability was interpreted as maintaining existing timber production levels, while for environmental advocates, it was interpreted as preservation of forests. These conflicts where never resolved.'

The failure to proactively identify and fund prudent alternative activities to public NFL resulted in the West Coast continuing to experience poor economic performance and low, and often negative, population growth. More recently, new government funding has more deliberately focussed on economic diversification via investment in the tourism industry, rail links and digital infrastructure. It is too early to tell if these interventions have been successful.

This experience suggests a proactive role for government to build regional economies' ability to adapt to structural changes away from public NFL, potentially through industry diversification or structural adjustment to support a resilient timber industry.

Source: Nel, E., & Conelly, S (2019). 'Regional economic transformation: Changing land and resource access on the West Coast of New Zealand's South Island', *Land Use Policy*, 93(2020). doe: https://doi.org/10.1016/j.landusepol.2019.04.008

4.2 Structural adjustments for the hardwood sector

Regions engaged in public NFL by necessity hold complementary transport infrastructure, skills and experience, service industries and access to markets underpinning that activity. These industry features and relationships are key economic assets which may be leveraged to support a transition out of public NFL. Forestry knowledge is a unique and valuable asset, which is not always transparently reflected in the official labour market statistics.[57]

Interventions to improve the supply chain resilience of hardwood resource and value-added potential for hardwood manufactured products can build on these regional strengths and potentially provide a foundation for future industrial growth and employment. As with all structural adjustments, this change would not be without uncertainty in both timing and outcomes.

In collaboration with WWF-Australia, we have considered the following broad structural adjustment initiatives which could be undertaken before and after a cessation in public NFL:

- **Develop alternative sources of hardwood supply**: A cessation in public NFL will result in reduced hardwood supply, which may be partially offset with increased harvesting of private forest resource and existing public hardwood plantations in certain areas. Against this, there are opportunities to incentivise investment in agroforestry and hardwood plantations to provide for longer term security of supply. The importation of Forest Stewardship Council (FSC) certified hardwood to support local hardwood manufacture might act as an additional source of supply, at least until new domestic resource is available.[58]
- **Incentivise alternative modes of manufacture**: The composition of harvested hardwood is changing as saw log diameter is reduced and the relative proportion of pulplogs rises, potentially providing opportunities for reinvestment in plant and equipment. For example, some manufacturing technologies can take pulplogs and manufacture construction materials for sale in domestic construction materials markets. Locations where current hardwood manufacture is present are potential candidate sites for these investments, being characterised by requisite skilled labour and connection to markets.
- **Manage and restore new protected areas**: Significant investment would be required to restore public native forests that were previously harvested. In addition to improving environmental values, restoration activities are also a source of direct and ongoing employment.

The coordination, timing, and ultimate impact of these coordinated interventions would be subject to uncertainty. In the longer run, a hardwood sector not reliant on public NFL would avoid key risks to surety of supply which may act to facilitate investment confidence in new manufacturing. Growth in manufacturing could, in turn, provide confidence for further investment in sustainable hardwood supply.

Potential employment opportunities after the transition out of public NFL

Frontier Economics has estimated the potential employment opportunities consistent with the structural adjustment interventions outlined above. These numbers are consistent with a longer

[57] In the broader forestry sector, accessing skilled labour has been identified as an issue by 42% of hardwood mill respondents to the ABARES National Wood Processing Survey 2021-22. See, ABARES, National wood processing survey 2021-22, table 5, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

[58] We note that the NSW economy is already importing significant timber resource to support the construction sector. It is outside the scope of this analysis to consider how the importation of timber resource would or could counter balance the importation of timber-based construction materials.

run scenario in which coordinated interventions have successfully occurred. These figures are summarised in Table 3 and outlined in more detail in Attachment C.

Table 3: **Potential employment opportunities after the transition out of public NFL**

Intervention	Description	Employment potential
Alternative sources of hardwood supply	Consistent employment in establishing and managing a new plantation estate	84
Hardwood manufacture	Employment maintained using existing wood supply, and potential for more employment dense methods of manufacture	579
Forest management and restoration	Employment in management of new national parks, and additional restoration activities	577
Total		1,240

Source: Frontier Economics based on a variety of benchmark sources.

This exercise shows the potential for these interventions to scale to support ongoing employment following a cessation of public NFL, noting there are many potential permutations of interventions.

These potential employment numbers are consistent with an expansion in the management of NSW's protected area estate (estimated to be in the order of 577 FTEs based on benchmarks of direct employment in national parks) and the management of an expanded hardwood plantation estate (estimated to be in the order of 84 FTEs based on employment density benchmarks and FCNSW's current softwood plantation estate).

Further down the supply chain, employment may be retained by existing manufacturers or created by new ones who obtain their timber from non-public NFL sources (estimated to be in the order of 579 FTEs based on employment density benchmarks).

These broad interventions are discussed in the sections below

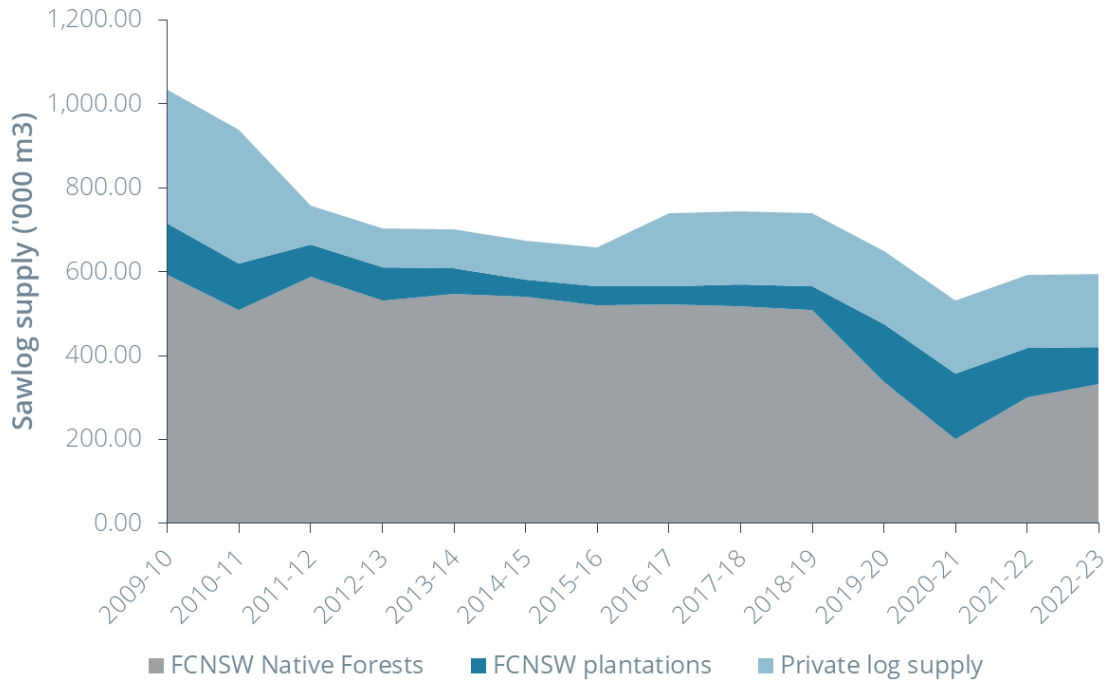
4.2.1 Alternative sources of wood supply

The cessation of public NFL could be complimented with investment in hardwood plantations to at least partially offset reductions in hardwood supply. The forestry sector is subject to long investment cycles reflecting rotation cycles measured across many years. As a result, future forestry industry outcomes will be reliant on plantation investment being made in the right place, at the right scale, and for the right purpose to meet demand.

The feasibility of alternative sources of plantation wood supply across different species, locations and scale is outside the scope of this work but is a key matter for decision makers.

Hardwood supply in NSW holds a reliance on public NFL supply. For example, FCNSW supplied approximately 68% of sawlogs in 2021-22,[59] of which 16% was sourced from plantations, and the remaining 52% was provided by public NFL.[60] Estimates of the supply of hardwood sawlog across NSW are presented in Figure 7.

Figure 7: NSW hardwood sawlog supply



Source: 5-year average private sawlog production from Figure 2.1c.ii-7 of the state of the forests report, assuming volumes have remained constant since 2020-21, https://www.agriculture.gov.au/abares/forestsaustralia/sofr/criterion-2/indicator-2.1c/2.1c.ii-removals-by-log-type#wood-products-from-native-forests, and FCNSW volumes from FCNSW sustainability report 2022-23.

Hardwood supply over the medium to longer term may be compensated for by the establishment of hardwood plantations, private supply initiatives such as agroforestry,[61] or imports of resource.

Investment in hardwood plantations

Investment in hardwood plantations is likely to represent the primary medium to long-term solution to replacing hardwood supply. FCNSW began investing in hardwood plantations in 1994 in order to replace a reduction in future supply caused by a removal of native forest from production (Box 4).

[59] Public and private supply of sawlog to NSW hardwood sawmills in 2021-22, found in: ABARES, National wood processing survey 2021-22, table 5, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

[60] In FY21 FCNSW produced 61,750 cubic meters of sawlog in plantations and 196,000 cubic meters in native forests – so 24% of FCSNW sawlog supply originated from plantations. Which equates to 16% of FCNSWs 68% supply share.

[61] Private hardwood supply can also be referred to as 'private native forestry' which encompasses a range of activities such as privately owned plantations, agroforestry, and private native forestry (PNF). In NSW, PNF is regulated by Local Land Services and requires the establishment of a Private Native Forestry plan.

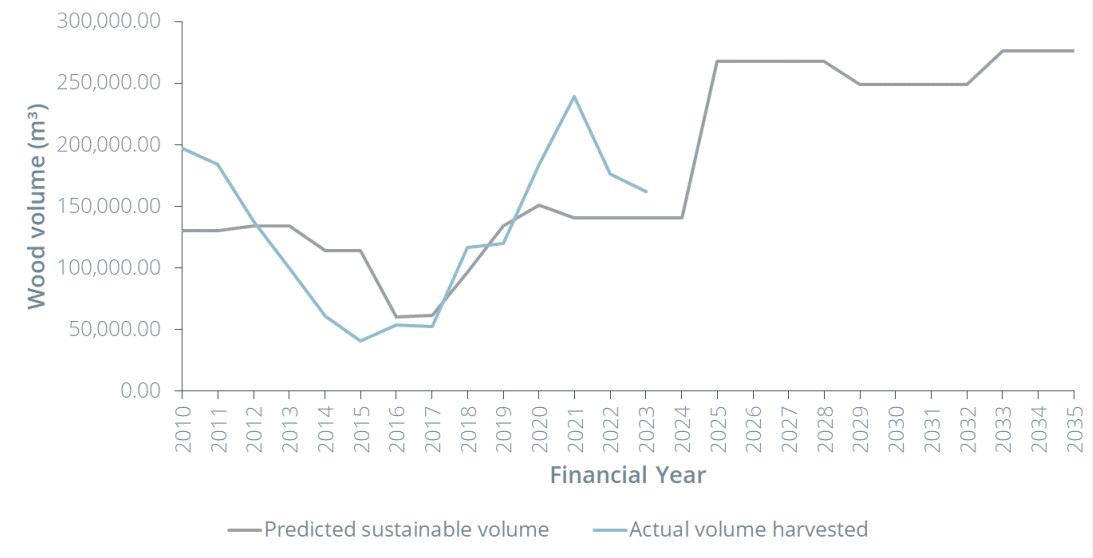
Box 4: NSW's public hardwood plantations

In the 1990s, FCNSW began establishing hardwood plantation resource on the North Coast under a mandate to, 'establish a new hardwood plantation resource to replace a reduction in future supply caused by removal of native forest from production.'[62] The hardwood plantations occur over a large number of relatively small blocks on the coastal lowlands between Newcastle and the Queensland border. Collectively, these hardwood plantations (managed for sawlog) are some of the largest of their type in the country.[63]

A majority of FCNSW's hardwood plantation planting occurred between 1996 and 2004. FCNSW (then Forests NSW) gained access to approximately 10,200 ha of private land either by way of an annual rental (annuity) or by agreeing to share final harvest proceeds (in proportion to the contributions made by each party in growing and selling the crops). Many of these blocks on private land are less than 50 hectares. In addition to this, 18,300 ha of hardwood plantations occur on State Forest land.[64]

Recently, these hardwood plantations have been subject to increased harvest, potentially to make up for lost public NFL supply from fire affected state forests. However, in the coming years sustainable yields from these plantations will rise significantly, potentially acting as a mitigant to the supply impact of any move away from public NFL.

Figure 8: FCNSW hardwood plantation sustainable volumes and harvesting



Source: FCSNW Sustainability report 2022-23

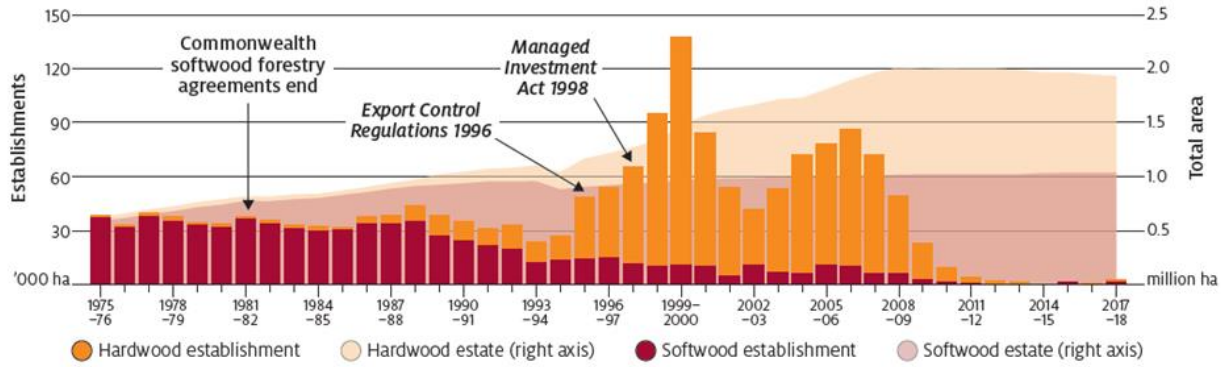
62 NSW Government & Forests NSW 2011, *Performance audit report yield forecasts – hardwood plantations*, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0009/439416/Yield-Forecasts_hardwood-plantations.pdf

63 Figure 5, ABARES, Australian plantation statistics update 2022-23, https://www.agriculture.gov.au/abares/research-topics/forests/forest-economics/plantations-update#key-facts

64 NSW Government & Forests NSW 2011, *Performance audit report yield forecasts – hardwood plantations*, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0009/439416/Yield-Forecasts_hardwood-plantations.pdf

Historically, government financial incentive and support has been an important impetus to investment in plantations across Australia (Figure 9). ABAREs states that softwood plantation investment in the 1960s and 1970s was a result of legislation allowing for long-term, partially interest-free loans provided to state governments, seeing steady growth in the softwood plantation estate including in New South Wales.[65] However, after these supports ended investment in softwood plantations noticeable reduced. Investment since 1995-96 has mostly been in plantation hardwood which is mostly managed for pulp log production in Victoria and South Australia. This investment was again supported by legislation acting to de-risk investment (that is, via the *Export Control (Hardwood Wood Chips) Regulations 1996* acting to reduce sovereign risk of plantation investment and the *Managed Investments Act 1998* allowing for tax deductions related to plantation investment).[66] Following the Great Financial Crises, several companies' managed investment schemes collapsed and new hardwood plantation establishment rates have since declined significantly.

Figure 9: Australian plantation establishments



Source: ABARES (2023)

Governments recognise that further plantation investment is required to meet growing demand for timber. The Australian Government is currently providing $73.76 million in grant funding over 2023-24 to 2026-27 to support the establishment of softwood and hardwood plantations.[67] The NSW Government is also planning to update the *NSW Forest Industry Roadmap*, which may include increasing the size of the state's plantation estate.[68]

Government support for plantation investment appears to be a key factor in incentivising investment for a range of potential reasons, including:[69]

- Rates of return: Related to cash flow challenges caused by the length of time between plantation and establishment. Rotation periods of 30 years act as a barrier to the investment

[65] ABARES 2019, *Economic potential for new plantation establishment in Australia outlook to 2050*, https://www.agriculture.gov.au/sites/default/files/abares/documents/PlantationEstablishmentOutlook2050_v1.0.0.pdf

[66] ABARES 2019, *Economic potential for new plantation establishment in Australia outlook to 2050*, https://www.agriculture.gov.au/sites/default/files/abares/documents/PlantationEstablishmentOutlook2050_v1.0.0.pdf

[67] Australian Government Department of Agriculture, Fisheries and Forestry, *Support Plantation Establishment program*, https://www.agriculture.gov.au/agriculture-land/forestry/industries/support-plantation-establishment-program (accessed 12/11/2024)

[68] Woodcentral 2024, *NSW Labor's New Policy Binds Minns to $2.9B Timber Industry*, 1 August, accessed 13 August 2024, https://woodcentral.com.au/nsw-labors-new-policy-binds-minns-to-2-9b-timber-industry/

[69] House of Representatives Standing Committee on Agriculture and Water Resources 2021, *Aussie logs for Aussie Jobs inquiry into timber supply chain constraints in the Australian plantation sector*,

proposition underpinning some plantations. We note that the generation and sale of Australian Carbon Credit Units (ACCUs) via the plantation forestry method may partially mitigate these challenges,[70] and

- Costs of land: Driven by increasing land values and competing land uses resulting in large upfront costs to plantation establishment in areas within economic haulage distances of existing sources of demand. A strategy of opportunistic purchases or public-private partnerships, as undertaken by FCNSW, may aide in managing these costs (Box 4).

Further, given the relatively long investment cycle for forestry resources and historic lack of investment in hardwood plantations, there is a coordination task in ceasing public NFL while new hardwood plantations are yet to yield supply.[71] Here, we note:

- Following the cessation of public NFL in early 2024 in Victoria and Western Australia, new supply is being derived from private native forestry, thinning activities, new fuel break tracks, or other means, [72] [73]
- There appears to be potential for new plantations to be managed on shorter rotations to provide juvenile logs for some downstream manufacturing activity that can utilise this resource (harvested after 10 to 15 years), and
- Imports of hardwood resource should be expected as businesses adapt to the change, as is being observed in Victoria.[74] An objective of the structural adjustment package could be to ensure that domestic hardwood supply is sufficient to substitute for imports over the medium to longer term.

Businesses may respond to supply risks in a variety of ways, include pursuing a diversification of supply sources or vertical integration (Box 5 and Box 6).

https://www.aph.gov.au/Parliamentary_Business/Committees/House/Former_Committees/Standing_Committee_on_Agriculture_and_Water_Resources/Timbersupply/Report

70 Australian Government Clean Energy Regulator 2024, *Plantation forestry method*, https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/plantation-forestry-method (viewed 12/11/2024).

71 In general, we understand that after 10-15 years plantations are thinned yielding pulplogs with the potential for future thinning operations before final harvest, and after 25-30 years plantations may yield sawlogs for processing by the sawmill sector, though some stands may be left longer to develop into larger, higher value sawlogs.

72 After the cessation of public NFL in Victoria in the beginning of 2024, reductions in supply are reported to have been (at least partially) compensated for by increased from private native forestry, fuel break tracks constructed by the state government, and increased international imports. See, Hall, B. (2024). 'Why native forest harvesting is the 'zombie' industry that won't die, *The Age*, 13 September, viewed 7 November 2024, https://www.theage.com.au/environment/conservation/why-native-forest-harvesting-is-the-zombie-industry-that-won-t-die-20240909-p5k8y2.html

73 After the cessation of public NFL in WA in the beginning of 2024, it has been reported that mills sourced supply from forest thinning programs and private forestry supply.

74 Hopkins, P. (2024). 'Adapting native timber industry', *Gippsland Times & Maffra Spectator*, 11/01/2024, https://www.gippslandtimes.com.au/news/2024/01/11/adapting-native-timber-industry/ (viewed 13/11/2024)

Box 5: Hardwood supply diversification

Based on publicly available information, we understand that Hurford's Hardwoods has established around 5,000 hectares of hardwood plantation to supplement supplies drawn from its FCNSW WSA.

In addition to establishing plantations, the business actively supports the uptake of private supply in the form of farm and agroforestry, offering forestry expertise to landholders to help them provide resource from their land and increase the diversity of supply. These measures have allowed Hurford's to obtain around half of their wood volumes from private sources.

Source: https://hardwood.com.au/environmental-awareness/ and https://www.lls.nsw.gov.au/__data/assets/pdf_file/0003/1153731/Case-Study-Private-Native-Forestry-at-Warrazambil.pdf#Warrazambil%20case%20study

Box 6: Regenerative forestry

Innovative plantation management techniques are being implemented by some industry participants to maximise the timber and biodiversity value of plantations via regenerative forestry techniques. These actions are adopted to provide additional benefits beyond timber revenues and dispel biodiversity concerns regarding monoculture plantations.

Regenerative forestry is a response to increasing awareness by community, investors, government and customers on the threats the natural environment is facing, including biodiversity decline and climate change.

For example, wood4good is a Victorian based company that creates new forests on degraded farmland. These forests can be managed to support biodiversity while also generating a permanent supply of firewood, timber, and bioenergy products. A regenerative forestry approach involves establishing forest with a diversity of species and, instead of harvesting via clear felling, an approach of selective harvesting is adopted to leave functioning forest ecosystems behind. In practice, this means retaining more biodiversity than if sections of the forest were clear felled. This regenerative approach to forestry can work side by side with broad acre farming, reducing cropped or grazed land without necessarily compromising yields (i.e., if marginal grazing or cropping land is converted to forests and/or if the forest can improve water retention in the soil and enhance the soil profile itself improving agricultural productivity).

Similar to agroforestry practices, regenerative forestry may be able to access funding through the generation of ACCUs and potential participation in Australia's future Nature Repair Market to support a commercial rate of return.

Source: Sustainable Forestry Victoria | Carbon Sequestration Victoria | wood4good

We have developed an estimate of potential employment from managing new hardwood plantations. We have based this on an assumed and conservative volume target, given the wide range of hardwood plantation investment options.

Given a target volume of 585,000 cubic metres,[75] and a sustainable yield of 8.8 cubic metres per hectare (based on existing FCNSW's current hardwood plantations), an additional hardwood plantation estate of approximately 66,000 hectares could be targeted. [76]

The management of this 66,000-hectare plantation estate could support potential employment of 57 FTEs[77] on an ongoing basis, combined with the existing FCNSW plantation estate of 34,000-hectares there would be approximately 84 FTEs in managing hardwood plantations. This estimate of 84 FTEs excludes any additional employment related to the establishment of plantations (a rough estimate of which is around 23 FTEs[78] if 3000 hectares of plantation were to be replanted annually). Further detail can be found in Attachment C.

We note potential for non-timber production such as bamboo (Box 7). While nascent, engineered bamboo products can be used for a variety of non-structural building purposes and substitute for hardwood and engineered softwood products.

[75] Here we use 10-year average of FCNSW hardwood output, less sustainable plantation yield in 2026, from FCNSW sustainability report 2022-23. Noting the long-term prospect for hardwood plantations is uncertain and requires further analysis of the future of the forestry, its processing industries, and where plantations may be economic.

[76] Based on yield of current north coast hardwood plantations in 2011, before any fire related disruption to yields. A sustainable yield of 300,000 cubic metres of timber across all product types on an estate of 34,000 hectares, giving a sustainable yield of 8.8 cubic meters per hectare. This is a conservative estimate, and actual requirement may be lower with ABARES noting North Coast plantation yields in the order of 13 or 18 m3 per hectare per year in Table A1, Australian plantation statistics and log availability report 2021, ABARES, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1032742/0

[77] Assumed to be 0.84 FTEs per 1000 hectares, based on the staffing of FCNSWs current softwood plantation estate. Table 7, Synergies (2022), *Estimation of forest-dependent jobs in New South Wales*, https://www.nrc.nsw.gov.au/Social%20benefits%20-%20Project%20SE1%20-%20Interim%20method%20-%20Synergies%20-%20November%202022.pdf

[78] Assuming a worker can plant 0.5 hectares of plantation per working day, this would require 6000 FTE days to establish. Assuming an FTE requires 260 working days, this results in ~23 FTEs in plantation establishment.

Box 7: Bamboo as a novel and sustainable building material

Bamboo has a long history of use in construction in Asia, but it has mainly been a niche building material in Australia. Bamboo fibres can be bonded together with heat and chemicals to become an engineered bamboo product. This engineered bamboo offers enhanced strength, durability and dimensional stability, allowing it to substitute for traditional timbers for some building applications. The timber equivalent of engineered bamboo is cross laminated timber.

A bamboo plantation must be actively managed and offers a yearly turnover. The Bamboo shoots once a year and over a period of three to four years will strengthen its cell structure. In general, harvest will begin in the fifth year where 25% of the stems are harvested. The clump regenerates and allows for annual harvests thereafter. There are many varieties of bamboo, including three native Australian species. Certain varieties of bamboo are 'clumping' which prevents it from becoming invasive.

There is no significant commercial bamboo industry in Australia, but this nascent sector offers the potential to meet growing demand for timber through adopting engineered bamboo for elements such as beams, posts, trusses, flooring, wall cladding, and furniture. Aside from its versatility, advantages to engineered bamboo include:

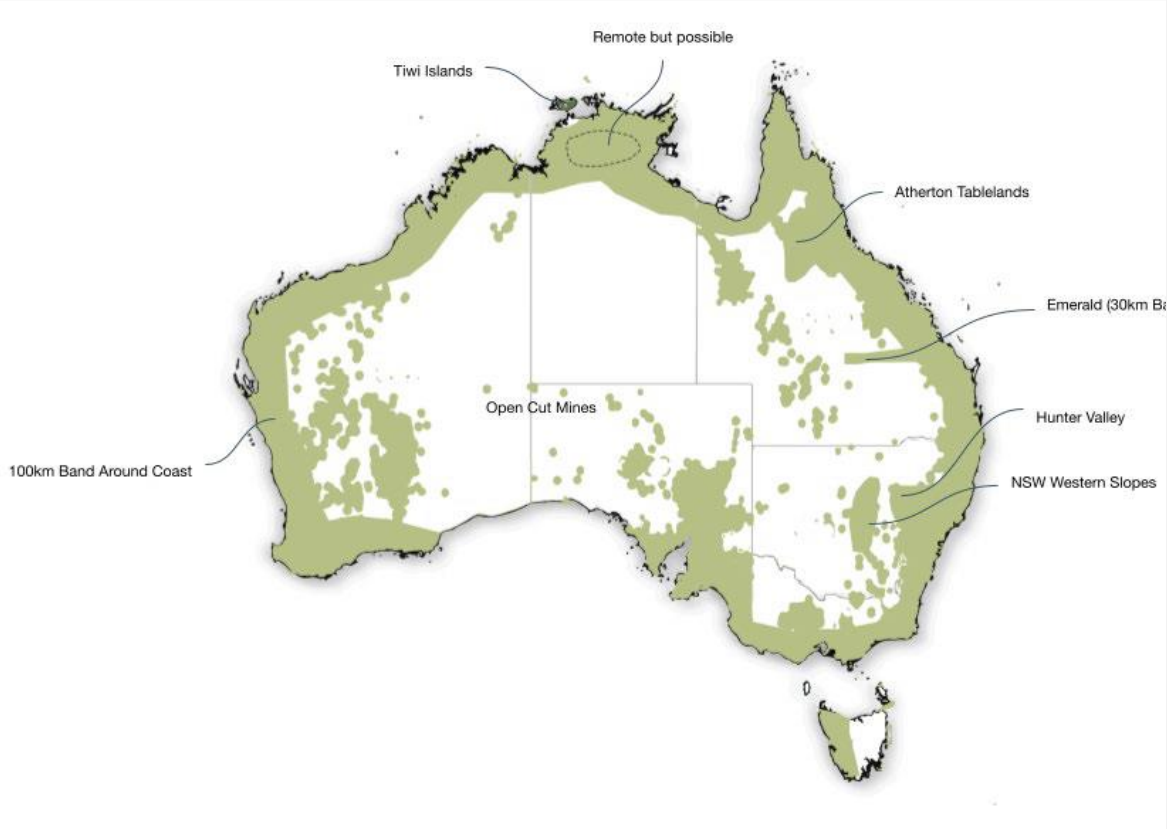
- Sustainability: Bamboo is one of the fastest-growing plants, with some species maturing within 3-5 years, while timber trees can take decades. This rapid growth makes bamboo highly renewable and potentially less resource-intensive if planted in areas not reliant on irrigation.
- Environmental impact: Carbon emissions form materials used in construction, such as steel and cement, are expected to become the largest source of carbon emissions in the NSW building sector in the coming decades. Bamboo may play a role increasing the supply of low-carbon building materials, alongside other materials such as plantation softwood. Bamboo also may also offer benefits in remediating ex-industrial and mining sites contaminated with heavy metals, potentially allowing for more successful revegetation or landscape restoration outcomes in future years.
- Cost efficiency: Although this depends on the market, engineered bamboo can be more cost-effective than high-quality hardwoods. For example, bamboo can be planted on toxic soils and used as a tool for soil remediation, this may include mine sites or slops unsuitable for foresting. This is potentially advantageous to securing relatively inexpensive land that does not compete with agricultural production or residential development.

Employment in this sector would be supported by active and regular management activities of the plantation resource and corresponding engineered product manufacturing activities.

Bamboo plantations and engineered products hold the potential to assist NSW decarbonise its construction sector and relieve supply pressures in Australia's domestic timber industry. Other jurisdictions, such as China and some EU countries, have recognised this opportunity in the face of similar challenges.

The House of Bamboo has assessed the commercial viability of cultivating bamboo on a large scale, a part of which involved assessing the climatic conditions, geographic features, soil and water considerations, and logistical and infrastructure needs to establish a bamboo industry. Suitable locations identified by The House of Bamboo are presented in Figure 10.

Figure 10: Locations with assessed characteristics to support bamboo plantations



Source: Reproduced with permission from the House of Bamboo.

One key impediment to uptake of engineered bamboo in Australia appears to be regulatory in nature. We understand that the Australian National Construction Code (NCC) does not currently anticipate engineered bamboo as a structural element that can provide support and stability to buildings. Further work in Australia is required to develop standards to appropriately incorporate these innovative materials into modern construction, in addition to the growing role this resource is playing as a non-structural material.

Source: Australian Bamboo Plantations 2024, *Feasibility Report*; Ross, J. (2023). 'Could bamboo replace green steel as building material of future?', *Woodcentral*, 27 November, https://woodcentral.com.au/could-bamboo-replace-green-steel-as-building-material-of-future/; International Bamboo and Ratton Organisation, *China Bamboo Industry Plans at National and Provincial Levels*, https://www.inbar.int/wp-content/uploads/2020/05/1529475037.pdf; International Bamboo and Rattan Organisation, *Trade overview 2021*, https://www.inbar.int/wp-content/uploads/2023/11/Trade-Overview-2021-Bamboo-and-Rattan-Commodities-in-the-International-Market.pdf; Lomberdo, E. (2023). 'An overview of bamboo cultivation in Southern Italy', *Advances in Bamboo Science*, 1, doi: https://doi.org/10.1016/j.bamboo.2022.100002; Timko, M. T. *et al.* (2024). 'Thinking globally, acting locally in the 21st century: Bamboo to bioproducts and cleaned mine sites', *iScience*, 27:10, doi: https://doi.org/10.1016/j.isci.2024.110763

Agroforestry to support hardwood plantation supply

Broadly, agroforestry (or farm forestry) is a land management practice that allows trees to grow alongside crops or pastureland. [79] A key difference between agroforestry and other practices is ownership – the landholder, often a farmer, commits resources toward the establishment and management of forests on their land (potential in partnership with other market participants).[80] As a result, a key advantage of agroforestry over plantations is that it does not require a capital outlay for land purchase.

If located in an area with economically feasible access to mills and other manufacturers, agroforestry could support a range of benefits, including:

- Environmental benefits: Agroforestry sequesters carbon form the atmosphere and stores it in above ground and below ground bio-mas, it also potentially enhances biodiversity values depending on the management approach adopted. Agroforestry can play an important role in assisting the agricultural sector to decarbonise, and can build climate resilience via the provision of windbreaks and livestock shelter for hot and cold weather.[81]
- Agricultural productivity: Strategically placed agroforestry investments can be impactful for providing shade and shelter to livestock (e.g., we heard an anecdotal example by one agroforester of a significant increase in lambing percentages as a result of increased shelter), improving soil, water quality and salinity. Collectively, these benefits can improve landholders' level of sustainable agricultural production.
- Income diversification: The sale of timber and potential generation of ACCUs provides an opportunity to both grow and supplement agricultural incomes. The benefits of income diversification can also extend to providing landholders increased income resilience in times of drought, including through improvements to agricultural productivity.

Similar to plantation investment, investment in agroforestry is often dependant on government financial incentives.[82] However, additional support may be required, including:

- Support for landholders to access the technical forestry expertise required to make decisions about potential agroforestry investments (e.g., appropriate tree species and soil types),[83] and
- There may be a role for an agency such as FCNSW to coordinate and aggregate harvests from numerous agroforesters to create log parcels of sufficient size and certainty for manufacturers. Agroforesters require confidence that harvested timber will find a buyer.

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79 Mukhlis, I., Rizaludin, M.S., Hidayah, I. (2022). *Understanding Socio-Economic and Environmental Impacts of Agroforestry on Rural Communities*, https://doi.org/10.3390/f13040556

80 Gordon A. M., Newman, S. M., Coleman B. R. W. (2018). *Temperate Agroforestry Systems*, 2nd edn., CAB International.

81 Quandt, A., *et. al.* (2023) 'Climate change adaptation through agroforestry: opportunities and gaps', *Current Opinion in Environmental Sustainability*, 60:101244, https://doi.org/10.1016/j.cosust.2022.101244

82 Currently, the Commonwealth Government's *Support Plantation Establishment* program is making grants of $2,000 per hectare available to plant plantations on property. It is not clear what proportion of the available $73.76 million available will go to agroforestry initiatives.

83 Frontier Economics stakeholder engagement with agroforester; House of Representatives Standing Committee on Agriculture and Water Resources 2021, *Aussie logs for Aussie Jobs inquiry into timber supply chain constraints in the Australian plantation sector*, https://www.aph.gov.au/Parliamentary_Business/Committees/House/Former_Committees/Standing_Committee_on_Agriculture_and_Water_Resources/Timbersupply/Report

4.2.2 Alternative modes of manufacture

ABARES estimates that in 2021-22 there were at most 53 hardwood sawmills in NSW, a reduction of around 15 compared to those reported in 2016-17.[84] These closures were mostly from mills with input capacity below 15,000 cubic metres per year. Around two thirds of hardwood sawmills in NSW have an input capacity less than 15,000 cubic metres per year, while the two largest hardwood sawmills in the state have an input capacity of between 45,000 and 75,000 cubic metres per year.

Hardwood sawmills obtain resource from a range of sources, with smaller hardwood sawmills potentially sourcing a relatively higher proportion of supply from private forests, with public NFL and hardwood plantations making up the remainder. Across the country, ABARES observes that the smallest hardwood sawmills (with an input capacity of less than 3,000 cubic metres per annum) source 61% of their sawlog input from private forests, while hardwood sawmills with an input capacity of between 3,000 and 15,000 cubic metres per annum source 34% from private forests.[85] A diversity of supply sources may offer a source of resilience for many of NSW's hardwood sawmills in the event public NFL ceases.

Notwithstanding the above, a cessation of public NFL would likely result in consolidation and change within the hardwood manufacturing sector. Under a scenario of continued public NFL, consolidation is also likely to continue and potentially accelerate given trends in public NFL supply and related markets (Section 3.2).

Given growing construction demand, there may be opportunities for the hardwood manufacturing sector to increase competitiveness against import markets for construction materials through investment in new technology and systems.[86] As an example, Box 8 explores technology which manufactures appearance and structural grade hardwood products using juvenile pulplogs, typically otherwise used for wood chipping, allowing for a financial return on hardwood plantations sooner.

The economic feasibility, location and scale of alternative modes of hardwood manufacture is complex and subject to a range of factors that should be considered in collaboration with, ideally led by, industry.

Other forestry areas in Australia are undertaking such work. In the Green Triangle, a forestry region spanning the South Australian and Victorian border, a feasibility assessment is underway to establish a hardwood timber manufacturing hub in Victoria's Glenelg Shire. Utilising local blue-gum eucalyptus plantations, the initiative looks to produce engineered timber such as glue-laminated timber.[87] The production of glue-laminated timber is intended to meet rising demand from the housing and construction industries for more sustainable wood products.[88]

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84 ABARES 2024, *ABARES National Wood Processing Survey 2021-22*, p. 9, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

85 ABARES 2024, *ABARES National Wood Processing Survey 2021-22*, p. 11, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

86 IBIS World 2024, *Wooden Structural Component Manufacturing in Australia - Market Research Report (2014-2029)*; IBIS World 2024, *Fabricated Wood Manufacturing in Australia - Market Research Report (2013-2028).*

87 GTFIH (2019), *Green Triangle Forest Industry Strategic Plan, https://gtfih.com.au/wp-content/uploads/2021/12/GreenTriangleStrategicPlan_FINAL.pdf*

88 @AuManufacturing 2024, *Push for manufacturing hub making timber products as hard as steel*, https://www.aumanufacturing.com.au/manufacturing-hub-making-timber-products-hard-as-steel (viewed 13/11/2024)

Box 8: 3RT technology

3RT wood products are an example of structural and appearance grade engineered wood products manufactured using juvenile hardwood pulplogs. Pulplogs are veneered and dried before being processed using a water-based, non-toxic glue to produce 'square' trees ready for sawing.

The technology replicates the natural tree growth process to simulate the rings developed over 50-100 years of tree growth, and precise heating methods are used to fold and condition the timber. This is particularly important for appearance grade purposes (Figure 10). The structural qualities of this engineered timber reportedly match or exceed comparable mature solid native species (Table 4).

Figure 11: Example applications of 3RT manufactured products

Source: 3RT.

Table 4: Mechanical performance

	3RT White Gum	White Gum
Type	Engineered timber	Solid
Source	Plantation thinnings	Native Forest
Age	12 years	50 years
Modulus of Elasticity (MPa)	16,400	12,000
Bending (MPa)	60	36
Density (kg/cubic metre)	800	670

Source: 3RT

We understand there are three facilities applying 3RT technology in Australia, with plans for two more. Crafted Hardwoods, a business utilising this technology, advises that the product is cost competitive with solid hardwood products on the market.

Sources: https://3rt.com.au/; https://www.craftedhardwoods.com/; Interview with Crafted Hardwoods.

Employment in manufacturing after a cessation of public NFL

Frontier Economics has made conservative assumptions to gauge the scale of potential employment that could be supported via manufacturing activities over time. Ultimately, employment outcomes would be determined by the private sector and its confidence and incentives to invest.

To obtain estimates of potential employment in manufacturing after the cessation of NFL we combine estimates of the employment density of the wood product manufacturing sector and the level of assumed future wood supply, which is driven by assumptions on the volume of additional resource obtained from private sources or through imports. Then combine to low, central and high employment estimates from wood manufacturing, details of which can be found in Appendix C.

Our central potential employment estimate uses an assumption of an FTE per 1000m^3 of wood provided to the processing industry. This is representative of the current employment density per unit of hardwood manufacture in NSW.

For wood supply, there is an assumption that 25% of the volume currently supplied by native forests is obtained from other sources such as private yield escalation or interim imports.

For the central case of manufacturing employment, where wood supply is assumed to be 579,000m^3 and a job density of an FTE per 1000m^3 of wood supply. This results in 579 FTE for the wood product manufacturing sector.

4.2.3 Managing and restoring new protected areas

A cessation of public NFL would likely result in approximately 2 million hectares of state forest moving into a form of protection. To achieve the full environmental benefits of protecting formally logged state forests, resources will need to be allocated to their management as well as for larger scale restoration (Box 9). The scale of the task to restore NSW's degraded forests is uncertain, though likely to be high.[89]

Public NFL activities impact ecosystems and have been linked to forest degradation over time.[90] Although deforestation has clear and immediate impacts on biodiversity, forest degradation is a significant and often overlooked impact. Forest degradation can reduce biodiversity through a range of channels including reduced resources for species survival (food, shelter, and breeding areas), facilitating invasive predator access and the spread of pathogens, and increasing the severity and frequency of wildfires. [91]

Forests across the state are not all alike, and there is no blue print to manage or restore all forests. Forests subject to logging typically have simplified ecosystems with reduced plant and animal biodiversity, potentially reflecting industry's preference for relatively evenly aged trees, which may be reinforced by management activities that suppress the understory.[92] The scale and nature forest degradation will inevitably vary across forests, as will their capacity to regenerate and recover, depending on a range of factors including former harvesting processes, remedial

[89] Ward, M., *et al.* (2024). 'Shifting baselines clarify the impact of contemporary logging on forest-dependent threatened species', Conservation Science and Practice, e13185. https://doi.org/10.1111/csp2.13185

[90] Ward, M., *et al.* (2024). 'Shifting baselines clarify the impact of contemporary logging on forest-dependent threatened species', Conservation Science and Practice, e13185. https://doi.org/10.1111/csp2.13185

[91] Ward, M., *et al.* (2024). 'Shifting baselines clarify the impact of contemporary logging on forest-dependent threatened species', Conservation Science and Practice, e13185. https://doi.org/10.1111/csp2.13185

[92] Watson, JE, *et al.* (2018). 'The exceptional value of intact forest ecosystems', Nature Ecology & Evolution, 2:599-610. https://doi.org/10.1038/s41559-018-0490-x

actions taken after logging, the length of time between disturbance, and the composition and structure of surrounding forests to assist in maintaining and distributing species.[93]

After a cessation of public NFL many state forests will require active intervention to recover ecosystems and address historic land degradation.[94] The objectives, scale and timing of future restoration activities for forests previously subject to NFL would be researched and developed by the NSW Government in collaboration with its stakeholders, including Traditional Owners.[95] [96]

Frontier Economics has made conservative estimates to gauge the potential employment that could be supported via forest management and restoration activities:

- For forest management, we have multiplied the existing state forest area of approximately 2 million hectares with (i) 0.3 FTES per 1000 hectares, or (ii) 0.23 FTEs per 1000 hectares based on a third-party analysis of forest-dependant jobs in NSW.[97] This results in a range in the order of 462 FTEs to 578 FTEs, with a midpoint of 520 FTEs, and
- For forest restoration activities, we have multiplied the existing state forest area of approximately 2 million hectares with an assumption of 0.03 FTEs for each 1000 hectares.[98] This results in the order of 57 ongoing FTEs.

This results in a central estimate of 577 potential FTEs in the maintenance of the preserved state forest estate. This benchmarked estimate is conservative, accounting for none of the wider employment which may be generated from tourism and other industries associated with the protected areas. A University of Newcastle study[99] into the establishment of the Great Koala National Park (10% of the State Forest estate) conclude that it would generate 9,810 FTEs over 10 years, or 981 ongoing FTEs.

We note that FCNSW currently undertakes a range of forestry management activities related to forest health, fire management, the road and infrastructure network, as well as other responsibilities outlined in its Forestry Management Plans.[100] It is uncertain how these responsibilities and underlying intensity of activity might change after the cessation of public NFL.

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93 Lindenmayer, D.B. *et al.* (2020). Managing interacting disturbances: lessons from a case study in Australian forests, Journal of Applied Ecology, 57:1711-1716. https://doi.org/10.1111.1365-2664.13696

94 McCormack, P. C. *et al.* (2024). 'Transformation in the forest: the role for restoration in the transition away from native forestry in Australia, 32:7 e14240,

95 Under the Victorian Forestry Plan the Victorian Government established an advisory panel to consult widely and make recommendations to Government on the areas of our forests that qualify for protection as National Parks, areas of forests that would be suitable for recreation opportunities, and opportunities for management of public land by Traditional Owners. See, Victorian Government, *Forestry Transition Program*, https://www.deeca.vic.gov.au/futureforests/future-forests/victorian-forestry-program (accessed 3/11/2024).

96 As an aside, we note the Commonwealth Government's *Nature Repair Act 2023* and forthcoming Nature Repair Market may provide an sources of funding for ecological restoration in the future on public and private land in the future. See, Australian Government, *Nature Repair Market*, https://www.dcceew.gov.au/environment/environmental-markets/nature-repair-market#toc_2 (accessed 3/11/2024)

97 Synergies (2022), *Estimation of forest-dependent jobs in New South Wales*, https://www.nrc.nsw.gov.au/Social%20benefits%20-%20Project%20SE1%20-%20Interim%20method%20-%20Synergies%20-%20November%202022.pdf

98 LEAN estimate 0.3 FTEs / Ha for restoration activities, we have applied a conservative 0.1% of this estimate, LEAN (2022), *A National Forest Protection and Workforce Plan for Australia,* A_National_Forest_Protection_and_Workforce_Plan_for_Australia_LEAN.pdf

99 The University of Newcastle, Hunter Research Foundation Centre, 2021. Great Koala National Park economic impact analysis and environmental assessment, http://hdl.handle.net/1959.13/1482919 ;

100 For example, see: Forestry Corporation of NSW 2022, *Forest Management Plan softwood plantations coastal and tablelands hardwood forests July 2022 to June 2027, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0003/1443567/FCNSW0880-FMP_2022-27020223.pdf*

Box 9: Native forests and ecosystem services

The NSW Government acknowledges that the state's biodiversity is in crises.[101] The restoration of formerly logged native forests, where feasible, is aligned government commitments to set nature on a path to recovery and achieve a range of conservation goals.[102]

Intact forests support a confluence of environmental values including biodiversity, carbon sequestration and storage, water provision, indigenous culture and the maintenance of human health.[103] These environmental values provide services to the NSW economy and society, known as ecosystem services, which may collectively exceed the value of utilising the resource for timber production.[104]

In 2019, the Victorian government conducted an assessment of ecosystem services from forests in its RFA regions. The assessment estimated the value of a range of ecosystem services, including:

- Erosion control – forests prevented 382 million tonnes of soil erosion to major waterways, valued at $3.1–8 billion based on the cost of artificially removing sediment.
- Flood mitigation – it was estimated that forests provided flood mitigation benefits to 646 localities across Victoria, with a minimum estimated value of $97 million per year in avoided damages to property and infrastructure.
- Carbon sequestration – in 2017, forests were estimated to capture 41 megatonnes of carbon from the atmosphere, valued at $3 billion. Carbon losses due to fire were estimated at 15 megatonnes, equating to a net increase of carbon stored of 26 megatonnes.
- Recreation and tourism – supporting opportunities for active and passive recreation, forests were estimated to deliver up to $905 million per year in recreation and tourism benefits to the community.

Altogether, erosion control, flood mitigation, carbon sequestration, recreation and tourism provided by forests in VIC's RFA regions were valued at $7.1 to $12 billion, while timber and firewood harvested from these forests was valued at $82 million and $3-7 million, respectively

Standing forests also provide many unquantified benefits including the immense cultural value to Traditional Owners and Aboriginal communities, air purification, health benefits, social and community connection, and amenity.

Source: Adapted from Victorian State Government (2020). Ecosystem services from forests in Victoria: Assessment of Regional Forest Agreement regions.

101 NSW Government 2024, *NSW Plan for Nature*, https://www.nsw.gov.au/departments-and-agencies/the-cabinet-office/resources/nsw-plan-for-nature

102 Australia is signatory to a range of international biodiversity conservation goals. For example, the *Global Biodiversity Framework* aims to 'ensure urgent management actions to halt human-induced extinction of known threatened species and for the recovery and conservation of species.' The *Glasgow Leaders' Declaration* committed us to halt and reverse deforestation by 2030. The 2030 Agenda for Sustainable Development and the Sustainable Development Goals includes Goal 15 Life on Land to reduce the proportion of land that is degraded over total land area.

103 Watson, J. E. M., *et al*. (2018). 'The exceptional value of intact forest ecosystems', Nature Ecology & Evolution, 2 pp 599–610

104 Frontier Economics 2021, *Comparing the value of alternative uses of native forests in Southern NSW*, https://www.frontier-economics.com.au/documents/2021/11/comparing-the-value-of-alternative-uses-of-native-forest-in-southern-nsw.pdf

5 Bega Valley Shire

This section provides an introduction to the regional economy of the Bega Valley Shire, an overview of the public NFL sector in the region, and considers the implications of a transition out of public NFL.

5.1 Regional socio-economic context

The Bega Valley Shire is located in the south-eastern corner of NSW, bordered by Eurobodalla Shire in the north, the State of Victoria in the south, and the Snowy Monaro Regional Council in the West.

The region is about 170 kilometres south of Canberra, and 350 kilometres south of Sydney. The coastal areas of the shire, particularly in the north, are geared towards residential development and tourism, with rural inland areas home to productive agriculture (particularly dairy and grazing). Inland areas contain mountainous terrain and significant areas of National Park and State Forest.

The region has a population of about 36,000, with major centres at Bega, Merimbula and Eden. The population is projected to grow to about 40,000 by 2036. The median age in the region is 52, which is higher than the rest of NSW (median age of 39). Similar to other regional areas, the region records outward migration of young adults (18–24 year olds), as they may move to seek education and employment opportunities in larger centres.[105]

Employment (by place of residence) in the Bega Valley Shire in 2021 by industry, percent of total employment, and growth since 2016 is reported in Table 5. According to the 2021 census, 117 people were employed in forestry and logging (0.81% of employment),and 78 in wood product manufacturing (0.54% of employment). These statistics reflect employment in softwood and private NFL, suggesting direct employment in public NFL is a subset of these figures.

The industries recording the largest employment numbers were Health Care and Social Assistance (2,386 or 16.57% of employment), Retail Trade (1,568 or 10.89% of employment), Construction (1,528 or 10.61% of employment), and Accommodation and Food Services (1,481 or 10.28% of employment). These 'service industry' employment concentrations are not widely out of step with employment patters in the rest of NSW, though Accommodation and Food Services is one notable specialisation in the data (measured via a Location Quotient (LQ) defined as the ratio of industry employment to in the region to the ratio of industry employment across the entire state).[106]

The region has a strong specialisation in Agriculture, Forestry and Logging (with a LQ of 3.2), particularly in Aquaculture (LQ of 26) and Forestry and Logging (LQ of 17), and wood product manufacturing (LQ of 2.12) likely reflecting activity at Allied Natural Wood Exports (produces wood chips, sawlogs, and briquettes). These specialisations suggest that, despite the relatively low share of observed forestry-related employment, the regional economy may hold the prerequisite concentrations of skills, infrastructure and industry mix to support future employment growth via structural adjustment to the hardwood sector.

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105 Department of Regional NSW 2023, *Far south coast regional economic development strategy – 2023 update*. https://www.nsw.gov.au/sites/default/files/2023-02/Far-South-Coast-REDS-2023-Update.pdf

106 Based on 2016 and 2021 data Frontier Economics calculates a Location Quotient (LQ) of 1.6 of the Accommodation and Food Services industry. A LQ is a ratio which determines the concentration of a particular industry in a LGA in comparison to the concentration of that same industry across the entire state of NSW. A ratio significantly greater than 1 suggests the region has a 'specialisation' in the given industry.

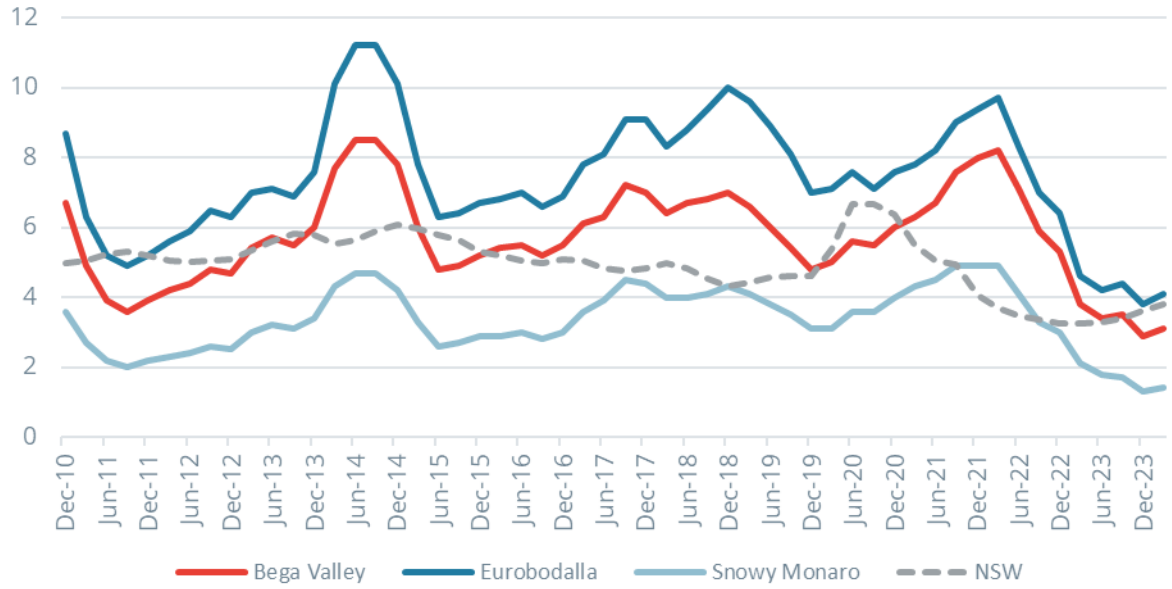
Table 5: Employment trends, Bega Valley Shire

Industry	Employment (2021)	Employment (% LGA)	Employment change (from 2016)	LQ
Health Care and Social Assistance	2,386	16.57%	491	1.1
Retail Trade	1,568	10.89%	48	1.2
Construction	1,528	10.61%	322	1.2
Accommodation and Food Services	1,481	10.28%	70	1.6
Education and Training	1,224	8.50%	243	0.93
Manufacturing	988	6.86%	-69	1.2
Incl. Furniture and Other Manufacturing	*30*	*0.21%*	*6*	*0.86*
Incl. Food Product Manufacturing	*645*	*4.48%*	*-123*	*3.0*
Incl. Wood Product Manufacturing	*78*	*0.54%*	*3*	*2.1*
Incl. Pulp, Paper and Converted Paper Product Manufacturing	*0*	*0.00%*	*0*	*0*
Agriculture, Forestry and Fishing	985	6.84%	63	3.2
Incl. Agriculture	*653*	*4.53%*	*21*	*2.5*
Incl. Aquaculture	*109*	*0.76%*	*24*	*26*
Incl. Forestry and Logging	*117*	*0.81%*	*23*	*17*
Public Administration and Safety	861	5.98%	178	0.95
Professional, Scientific and Technical Services	700	4.86%	132	0.53
Other Services	547	3.80%	85	1.0
Administrative and Support Services	513	3.56%	84	1.1
Transport, Postal and Warehousing	449	3.12%	7	0.65
Wholesale Trade	315	2.19%	67	0.75
Arts and Recreation Services	212	1.47%	-5	1.0
Financial and Insurance Services	181	1.26%	5	0.23
Electricity, Gas, Water and Waste Services	177	1.23%	55	1.22
Rental, Hiring and Real Estate Services	155	1.08%	-28	0.61
Information Media and Telecommunications	101	0.70%	-8	0.37
Mining	30	0.21%	2	0.21
Total	**14,401**	**100%**	**1,742**	

Source: ABS 2016 Census; ABS 2021 Census; Frontier Economics analysis. Note: Totals may not sum to reported totals due to rounding. LQ reported to 2 significant figures.

The unemployment rate in the region, and surrounding local government areas and NSW, is presented in Figure 12. Bega Valley Shire's estimated unemployment rate has declined from a peak of 8.2% in March 2022, to around 3.1% in March 2024, while over the same period the number of people in the labour force (i.e., those employed plus those looking for a job) increased by almost 2,000 to 17,600. These statistics are consistent with employment growth over the past couple of years, an observation shared by anecdotal feedback from local stakeholders who noted a tightening labour market.

Figure 12: Bega Valley Shire unemployment trends, per cent



Source: Australian Government Jobs and Skills Australia 2024, Small Area Labour Markets, March Quarter 2024, https://www.jobsandskills.gov.au/data/small-area-labour-markets (accessed 11/09/2024); ABS 2024, Labour Force, Australia, *Table 4., https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia/jul-2024 (accessed 11/09/2024); Frontier Economics analysis. Note: LGA level unemployment data lags actual changes in labour market conditions and is subject to statistical variability.*

Heightened unemployment in the 2017–2019 period would have been influenced by a sustained period of drought in the region which had a significant impact on the agriculture, particularly the dairy sector. Similarly, the 2019/20 bushfires had significant impacts on the local economy impacting 68% of the shire's landmass, 80% of the hardwood native forest, 80% of annual tourism revenue lost, and 4% of the total dairy herd lost.[107]

Socio-economic outcomes in the Bega Valley Shire are similar to those measured in in other coastal regional NSW communities. The ABS' Index of Relative Socio-Economic Disadvantage (IRSD) finds that the shire has higher levels of relative disadvantage than 58% of NSW, based on the measurement of a combination of attributes such as low income, low educational attainment, jobs in relatively unskilled occupations, as well as other variables that broadly reflect disadvantage.[108] Within the shire, the IRSD suggest higher relative levels of disadvantage in the Eden coast and Bega district.[109]

[107] Department of Regional NSW 2023, *Far south coast regional economic development strategy – 2023 update*, p. 14, https://www.nsw.gov.au/sites/default/files/2023-02/Far-South-Coast-REDS-2023-Update.pdf (accessed 11/09/2024)

[108] ABS 2023, *Socio-economic indexes for Areas (SEIFA), Australia*, https://www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release#data-downloads

[109] .id (informed decisions), https://atlas.id.com.au/bega-valley (accessed 11/09/2024).

5.2 Public NFL in the Bega Valley Shire

History of public NFL industry contraction and change

Public NFL activity in the Bega Valley Shire region has undergone a period of significant contraction over the decades. On a volumes basis, public NFL activity in the Eden region is geared toward supplying resource for wood chip export, with most historic sawmilling activity having already ceased.

The forestry industry in the Eden region has a long history. Before the 1960s, the relative remoteness of the native forests and the region's record of destructive fires meant that there was limited commercial interests in the forests – except for selective harvesting in those relatively accessible areas.[110]

By the mid-1960s, Japanese businesses were canvassing the potential to obtain Australian wood chips to use as inputs for their domestic pulp and paper industry. An agreement was struck between the NSW Government and Harris-Daishowa, requiring the company to establish a chipping plant and wharfage facilities in Twofold Bay, just out of Eden. NFL started in 1969, with the first shipment of wood chips to Japan taking place in January 1971.[111]

Around the same time, the NSW Government increased the state forest estate in the area by around 140,000 hectares, from 60,000 hectares pre-1960, to provide a supply of sawlogs for the Eden and Bombala sawmilling industry and pulplogs the new woodchip facility. These new industrial arrangements facilitated the replacement of selective harvesting with clear felling harvesting techniques, over coupes as large as possible.[112]

Over the subsequent decades, the volumes of sawlog commitments steadily declined as did recorded quantities of timber harvested (from State Forests, timber reserves, and other crown land) in the Eden area. These reductions in commitments and quantities of harvest followed a series of regulatory decisions, including more recently:[113]

- Reductions in sawlog allocations in 1992 to account for reductions in the State Forest as a result of The South East Forest Agreement, and
- The NSW Government Forestry Reform Strategy, announced in June 1995, reducing sawlog allocations by 40% in the Eden Management area from 1 January 1996. This was followed by a NSW Government decision to commit sawlog allocations at least 26,000 cubic metres until the RFA for the Eden region was finalised.

These historic trends are presented in Figure 13. Sawlog resource, and later on pulplog resource, have undergone significant reductions in supply necessitating industry transition at those times. The Productivity Commission reports that in 1995-96 there were 13 hardwood sawmills and 1 woodchip mill in the Eden RFA region, with sawlog intake at 36,700 cubic metres and pulp log

110 Carron, L. T. (1985). *A history of forestry in Australia.* Australia: Australian National University Press, p. 42, https://openresearch-repository.anu.edu.au/bitstream/1885/114759/2/b16120644.pdf

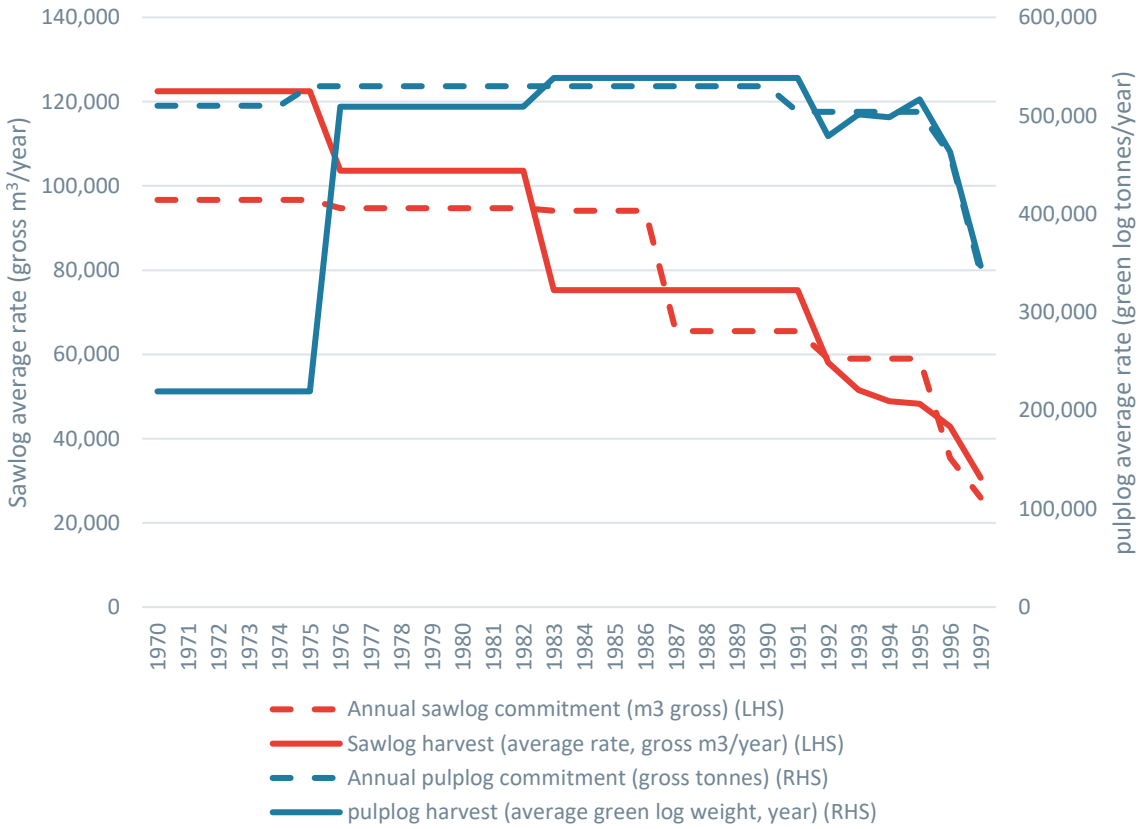
111 Carron, L. T. (1985). *A history of forestry in Australia.* Australia: Australian National University Press, p. 42, p. 43, https://openresearch-repository.anu.edu.au/bitstream/1885/114759/2/b16120644.pdf

112 Carron, L. T. (1985). *A history of forestry in Australia.* Australia: Australian National University Press, p. 42, p. 43, https://openresearch-repository.anu.edu.au/bitstream/1885/114759/2/b16120644.pdf

113 Commonwealth Department of Primary Industries and Energy 1998, A report on Forest Wood Resources and Wood Based Industries in the Eden CRA Region, pp. 24–25, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/rfa/regions/nsw-eden/social-economic/nsw_ed_ne05es.pdf

intake at 463,000 cubic metres (with 77 people employed in pulpwood processing and 57 in hardwood sawmilling).[114]

Figure 13: Historic sawlog and pulp log commitments, estimated quantity of harvest



Source: Commonwealth Department of Primary Industries and Energy 1998, A report on Forest Wood Resources and Wood Based Industries in the Eden CRA Region, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/rfa/regions/nsw-eden/social-economic/nsw_ed_ne05es.pdf; Frontier Economics analysis.

The Eden Region RFA between the Australian and NSW governments was signed in August 1999. The 1999 Eden RFA allowed for: [115]

- A minimum of 25,000 cubic metres quota sawlogs annually for the first five years and 24,000 cubic metres for the remaining 15 years of the 20-year agreement. Wood chipping was to continue only if derived from sawmill residues or silviculture operations, and
- The addition of 33,000 hectares of state forests to the national parks and nature reserves in the Eden region. This brought the total area reserved in national parks and nature reserves in the Eden region to more than 243,000 hectares.

The Eden RFA was subsequently varied in November 2018. Among other amendments, the variation substituted reference to a minimum per annum quota of sawlog with volumes no

[114] Productivity Commission 2001, *Competitive Neutrality in Forestry, Chapter 2 Forestry background and institutional framework*, p. 10, https://www.pc.gov.au/competitive-neutrality/research/forestry/03-chapter02.pdf

[115] NSW Government 1999, *Forest Agreement for the Eden Region,* https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/forestagreements/edenagreement.pdf

greater than sustainable yields for timber and *Forestry Products*[116] for the Eden Region, which may be amended from time to time in accordance with the Eden RFA.[117]

This amendment may reflect a recognition that wood chipping is now the primary activity supported by public NFL in the region, and not a 'secondary' activity related to utilising the by-product of sawlog harvest and sawmilling.

Around the same time, a large sawmill closed in doors as a result of constraints to the physical availability of sawlog supply (Box 10).

Box 10: Blue Ridge Hardwoods in Eden

Blue Ridge Hardwoods in Eden had a WSA for 24,000 m^3 of high-quality sawlogs per annum which expired in 2018.[118] The native forest resource was no longer available to supply this quantity of high-quality sawlogs and hence the WSA was not renewed.

FCNSW has been able to offer 25,000 m^3 per annum of smaller regrowth sawlogs rather than high quality sawlogs. Presumably to ensure that it obtains a fair market price for this wood, it was also offered the smaller sawlogs to the market via a competitive tender process.

Blue Ridge Hardwoods would have required new or altered equipment to process the smaller logs. They were unsuccessful in the tender process, which was won by Allied Natural Wood Exports who proposed to build a new mill suited to processing the smaller logs.[119] The government provided financial transition support to the impacted workforce of around 50 employees.[120] Subsequently, South Coast Timber took over the mill (in October 2020) employing 30 employees (some of whom were retained from Blue Ridge Hardwoods). The mill is sourcing wood supplies from private property and from the Eden Management Area (Forestry).[121]

The 2019-20 bushfires substantially reduced the supply of public native forest hardwood, impacting over 80% of the forest that was able to harvest in the South Coast and Eden RFA areas,

116 Forest Products are the product of trees and other vegetation (other than timber) as defined in the *Forestry Act 2012 (NSW).*

117 The Commonwealth or Australia and the State of New South Wales 2018, *Deed of Variation Deed of variation in relation to the regional forest agreement for the Eden region,* para 75, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/forestry/rfa/2018-eden-rfa-variation.PDF

118 IPART 2017, *Review of Forestry Corporation of NSW's native timber harvesting and haulage costs, Final Report*, December, p. 17.

119 NSW Forestry Corporation, Eden Wood Supply Agreement – statement, viewed 20 April 2022, https://www.forestrycorporation.com.au/about/releases/2019/eden-wsa-statement

120 NSW Parliament, *Budget Estimates 2020–21 supplementary questions Portfolio Committee No.4 – Industry*, viewed 16 September 2022, https://www.parliament.nsw.gov.au/lcdocs/other/15367/Answers%20to%20supplementary%20questions%20-%20Barilaro.pdf

121 Szanto, L 2021, "Future looks bright', Eden's South Coast Timber reflects on first year of business', viewed 20 April 2022, https://www.begadistrictnews.com.au/story/7539230/future-looks-bright-edens-south-coast-timber-reflects-on-first-year-of-business/

with implications for sustainable yield and composition of future resource.[122] In its 2023 Sustainability Report, FCNSW reports predicted sustainable yields for the Eden Region of:

- Approximately 25,000 m^3 per annum of high-quality large logs, high quality small logs, and low quality logs in 2023 projected forward to 2030, and
- Approximately 133,000 m^3 per annum of pulp/other in 2023, projected forward to 2030. Note, Figure 13 presents pulp log statistics in terms of weight, not volume.

Current public NFL footprint in the region

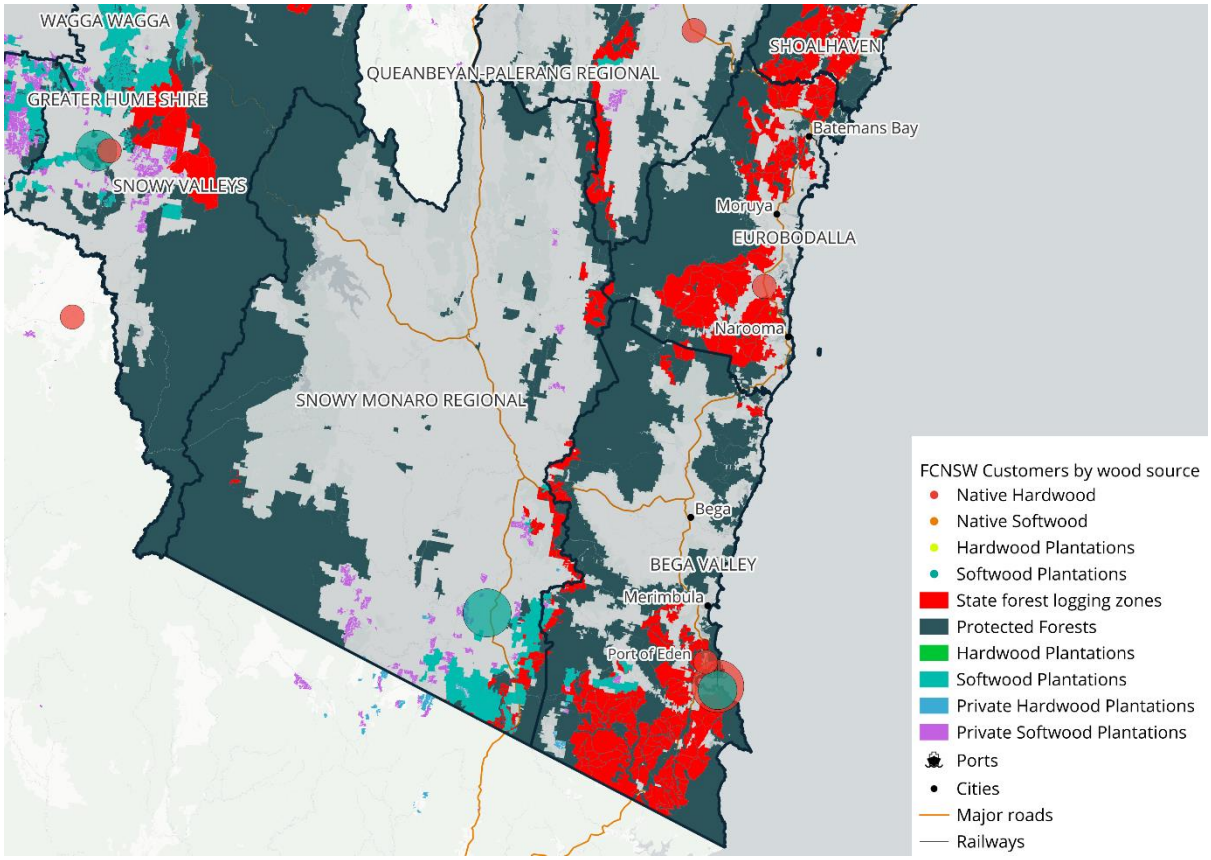
The current footprint of public NFL in the region is presented in Figure 14. Within the Bega Valley shire the primary customer of FCNSW is the Eden wood export terminal, that is supplied over 300,000 cubic meters of small sawlogs and pulplogs. This facility primarily produces native hardwood chips for export, along with smaller operations producing sawn wood for pallet manufacture and using residues to manufacture briquettes.

Pulpwood resource is sourced from state forests to the south of Eden, from state forests located north of the Bega Valley LGA further up the south coast, and a limited extent from privately owned hardwood plantations.

The precise public NFL employment in the region is uncertain, but from our previous estimate of 332 hardwood FTEs on the south coast, and with reference to the ABS employment statistics above, it seems that there might be around 200 direct public NFL employees within the Bega Valley LGA.

[122] NSW Natural Resources Commission 2021, *Coastal IFOA operations post 2019/20 wildfires*, June. This was a Cabinet-in-Confidence report that has been publicly leaked.

Figure 14: Eden region forestry industry footprint



Source: Frontier Economics analysis of various spatial datasets

Box 11: Plantation resource in the region

There are limited hardwood plantations in the vicinity of Bega Valley Shire, none are owned by FCNSW, but there are 6,200 hectares of plantation within the East Gippsland – Bombala region, for which the primary hardwood processing facility is located in Eden.[123] These plantations produce similar pulp log resource to the surrounding native forests, but operate at a smaller scale.

The softwood sector is sustained by large plantation estates that border the existing national park estate, sitting west of Eden within the Bega Valley LGA and in neighbouring Snowy Monaro LGA. Primary customers of this timber include:

- Dongwha's softwood processing facility in Bombala, which processes plantation timber logs into decking, structural timber and sleeper products,
- Allied Natural Wood Exports, where lower quality logs yielded from the plantations and native forests are sent to be chipped and exported, along with a proportion of raw log exports, and
- A number of smaller hardwood customers on whom information is limited, who produce firewood with low quality wood, and sawmill hardwood products with higher quality logs.

[123] Table 33, Australian plantation statistics and log availability report 2021, ABARES, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1032742/0

Transition in the Bega Valley Shire

To a large extent, the transition out of public NFL has already played out in the Bega Valley. Public NFL in the region is now almost entirely focused on the chipping of pulplogs for export. Hardwood sawmilling activity has largely exited the region over past decades. The regional economy appears to have shown the requisite capacity to adapt during this transition.

The largest source of public NFL employment in the region is Allied Natural Wood Exports (produces wood chips, sawlogs, and briquettes) which we understand holds a WSA until 2033.

Today, forestry-related employment is a relatively small component of the region's broader employment profile suggesting the cessation of public NFL need not represent a severe shock to the regional economy. Subject to decisions on timing and scale, the transition out of public NFL in the Bega Valley could include:

- **Establishing hardwood plantations:** This would involve assessing the feasibility of long term sustainable hardwood supply in the region, and the locations and types of plantations which could be established. This could involve establishing short rotation plantations or agroforestry,[124] or establishing longer rotation stands to supply the relatively modest hardwood sawmilling industry. Potential employment associated with these investments would begin in the short term, with the scale depending on the area of hardwood plantations established in the region.
- **Short-term supply-side responses:** There may be an uptake in supply from private forestry sources, such as that being observed in Victoria and Western Australia after public NFL ceased in those jurisdictions. There is currently little information as to the presence of private hardwood supply in the region, though NSW DPI notes there are material amounts of suitable private lands not currently registered for a Private Forestry Plan with Local Land Services.[125] In the short to medium term, imports may provide resource (potentially via the Port of Eden)[126] to supplement local supplies. Potential economic activity would range from the management, harvest and haulage of private supply, and the potential handling of imports at the Port of Eden.
- **Manufacturing interventions**: Local hardwood milling activity may continue based on accessing alternative supply sources, including through government support to adopt new manufacturing technologies to improve competitiveness in domestic construction markets. Additional investment in manufacturing could be guided by market-led initiatives and potentially be supported by governments.

Interventions in managing and restoring new protected areas include:

- **Establishing management activities:** These new protected areas will require a workforce for ongoing forest management activities. Within the Eden IFOA region there are around 200,000 hectares of forest that would need to be managed, providing around 55 potential ongoing FTEs.

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[124] Supporting the uptake of agroforestry is an identified opportunity in the region. See: Bega Valley Shire Council, *Bega Valley Shire Local Strategic Planning Statement 2040*, https://begavalley.nsw.gov.au/files/Local_Strategic_Planning_Statement_2040_adopted.pdf

[125] NSW Department of Primary Industries 2024, *Technical report for Local Land Services Report on the suitability to produce sawlogs of private property forests in Southern NSW PNF code region*, https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/1579713/Report-on-the-suitability-of-Southern-private-property-for-sawlog-production.pdf

[126] It is also the only port on the south cost that can allow cruise ship passengers to board and disembark outside of major cities – the 2023/24 season is reported to have bought 41 ship visits, 20% growth in the previous year, and 70,000 passengers. See, NSW Government 2024, *Eden summer cruise season the busiest on record*, 27 March, https://www.nsw.gov.au/media-releases/eden-summer-cruise-season-busiest-on-record (accessed 11/09/2024).

- **The restoration task:** Public native forests in the region are harvested at younger ages to support pulplog yields. Transitioning away from this practice will likely require significant restoration efforts, leading to increased expenditure, activity, and employment compared to standard reserve management practices.

These collective changes are interdependent and uncertain, and ultimately their success in the region would be determined by private sector investment decision making. Governments would have a role to guide and manage this transition process in the region and across the state.

While not the focus of this report, the Bega Valley Shire's transition out of public NFL may also be supported by economic diversification initiatives outside of the hardwood sector, including in growing the nearby softwood sector. A credible plan to grow the regional economy should build upon its regional economic strengths to ensure that these diversification initiatives have the best chance of success.[127]

[127] For example, see: Department of Regional NSW 2023, *Far south coast regional economic development strategy – 2023 update*. https://www.nsw.gov.au/sites/default/files/2023-02/Far-South-Coast-REDS-2023-Update.pdf

6 Port Macquarie Hastings

This section provides an introduction to the regional economy of Port Macquarie Hastings, an overview of the public NFL sector in the region, and considers the implications of a transition out of public NFL.

6.1 Regional socio-economic context

The Port Macquarie-Hastings Council region is located in the Mid North Coast of NSW, it is bordered by Kemsley, Walcha and Mid-coast local government areas.

The region is about 420 kilometres north of Sydney, and 510 kilometres south of Brisbane. The natural environment is a defining feature of the region, with a sizeable proportion being made up of State Forest and National Park. The region has undergone considerable development over the decades, particularly along the coast, and become increasingly diversified as migrants are attracted to the amenity of the area.

The region has a population of around 89,596. Port Macquarie is the main driver of residential and economic growth with about 50,000 residents. Population growth in the region grew by 8% from 2018 to 2023, significantly higher than NSW's 4.9% growth over the same period.[128]

The median age of the population is 49, which is higher than the rest of NSW (median age of 39). It is noteworthy that about 41% of the population can be categorised as older workers or retirees (i.e., older than 50) versus 31% in NSW more broadly.[129] A key challenge for the region is in attracting and retaining workers in the prime working years, between 20-54 years.[130]

Employment (by place of residence) in Port Macquarie Hastings in 2021 by industry, percent of total employment, and growth since 2016 is reported in Table 6. The largest employment numbers were in Health Care and Social Assistance (7,354 or 21% of employment), Retail Trade (3,845 or 11.17% of employment), Construction (3,658 or 10% of employment), and Education and Training (3,586 or 10% of employment). These employment concentrations are consistent with a growing population and wider state-wide trends toward a service-based economy. The observed specialisation in Health Care and Social Assistance may reflect the cohort of the population that is relatively older than the wider NSW population.

The region's degree of specialisation in forestry is reflected in its employment statistics (measured via a Location Quotient (LQ) defined as the ratio of industry employment to in the region to the ratio of industry employment across the entire state).[131] According to the 2021 census, 77 people were employed in forestry and logging (0.22% of employment, LQ of 4.74), and 177 in wood product manufacturing (0.51% of employment, LQ of 2). These statistics reflect employment in forestry generally, suggesting direct employment in public NFL is a subset of these figures. It is important to note that a regional economy may hold a specialisation in an industry without it being a *relatively* large employer.

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128 ABS, *Region summary: Port Macquarie-Hastings,* https://dbr.abs.gov.au/region.html?lyr=lga&rgn=16380 (accessed 12/09/2024); ABS, *Region summary: New South Wales,* https://dbr.abs.gov.au/region.html?lyr=ste&rgn=1 (accessed 12/09/2024).

129 Regional Development Australia 2023, *Regional snapshot Port Macquarie-Hastings LGA*, https://rdamnc.org.au/wp-content/uploads/RDA_Snaphot_Port_r2-1.pdf (accessed 12/09/2024).

130 Department of Regional NSW 2023, *Hastings Macleay Regional Economic Development Strategy – 2023 Update*, https://www.nsw.gov.au/sites/default/files/2023-02/Hastings-Macleay-REDS-2023-Update.pdf (accessed 12/09/2024).

131 A LQ is a ratio which determines the concentration of a particular industry in a LGA in comparison to the concentration of that same industry across the entire state of NSW. A ratio significantly greater than 1 suggests the region has a 'specialisation' in the given industry.

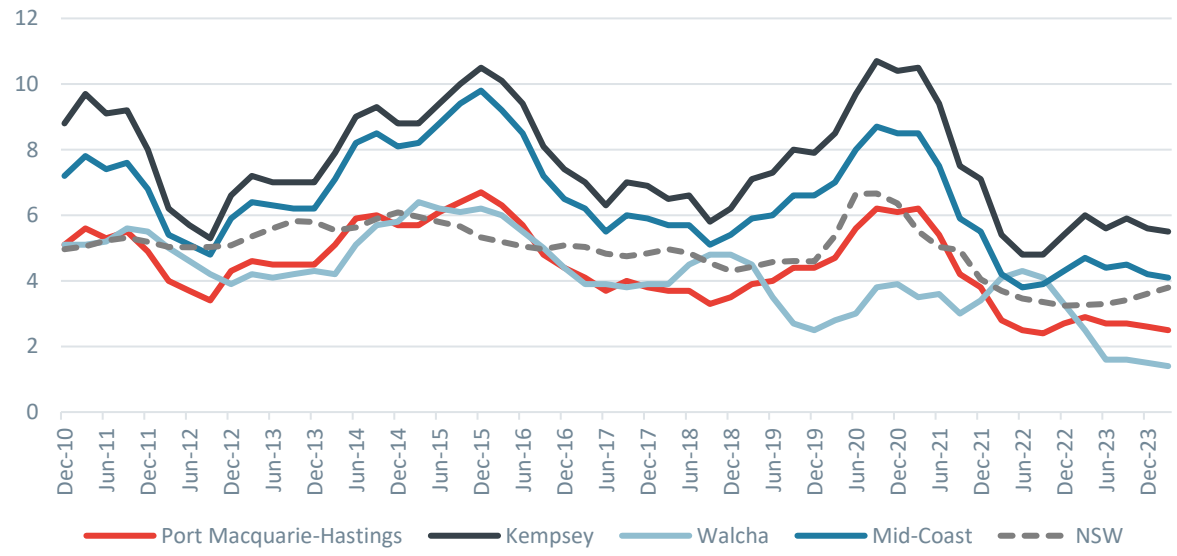
Table 6: Employment trends, Port Macquarie Hastings

Industry	Employment (2021)	Employment (% LGA)	Employment change (from 2016)	LQ
Health Care and Social Assistance	7,354	21.36%	2,165	1.4
Retail Trade	3,845	11.17%	421	1.2
Construction	3,658	10.63%	500	1.2
Education and Training	3,586	10.42%	769	1.2
Accommodation and Food Services	3,174	9.22%	482	1.4
Public Administration and Safety	1,891	5.49%	266	0.88
Other Services	1,466	4.26%	230	1.21
Professional, Scientific and Technical Services	1,452	4.22%	213	0.46
Manufacturing	1,237	3.59%	129	0.64
Incl. Furniture and Other Manufacturing	*74*	*0.21%*	*0*	*0.89*
Incl. Wood Product Manufacturing	*177*	*0.51%*	*-19*	*2.0*
Incl. Pulp, Paper and Converted Paper Product Manufacturing	*5*	*0.01%*	*1*	*0.13*
Administrative and Support Services	1,203	3.49%	99	1.06
Transport, Postal and Warehousing	1,146	3.33%	96	0.7
Electricity, Gas, Water and Waste Services	1,022	2.97%	152	2.97
Agriculture, Forestry and Fishing	815	2.37%	66	1.1
Incl. Agriculture	*603*	*1.75%*	*49*	*0.98*
Incl. Aquaculture	*56*	*0.16%*	*-2*	*5.67*
Incl. Forestry and Logging	*77*	*0.22%*	*5*	*4.74*
Financial and Insurance Services	624	1.81%	59	0.33
Wholesale Trade	607	1.76%	35	0.61
Rental, Hiring and Real Estate Services	502	1.46%	-46	0.83
Arts and Recreation Services	434	1.26%	70	0.87
Information Media and Telecommunications	239	0.69%	6	0.36
Mining	169	0.49%	45	0.49
Total	**34,424**	**100%**	**5,757**	

Source: ABS 2016 Census; ABS 2021 Census; Frontier Economics analysis. Note: Note: Totals may not sum to reported totals due to rounding. LQ reported to 2 significant figures.

The unemployment rate in Port Macquarie Hastings, neighbouring local government areas and NSW is presented in Figure 15. Port Macquarie Hastings' estimated unemployment rate is around 2.5% in March 2024, lower than the surrounding LGAs except for Walcha. We have heard anecdotal evidence from stakeholders in the region that Port Macquarie Hastings, and the wider mid north coast, is facing skills shortages particularly in construction and manufacturing sectors.[132] Analysis commissioned by Regional Development Australia Mid North Coast finds the labour force participation rate in Port Macquarie Hastings on par with levels observed across NSW, linking this performance to the more urbanised economy.[133]

Figure 15: Port Macquarie Hastings unemployment trends, per cent



Source: Australian Government Jobs and Skills Australia 2024, Small Area Labour Markets, March Quarter 2024, https://www.jobsandskills.gov.au/data/small-area-labour-markets (accessed 11/09/2024); ABS 2024, Labour Force, Australia, *Table 4., https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia/jul-2024 (accessed 11/09/2024); Frontier Economics analysis. Note: LGA level unemployment data lags actual changes in labour market conditions and is subject to statistical variability.*

Heightened unemployment in 2019-20 likely reflect the confluence of the covid-19 pandemic and 2019-20 bushfires impacting the service-based economy, particularly the tourism sector. Because the regional economy is diverse the economic impact of the 2019-20 fires on the economic output of the region may be relatively small in the long term.[134]

Socio-economic outcomes in Port Macquarie-Hastings are similar to other NSW coastal communities. The ABS' Index of Relative Socio-Economic Disadvantage (IRSD) finds that the region has higher levels of relative disadvantage than 57% of NSW, based on the measurement of a combination of attributes such as low income, low educational attainment, jobs in relatively unskilled occupations, as well as other variables that broadly reflect disadvantage.[135] On the

[132] This issues are noted in: Department of Regional NSW 2023, *Hastings Macleay Regional Economic Development Strategy – 2023 update*, p. 22, https://www.nsw.gov.au/sites/default/files/2023-02/Hastings-Macleay-REDS-2023-Update.pdf

[133] Regional Australia Institute 2023, *Mid North Coast Labour Force Analysis RDA Mid North Coast*, December, https://rdamnc.org.au/wp-content/uploads/FINAL_Mid-North-Coast-Labour-Force-Analysis-Report_Dec23.pdf

[134] Department of Regional NSW (2020), *REDS Impact Review Hastings-Macleay REDS fire impact addendum*, p. 1, https://www.nsw.gov.au/sites/default/files/2020-05/Hastings-Macleay%20REDs%20fire%20impact%20addendum%C2%A0_0.pdf

[135] ABS 2023, *Socio-economic indexes for Areas (SEIFA), Australia*, https://www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release#data-downloads

other hand, and perhaps reflecting the tilt in the age profile of the region, the ABS' Index of Economic Resources finds that households in the region have relatively greater access to economic resources (e.g., higher incomes, higher home ownership) than 57% of NSW.

6.2 Public NFL in Port Macquarie Hastings

History of public NFL industry contraction and change

Public NFL activity in the Port Macquarie Hastings region, and wider north east region, has undergone a period of contraction over time.

The 1970s and 1980s was characterised by growing community concern on the management of public forests, including in the NSW North East.[136] [137] This saw a greater policy emphasis on reducing logging to sustainable levels while creating a reserve system – for example, in 1982, the New South Wales Government made a decision to halt rainforest logging in the state resulting in the transfer of approximately 120,000 ha of State Forest and related lands to create national parks and nature reserves.[138] This Rain Forest Decision has been described as 'the turning point' toward growing restrictions on public NFL.[139]

In 1998, the NSW Government announced the North East Forests Agreement which added about 380,000 ha to the national park and nature reserves estate while also guaranteeing about 269,000 cubic metres of resource to industry.[140]

The Australian and NSW Governments signed the North East RFA on 31 March 2000. Broadly, the North East RFA allowed for:[141]

- A total of 269,000 cubic metres of high quality large sawlogs and large veneer logs per year for 20 years. This was made up of 129,000 cubic square metres per annum in the Upper North East Region and 140,000 cubic metres per annum in the Lower North East Region, with some logs allocated in the upper region sourced from the south,[142]
- High quality small sawlogs to be supplied at levels greater than 1999 contracted volumes,

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136 Public Accounts Committee of the forty-ninth Parliament 1990, *Inquiry pursuant to Section 57(1) of the Public Finance and Audit Act 1983, concerning the Forestry Commission*, https://www.parliament.nsw.gov.au/ladocs/inquiries/2717/The%20Forestry%20Commission.pdf

137 Carron, L. T. (1985). *A history of forestry in Australia.* Australia: Australian National University Press, p. 41, https://openresearch-repository.anu.edu.au/bitstream/1885/114759/2/b16120644.pdf

138 Glascott, J. (2022) 'From the archives, 1982: Conservationists win the rainforest battle', *The Sydney Morning Herald*, 26 October, https://www.smh.com.au/environment/conservation/from-the-archives-1982-conservationists-win-the-rainforest-battle-20221017-p5bqgk.html; Pugh, D. (2022) 'Saving North East NSW's rainforests, 40 years on', 19 October, https://www.echo.net.au/2022/10/saving-north-east-nsws-rainforests-40-years-on/#:~:text=When%20logging%20moved%20to%20Mount,was%20required%20before%20logging%20rainforest.

139 Loxton, E., Schirmer, J., Kanowski, P., Dargavel, J., 2012. Cumulative social impacts in northern NSW: forest policy 1980–2010, https://www.foresthistory.org.au/2010_conference_papers/Loxton%20Paper.pdf

140 NSW Parliament Library Research Service 1999, *Forests in NSW; An* Update, p. 9, https://www.parliament.nsw.gov.au/researchpapers/Documents/forests-in-nsw-an-update/02-99.pdf

141 Regional Forest Agreement for North East New South Wales (Upper North East and Lower North East Regions) 2000, The Commonwealth of Australia and The State of New South Wales, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/rfa/regions/nsw-north-east/rfa/nsw_ne_rfa.pdf

142 Provided for under the Sustainable Wood Supply Strategy which refers to the intent to manage yields at a specific and constant level for 20 years. These volumes where to be subject to a wood supply review to be completed by December 2006. The RFA also allowed supply of 2,846 cubic metres and 5,911 cubic metres to mills in the Upper North East Region and Lower North East Region, respectively, in 2000 under transitional arrangements.

- Arrangements for pulp grade timber to include an amount of approximately 182,000 tonnes per annum, reflecting supply levels at the time of the agreement (30,000 tonnes per annum on the Upper North East Region and the balance in the Lower North East Region).
- The Upper North East Forest Agreement resulted in a 190 per cent increase in the area of forest in reserve, from 243,700 ha prior to the RFA to 705,000 ha in 2001.[143]

Across the Upper and Lower North East RFA regions, harvest was reduced from around 976,000 cubic metres in 1994/95 to around 517,000 cubic metres in 2004.[144] In June 2013, Boral announced it was exiting the residue and wood chipping operations in the north east due to a fall in demand.[145] We understand that there is currently no major wood chipping activity being undertaken in the north east.

In a move designed to support the sustainability of the regions forest's, in 2014 the state government spent $8.5 million buying back sawlog timber allocations (Box 12).

Box 12: Boral buy-back of 50,000 m³ of native timber

In 2014, the NSW Government spent $8.5 million to buy back timber allocations on the north coast from Boral. The purchase reduced Boral's annual supply of high-quality native sawlogs by 50,000 cubic metres for nine years to achieve sustainable harvest levels.

The buyback was recommended by a government steering committee which considered it the most effective way of achieving a sustainable yield after investigating North Coast timber supply issues. Boral had in the past sued Forests NSW (predecessor to Forestry Corporation) in 2006 and 2011 for a failure to supply the contracted amount of high-quality timber.

Source: IPART 2017, Review of Forestry Corporation of NSW's native timber harvesting and haulage costs, Final Report, December.

The North East RFA was subsequently varied in 2018, with an extension out to August 2039.[146] Under the variation, NSW agrees to make timber Forest Products[147] available at volumes no greater than sustainable yields calculated for the Upper North East and Lower North East regions. In its 2023 Sustainability Report, FCNSW reports predicted sustainable yields for the North Coast of (excluding hardwood plantations):[148]

- Approximately 400,000 cubic metres per annum of high quality logs, high quality small logs, and low quality logs in 2023, trending to around 370,000 cubic metres per annum in 2030.

143 Loxton, E., Schirmer, J., Kanowski, P., Dargavel, J., 2012. Cumulative social impacts in northern NSW: forest policy 1980–2010, https://www.foresthistory.org.au/2010_conference_papers/Loxton%20Paper.pdf

144 Loxton, E. A., Schirmer, J., Kanowski, P. (2013). 'Designing, implementing and monitoring social impact mitigation strategies: lessons from Forest Industry Structural Adjustment Packages, 42, pp. 105-115, https://doi.org/10.1016/j.eiar.2012.11.003

145 Tiberbiz 2013, *Boral abandons more timber operations*, 27 June, https://www.timberbiz.com.au/boral-abandons-more-timber-operations/ (accessed 11/11/2024)

146 Deed of variation in relation to the regional forest agreement for the north east region 2018, The Commonwealth of Australia and the State of New South Wales, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/forestry/rfa/2018-north-east-rfa-variation.PDF

147 Forest Products are the product of trees and other vegetation (other than timber) as defined in the *Forestry Act 2012 (NSW).*

148 FCNSW 2023, *Sustainability Report 2022-23*,

Actual harvest was about 158,000 cubic metres in 2022 reflecting a significant reduction in volumes in 2019 and 2020, and

- Approximately 182,000 cubic metres per annum of pulp/other, trending to about 150,000 cubic metres in 2030. Actual volumes harvested were around 36,000 cubic metres in 2022 reflecting a significant reduction in volumes in 2013 and 2014.

Current public NFL footprint in the region

The current footprint of public NFL is presented in Figure 16. The hardwood sector is a geographically dispersed industry reflecting the spread of resource and transportation costs. The footprint of public NFL within the Port Macquarie Hastings region similarly follows this pattern.

Supply in the region comes from three main sources: Public NFL, public hardwood plantations, and private supply. Public NFL takes place in states forests that span the north coast. Similarly, public hardwood plantations are spread across the region and provide resources that complement those provided by public NFL.

Private hardwood supply, which makes up about 38% of the region's total volume,[149] includes timber harvested from private landowners operating under Private Native Forestry (PNF) plans and approximately 20,000 hectares of private hardwood plantations.[150] These plantations, likely established by some participants to secure long-term supply (see Box 5), have an unclear supply profile that requires further assessment.

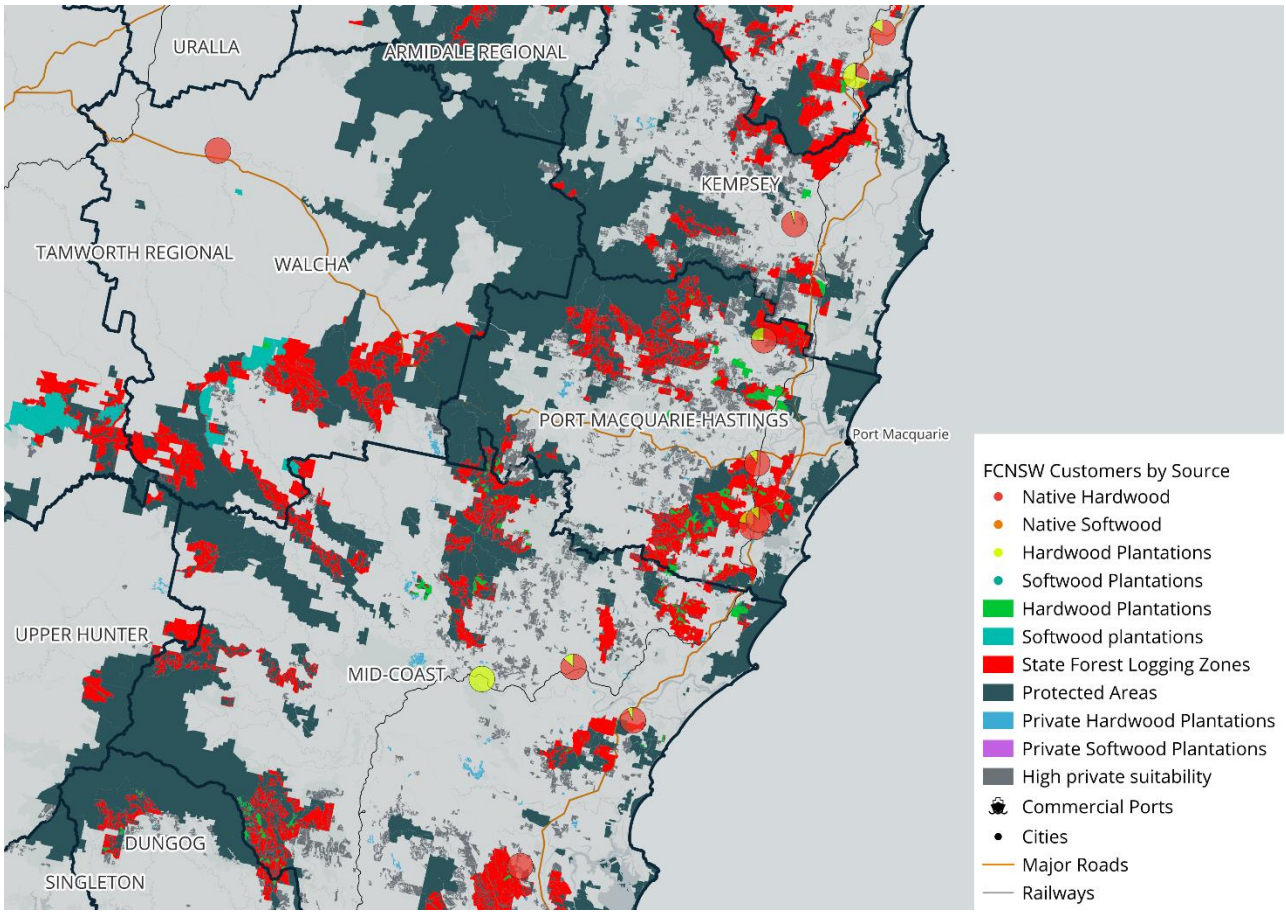
Within the Port Macquarie LGA, FCNSW has approximately four customers – two smaller customers who received under 5,000 cubic meters in 2022-23, and two larger customers, a former Boral timber site now owned by Pentarch that was supplied with 70,000 cubic meters, and Hayden timbers in the north of the LGA that was provided 15,220 cubic meters in 2022-23. In the region, 22% of the 90,000 m^3 of wood supplied by FCNSW to customers came from plantation timber. This is lower than the approximately 40% of FCNSW's total supply from plantations across the north in FY23. It also represents a decline from the higher levels seen in 2020–21, when plantation resources were used to offset reduced native forest yields following the 2019 bushfires.

According to ABS figures, around 250 people are employed in selected forestry-related industries in the Port Macquarie-Hastings LGA – this would include those how live in the LGA and commute to work in the neighbouring Mid-coast and Kempsey LGAs. Our own estimates place direct employment across the public NFL supply chain (in the entire north coast) at around 590.

[149] NSW Government, *2018 Private Native Forestry*, (accessed 10/10/2024) https://www.dpi.nsw.gov.au/forestry/science/forest-resources/2018-private-native-forestry

[150] Total north coast hardwood plantations in addition to FCNSWs 34,000 ha, 2019-20, ABARES, Australian plantations statistics and log availability report 2021, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1032742/0

Figure 16: Forestry in the port Macquarie region



Source: Frontier Economics analysis of assorted ABARES, FCNSW, NSW Govt Datasets.

Transition in Port Macquarie Hastings

The Port Macquarie Hasting's region has a relatively diversified economy, buoyed by relatively strong population growth. The regional impact of a cessation of public NFL may be partially mitigated by alternative local supplies of resource, including FCNSW's hardwood plantations.

Public NFL activity predominantly supports sawmilling, with significant wood chipping activity in occurrence.[151] Current plantations, which also produce pulplogs through thinning actions, are sent north to a woodchip export facility in the Port of Brisbane,[152] with around 14,000 cubic metres being sold to the export terminal in FY23.

Forestry related employment in the region is a relatively small component of the region's broader employment profile suggesting the cessation of public NFL need not be a severe shock to the regional economy. Further, the region's economic diversification and historic growth profile suggest it is well placed to handle and adapt to change. Subject to decisions on timing and scale, the transition out of public NFL in Port Macquarie-Hastings could include:

- **Understanding the potential future supply profile**: The North Coast of NSW has a material stream of non-public NFL supply to support local industry, with around 50% of

[151] We note that Weathertex on the north coast does have a WSA for small and pulplogs.

[152] FCNSW sold 14,242 m3 of plantation hardwood to a customer at the port of Brisbane, via analysis of Our Customers, FCNSW Sustainability report 2022-23, exports mentioned by ABARES in, Australian plantation statistics and log availability report 2021, p.44, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1032742/0

current wood supply levels available from these sources.[153] Further, there may be potential for supply from additional private plantations and private sources to reduce short to medium term requirements for imports.

- **Establishing additional plantations:** This would involve assessing the feasibility of long term sustainable hardwood supply in the region, and the locations and types of plantations which could be established. This might include incentivising short-rotation plantations or agroforestry systems, supporting manufacturers to access and utilise this resource, and establishing longer-rotation stands to supply the hardwood sawmilling sector in the longer term. Employment opportunities tied to these investments could begin in the short term, with their extent depending on the area of hardwood plantations established locally.
- **Manufacturing interventions:** Local hardwood milling activity may continue based on accessing alternative supply sources, including through government support to adopt new manufacturing technologies to improve competitiveness in domestic construction markets.

  Opportunities to manufacture engineered products using younger, or lower quality hardwood resource, is a potential opportunity for the region. The specific location, type of manufacturing[154] and scale of investment will depend on commercial decisions made on where plantations are to be located and an analysis of where downstream demand lies.

Interventions in managing and restoring new protected areas include:

- **Establishing management activities:** These new protected areas will require a standing workforce for ongoing forest management activities. Within the upper and lower North Coast IFOA regions there are around 800,000 hectares forest that would need to be managed, providing around 215 ongoing FTEs across the wider North Coast, with some of this employment directly in the Port Macquarie Hastings LGA.
- **The restoration task:** Native forests in the Port Macquarie region will likely be subject to more intensive restoration activities post NFL. The scale of the activity is uncertain, it may range from restoring damage caused by historic logging activity to establishing significant tourism infrastructure in a similar vein to that associated with the Great Koala National Park.

These collective changes are interdependent and uncertain, and ultimately their success in the region would be determined by private sector investment decision making. Governments would have a role to guide and manage this transition process in the region and across the state.

While not the focus of this report, the region's transition out of public NFL could also be supported by a range of broader economic diversification initiatives outside of the hardwood sector. [155]

[153] See plantation management employment estimate within Appendix C.

[154] This could include board manufacturing, or the manufacturing of value add, appearance grade products such as undertaking alternative manufacturing seen in Box 8

[155] See: NSW Government 2018, *Hastings Macleay Regional Economic Development Strategy 2018-2022*, https://www.nsw.gov.au/sites/default/files/2020-06/Hastings%20Macleay%20REDS.pdf (accessed 16/09/2024); and Department of Regional NSW 2023, *Hastings Macleay Regional Economic Development Strategy – 2023 Update*, https://www.nsw.gov.au/sites/default/files/2023-02/Hastings-Macleay-REDS-2023-Update.pdf (accessed 16/09/2024)

7 Transition pathways

A focus on building resilience in the hardwood sector differs to that adopted in the states of Victoria and Western Australia, who appear to have emphasised the role of broader economic diversification interventions and the development of the softwood plantation estate.[156]

Forestry is a long term venture and government structural adjustment supports hold the potential to transition the hardwood sector to a new and more sustainable footing. Complementary investments in alternative sustainable sources of hardwood supply and modes of manufacture hold the potential to be mutually reinforcing over time, facilitating private sector investment and employment across the medium to long term without the need for ongoing public funding support. As discussed in Section 4, these big changes would not be without uncertainty in both timing and outcomes.

If the NSW Government was to implement a policy to cease public NFL, it would likely also intervene to guide and manage the transition process. This would be in line with recent actions by the Victorian Government and Western Australian Government to cease public NFL within their jurisdictions and follows precedent set by previous NSW Government reforms to public NFL arrangements.[157]

7.1 Role of governments

A central policy problem in developing and implementing structural reform in the NSW hardwood sector is that the adverse impacts to employment are regionally concentrated and visible, while the corresponding potential employment, productivity, and environmental benefits are by their nature less certain. In principle, the small relative size of direct public NFL employment, in the order of 1,070, does not avoid this issue.

To address this problem, government could set objectives of reform in collaboration with regional communities and industry, before assessing the economic feasibility of a range of options (Box 13). A well understood and economically feasible transition plan will play a large role in supporting community and industry confidence during a transition out of public NFL.

Box 13: Objectives of transition

In practice, the objectives behind industry transition plans can vary. Broadly, objectives can touch on the following points: [158]

- Promoting efficiency: Government can support businesses to innovate, invest, improve productivity and efficiency, or take advantage of opportunities not yet fully realised in the economy. This can include structural reform to facilitate new sources of economic activity such as those outlined in this report, but also often includes the

[156] Victorian Government, *Forestry Transition Program*, https://www.deeca.vic.gov.au/futureforests/future-forests/victorian-forestry-program (viewed 13/11/2024); Western Australian Government, *Native Forestry Transition*, https://www.wa.gov.au/organisation/department-of-jobs-tourism-science-and-innovation/native-forest-transition (viewed 13/11/2024).

[157] For a fuller discussion see: Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

[158] Australian Government 2014, *Structural Adjustment in Regional Australia learning from experience, improving future responses by Aiether*, https://www.aither.com.au/wp-content/uploads/2019/04/15-110-NRI-Structural-Adjustment_online.pdf ; Australian Government Productivity Commission December 2017, Transitioning Regional Economies Productivity Commission Study Report.

provision of exit grants and reskilling programs designed to reduce the costs incurred during the transition, in turn promoting efficiency.

- Delivering fair outcomes: Given the cessation of public NFL would be the result of a government policy change, it is often considered reasonable to compensate those directly and adversely impacted by the change. This is especially the case if the policy change is not well signalled or impacts well defined property rights.[159]
- Buying reform: Like many environmental issues, the topic of public NFL is a political issue as well as an economic and social one. Governments sometimes choose to intervene in order to reduce stakeholder opposition and ensure that reforms can be smoothly implemented. Ideally, if this had to occur, it would be done to minimise the incentive for stakeholders to make repeated calls for further support in the future.

The primary focus of this report is to identify an option to build resilience in the NSW hardwood sector as a means to grow regional employment and resilience.

Based on the analysis in this report, Frontier Economics recommends that the following be subject to further economic feasibility assessment:

- Alternative sources of hardwood supply: Governments should prioritise the development of future hardwood supply. Key actions include:
  - Feasibility study on plantation investment: Governments should conduct a feasibility study to evaluate the potential for expanding hardwood plantations across different species, locations, and scales. This study should also consider historic models of delivery, such as the one adopted by FCNSW in the 1990s, to inform future investment strategies.
  - Support for agroforestry: Consider policies, financial incentives, and information support to encourage agroforestry as a viable source of hardwood supply. This could include exploring opportunities for the NSW Government to take on a coordinating and aggregation role, helping to streamline harvests from various agroforestry operations and optimise the supply chain.
- Alternative modes of manufacture: Governments should prioritise enhancing the hardwood sector's value added potential. Key actions include:
  - Work with industry: Coordinate industry participants, regional communities, and experts to identify and design investment options (this could be similar to industry-lead initiatives in the Green Triangle as discussed in Section 4.2.2).
  - Economic feasibility assessment: Undertake a detailed assessment of alternative manufacturing approaches, such as using lower-grade hardwoods and pulplogs to produce engineered wood products or other construction materials. This should include understanding the barriers, costs, and risks to making these investments in NSW.
  - Facilitate investment in technology: Consider mechanisms (e.g., funding, grants or incentives) to derisk the adoption of advanced manufacturing technologies and to improve the commercial viability of plantation and agroforestry hardwood supplies over the medium to longer term.

[159] These interventions should be considered against income and other support systems put in place to support the broader cohort of Australians who experience involuntary job losses. The intent should reflect the objective to compensate those adversely and directly impacted by the policy change, rather than provide

  - Integrated supply chain strategy: Aim to ensure that investments in hardwood manufacturing innovation are integrated with efforts to expand sustainable hardwood supply, with a goal to establish a mutually reinforcing system that attracts private investment and supports long-term growth.

- Managing and restoring new protected areas: Governments should prioritise the management and restoration of newly protected areas. Key actions include:
  - Establishing a comprehensive management plan: Develop a detailed management and restoration plan for the approximately 2 million hectares of forests transitioning to protected areas. This should include strategies for long-term conservation, biodiversity protection, and sustainable land management practices in collaboration with local communities and stakeholders.
  - Provide long-term funding: This will ensure the ongoing maintenance and restoration of protected areas, including technical support and capacity-building for regional communities involved in these efforts.

As highlighted throughout this report, these complementary actions are interdependent and uncertain, and ultimately their success would be determined by private sector investment decision making. Further economic assessment will reveal the strengths, weaknesses and risks of these potential interventions.

Lastly, undertaking these hardwood sector-specific interventions do not preclude other interventions and transition supports, including the provision of business assistance/exit grants, retraining and support services for employees engaged in public NFL, and broader economic diversification initiatives to grow employment in industries outside of the timber sector. These matters would likely be developed and refined as part of a broader structural adjustment package.[160]

[160] See, Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

A Further industry information

This attachment provides additional background information on the NSW forestry sector.

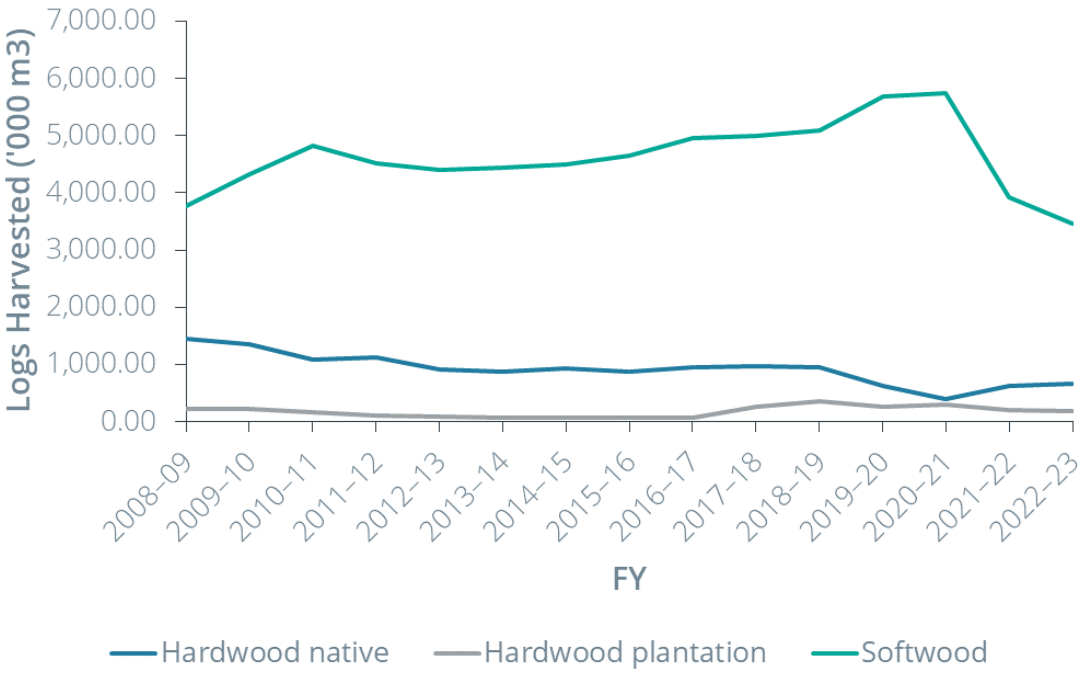
Softwood plantations

Softwood is primarily used as an input to downstream domestic manufacturers producing paper, fibreboard or structural timber products. Generally, softwood is not a direct product substitute for hardwood timber.

FCNSW is holds approximately 225,000 hectares of softwood timber plantations across the south and west of the state. These softwood plantations are largely entirely composed of radiata pine. FCNSW's softwood plantations account for more than 75% of the total NSW estate and about 90% of the state's total softwood sawlog harvest, a point of difference among other states where these resources tend to be more privately held.[161] [162]

Figure 17 shows the level of total softwood harvesting is significantly greater than that for hardwood. Elevated harvesting levels in 2019-20 and 2020-21 were a result of actions to recover fire damaged timber, and medium-term volumes are expected to be reduced as a result of the 2019-20 bushfires.[163]

Figure 17: Total wood harvest in NSW



Source: ABARES data, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/5

[161] Figure 7, https://www.agriculture.gov.au/abares/research-topics/forests/forest-economics/plantations-update#download-the-overview-report-and-datasets

[162] ABARES 2024, *ABARES National Wood Processing Survey 2021-22*, p. 10, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036362/0

[163] FCNSW Tumut management area fire salvage report, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0006/1531392/tumut-fire-salvage-report.pdf

New South Wales accounted for the majority of softwood plantations established in Australia in 2022-23.[164] [165] ABARES attributes the increase in new (hardwood and softwood) plantation establishment in part to, 'plantation managers expectations of increased demand for wood products and current state and federal government programs to increase the plantation estate.[166] The potential to earn Australian Carbon Credit Units (ACCUs) for some plantation forest investments also provide a source for additional incentives to invest in new plantations.[167] [168]

The Commonwealth Government's recent *Support Plantation Establishment Program* provides $73.76 million in grant funding over the four years from 2023-24 to 2026-27.[169] In 2022-23, investment in new plantation establishment across Australia almost doubled from the year before (around 4,500 hectares, or 0.3% of the total estate) the vast majority of which was softwood plantations. The majority of this new plantation establishment occurred in NSW, in particular 2,900 hectares of softwood plantations.[170]

FCNSW is reinvesting in softwood plantations following the widespread impacts of the 2019-20 fires and expects higher than average replanting rates through to 2026.[171] FCNSW has been the recipient of grant funding under the *Support Plantation Establishment* program, so far receiving around $2.5 million to support the establishment of just under 1300 ha in softwood plantations.[172]

Financial returns of public NFL

Primary sources of income for FCNSW's native forest business include timber sales and government grants, including Community Service Obligation (CSO) grants. The CSO grants are provided to FCNSW to provide a range of community services including recreational facilities, education, regulatory and fire protection services.

The hardwood division made a normalised earnings loss of $9 million and $15 million in FY22 and FY23, respectively. FCNSW's hardwood business (incorporating both public NFL and hardwood plantation harvesting) has experienced long periods of poor normalised earnings, as summarised in Figure 18.

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164 ABARES 2023, *Australian Plantation Statistics 2023 update,* *https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036061/0*

165 Australia's softwood plantation estate has remained stable for more than twenty years, at around one million hectares. Most commercial softwood plantations are located in NSW (29% of total softwood plantation area), followed by Victoria (22%), and Queensland (18%).

166 ABARES 2023, *Australian Plantation Statistics 2023 update,* p. 4, *https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1036061/0*

167 Australian Government Department of Agriculture 2024, *Australian forest and wood product statistics Production to 2022-23*, July, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0

168 Australian Government, *Planation forestry method*, https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/plantation-forestry-method (accessed 27/09/2024)

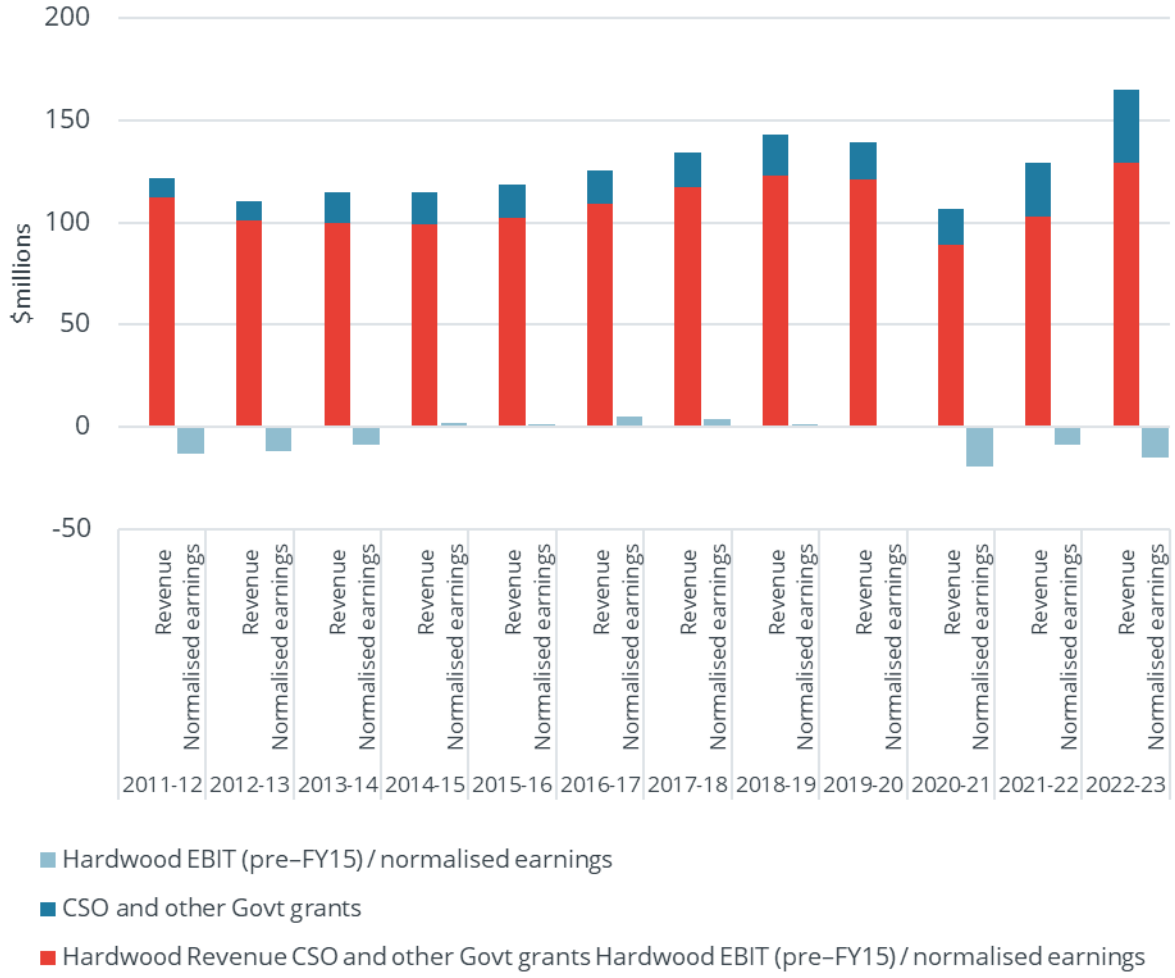
169 Australian Government, *Support Plantation Establishment program*, https://www.agriculture.gov.au/agriculture-land/forestry/industries/support-plantation-establishment-program (accessed 27/09/2024)

170 Australian Government Department of Agriculture 2024, *Australian forest and wood product statistics Production to 2022-23*, July, https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0

171 FCNSW, Annual Report 2022-23, p. 15, https://www.forestrycorporation.com.au/__data/assets/pdf_file/0008/1499255/forestry-corporation-nsw-annual-report-2022-23.pdf

172 $930,000 for 465 ha of softwood, $1.32 m for 660 ha of softwood, $208,800 for 116 ha of softwood, and $81,160 for 40.38 ha of softwood. See, Australian Government Department of Agriculture, Fisheries and Forestry, *Support Plantation Establishment Program,* https://www.agriculture.gov.au/agriculture-land/forestry/industries/support-plantation-establishment-program [accessed 6/09/2024]

Figure 18: FCNSW normalised earnings, FY15–FY23



Source: FCNSW Annual Report 2018-19; FCNSW Annual Report 2022-23; Frontier Economies analysis. Note: FY20 and FY21 results include fire-recovery related expenses.

The poor financial returns of FCNSW's hardwood business reflect the costs of production exceeding revenue. NSW IPART, which reviews FCNSW's native timber harvesting and haulage costs, has noted its concerns that these and other costs have not been recovered over a significant period and that rising costs will make this more challenging in the future:[173]

> *Cost recovery refers to Forestry Corporation's ability to recover its harvesting and haulage costs through revenue for its activities. In addition to its delivery charges, Forestry Corporation received industry adjustment grants from the NSW Government, which related to forestry policy changes on the South Coast. However, during the review period, Forestry Corporation's costs exceeded its revenue from these 2 sources, with an average shortfall of $3.96 per green metric tonne.*
>
> *We note that the negative operating margin is an issue that has carried over from the previous review period, when a shortfall of similar magnitude was reported.*
>
> *We note that the post-bushfire operating environment is likely to be more costly because of supply-side impacts and increased environmental regulation.*

[173] IPART 2021, *Review of Forestry Corporation's native timber harvesting and haulage costs 1 July 2016 – 30 June 2019*, Final Report, May, p. 23, 25.

A previous benchmarking report by IPART published in 2017 found that significant parts of the business were not covering costs:

> *The harvesting and haulage costs for some species of native timber – particularly some of the species grown in the New England area – are so high relative to the value of the resource that the price FCNSW charges for supply (stumpage plus delivery) does not fully recover these costs, or any of the direct costs FCNSW incurs in managing the forests for harvesting.*

The NSW Independent Pricing and Regulatory Tribunal is set to soon release a review of FCNSW's native timber harvesting and haulage costs (from 2019 to 2022) once it receives Treasurer permission.[174]

Fines incurred for environmental breaches are also likely to be impacting the financial returns of public NFL (Box 14). Supply disruptions related to environmental compliance issues also appear to impose risks and costs on local manufacturers.[175]

Box 14: Environmental fines and penalties

According to the NSW EPA, FCNSW 'has a pattern of environmental offending'[176] with some recent convictions and fines including:

- In July 2024, FCNSW was fined $360,000 after being found to have illegally harvested trees in environmentally significant areas near Eden impacted by the 2019/20 bushfires,[177]
- In November 2023 FCNSW was fined $500,000 following the removal of protected trees from the Coopernook State Forest on the NSW mid-North Coast,[178]
- In November 2023, FCNSW was fined $104,000 after being found to have illegally felled hollow bearing trees in Mogo State Forest on the South Coast,[179]
- In August 2023 the EPA issued a Stop Work Order on Forestry operations in Tallaganda State Forest after a deceased Southern Greater Glider was found 50 metres from forestry harvest operations, and
- In June 2022, FCNSW was fined $230,000 after being found to have illegally harvested trees in an exclusion zone. This followed four other convictions in June 2022 for breaches in Wild Cattle Creek State Forest and South Brooman State Forest, with fines and costs totalling more than $530,000.

174 IPART 2024, Review of Forestry Corporation of NSW's native timber harvesting and haulage costs from 2019 to 2022, https://www.ipart.nsw.gov.au/Home/Industries/Special-Reviews/Reviews/IPART-Regulation/Review-of-Forestry-Corporation-of-NSWs-native-timber-harvesting-and-haulage-costs-for-2019-22 (accessed 26/09/2024)

175 Ferrier, t. (2024). 'Timber industry bleeding cash as shutdown bites', *Blue mountain gazette*, 7 June, https://www.bluemountainsgazette.com.au/story/8654876/timber-industry-bleeding-cash-as-shutdown-bites/

176 Environment Protection Authority v Forestry Corporation of New South Wales [2024] NSWLEC 78, paragraph 145, accessed 11 August 2024, https://www.caselaw.nsw.gov.au/decision/191025c8c3849ddaec6b6ba2

177 NSW EPA 2024, *FCNSW fined for breaking bushfire harvesting rules*, https://www.epa.nsw.gov.au/news/media-releases/2024/epamedia240731-fcnsw-fined-for-breaking-bushfire-harvesting-rules

178 NSW EPA (2023). Forestry Corp to pay $500,00 after removal of trees at Coopernook State Forest. Accessed July 2024 from https://www.epa.nsw.gov.au/news/media-releases/2023/epamedia231117-forestry-corp-to-pay-500000-after-removal-of-trees-at-coopernook-state-forest

179 NSW EPA 2023, Forestry Corporation ordered to pay $104,000, https://www.epa.nsw.gov.au/news/media-releases/2023/epamedia231222-forestry-corporation-ordered-to-pay-$104000

In its latest 2022-23 Annual Report, FCNSW notes a number of regulatory and external challenges are still be resolved and, additionally, a penalty infringement notice and stop work order was received after financial year's end.[180]

[180] FCNSW 2024, *Annual Report 2022-23,* p. 18.

B Mapping information

Maps developed for this report synthesise a range of datasets from relevant bodies including FCNSW, ABARES and the NSW spatial data portal, with the objective of characterising the distribution of forestry activity in NSW and a view to where downstream industry exists. Table 8 below describes the key files used in the development of the map, providing a brief description of that data and its source.

Table 7: Map layer definitions

Layer Name	Description	Source
FCNSW Customers by Source	An overview of FCNSW customers	Our customers – FCNSW Sustainability report 2022-23 - https://www.forestrycorporation.com.au/about/pubs/corporate/sustainability-reports
Hardwood Plantations	Hardwood plantations owned by FCNSW.	https://data-fcnsw.opendata.arcgis.com/datasets/74b6f2dfed224759a3eb3729fd694016_0/
Softwood plantations	Softwood plantations owned by FCNSW.	https://data-fcnsw.opendata.arcgis.com/datasets/e5c1c06cb4514a0ea15f7675b8ad4b3f_0/
State Forest Logging Zones	State Forest Zone 4 - general management zones. 87% of native forest timber comes from these forests.	Classification of all FCNSW forest management zones - https://data-fcnsw.opendata.arcgis.com/datasets/aa08e455b4ff499cabca7a0e46525428_0/
Protected Forests	NSW NPWS estate and State Forests excluding general management zones.	NPWS estate - https://data.nsw.gov.au/data/dataset/nsw-national-parks-and-wildlife-service-npws-estate3f9e7, FCNSW data as above.
Private hardwood plantations	Hardwood plantations within ABARES 2020-21 plantations dataset, sits behind FCNSW plantations layer to visible plantations are private.	https://www.agriculture.gov.au/sites/default/files/documents/australias-plantations-2020-21.zip
Private softwood plantations	Softwood plantations within ABARES 2020-21 plantations dataset, sits behind FCNSW plantations layer to visible plantations are private.	https://www.agriculture.gov.au/sites/default/files/documents/australias-plantations-2020-21.zip
Suitable private land	Privately held land on the North Coast of NSW that could supply native timber, per a DPI study. A similar, more recent, study has occurred for the South Coast, but no shapefile is available.	https://www.dpi.nsw.gov.au/forestry/science/forest-resources/2018-private-native-forestry

Source: Frontier Economics

C Employment benchmarking

C.1 Estimated direct employment in public NFL

Frontier Economics' estimates that direct employment in public NFL is in the order of 1,070.[181]

The NSW Natural Resource Commission (NRC) provides credible data on employment associated with the native forest business of FCNSW in the coastal IFOA regions. This captures the bulk of FCNSW's native forestry business.[182]

The NRC estimate that the number of employees associated with FCNSW's coastal native forestry business – including FCNSW staff, harvest and haulage contractor staff and primary processors (hardwood forest mills and chipping) – is 332 in the South Coast sub regions and 590 in the North Coast sub regions.

For FCNSW's other native forestry areas in the Western IFOA regions, Frontier Economics estimated that there are no more than 150 employees, accounting for FCSNW, harvest and haulage and processor employees.

For more details, please refer to Attachment B of Frontier Economics 2022, *Transition support for the NSW native forest sector*: https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

C.2 Potential Employment after structural adjustment

This section outlines our approach to benchmarking potential employment. These estimates are for potential short to medium term employment potential after a cessation of public NFL, with longer term employment opportunities being determined by private participants.

The intention behind these estimates is to support the case for further analysis of a structural adjustment package to improve resilience in the hardwood sector.

Were possible, we have made conservative assumptions to support these potential employment benchmarks. These estimates should not be interpreted as forecasts.

We have assumed that employment may arise across four areas:

- Plantation management – employment to manage newly established plantations,
- Forest restoration – employment to restore formerly logged native forests,
- NPWS direct employment – employed to undertake BAU national park activities, and
- Wood product manufacturing employment – employment involved in process hardwood supply in NSW.

We have not considered employment from harvesting and haulage activities or from increased forester and regulatory employment driven by an increased scale of agroforestry.

Plantation management

Employment in plantation management is the workforce required to undertake business as usual activities in the monitoring and maintenance of a plantation estate, this does not include

[181] Frontier Economics 2022, *Transition support for the NSW native forest sector*, https://wwf.org.au/blogs/transition-support-for-the-nsw-native-forest-sector/

[182] NRC 2021, *Advice on Coastal IFOA operations post-2019-20 wildfires, Final Report*, June.

short term spikes in employment for requirements such as plantation replanting. Plantation management estimates are derived by the following formula:

$$jobs\ per\ hectare * hectares\ of\ new\ plantation$$

This does not consider the short-term staff involved in establishing these plantations, nor does it measure any additional staff in the harvest and haulage of these plantations, which is likely focused on the longer term as plantations reach maturity.

Jobs per hectare

High and low estimates for jobs from plantations are derived from FCNSW's 2020 FTEs provided to Synergies for their report.[183] These estimates are:

- 0.14 FTEs / '000 hectares – drawn from the hardwood business, and
- 0.84 FTEs / '000 hectares – drawn from the softwood plantation estate.

We assume that a new hardwood plantation estate may be managed akin to the softwood plantations as opposed to the much larger, and lower yielding, state forest-based hardwood estate. We note that the two hardwood regions with plantations (Lower North East and Upper North East) have a higher employment per hectare.

Figure 19: Forestry Corporation FTEs by region

Table 7 Forestry Corporate FTEs by business area and region

Region	FTEs	Area	FTEs per '000 hectares
Hardwoods (native forest and plantations)			
Eden	25.2	164,822	0.15
Lower North East	78.3	468,916	0.17
Southern	34.7	308,650	0.11
Upper North East	81.2	413,342	0.20
Western	34.0	530,735	0.06
Corporate – Hardwoods	17.1	-	-
Total hardwoods	**270.5**	**1,886,465**	**0.14**
Softwoods (plantations)			
Bathurst	61.7	84,642	0.73
Bombala	26.0	41,900	0.62
Grafton	16.6	16,904	0.98
Tumut	75.0	108,758	0.69
Walcha	9.5	14,944	0.64
Corporate – Softwoods	34.9	-	-
Total softwoods	**223.8**	**267,149**	**0.84**
Corporate (common)	55.0	2,153,614	0.03
Totals	**549.3**	2,153,614	**0.26**

Note: Based on 2020 FTE information.
Source: Synergies and Verterra analysis based on FTE data provided by Forestry Corporation.

Source: Synergies (2022), Estimation of forest-dependent jobs in New South Wales

[183] Table 7, Synergies (2022), Estimation of forest-dependent jobs in New South Wales, https://www.nrc.nsw.gov.au/Social%20benefits%20-%20Project%20SE1%20-%20Interim%20method%20-%20Synergies%20-%20November%202022.pdf?downloadable=1

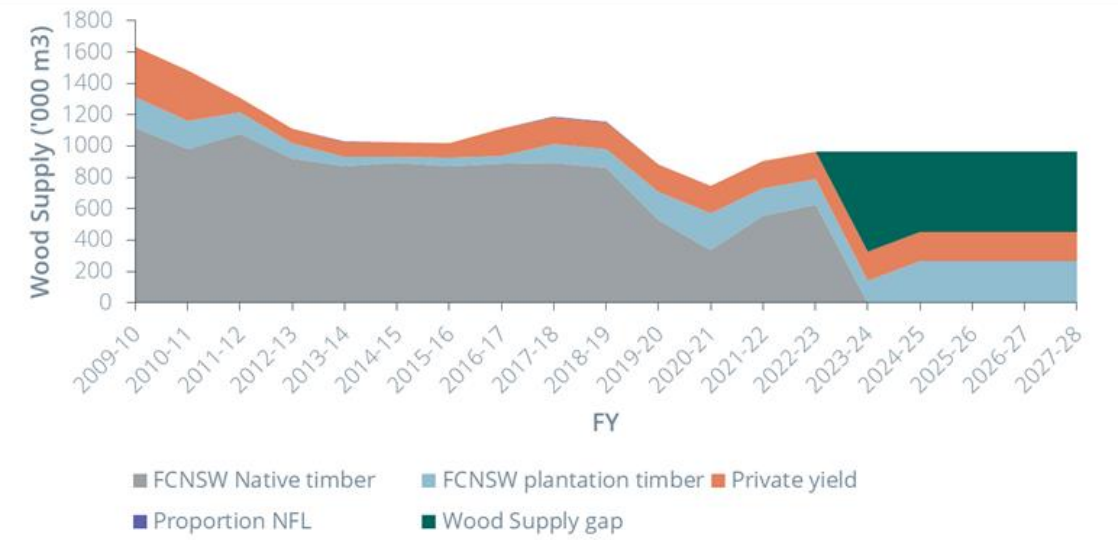
Hectares of new plantation

The estimate of hectares of new plantation is developed from an assumed objective of keeping hardwood supply volumes constant over time. The target for future output is the 10-year average output of FCNSW (including native forest and plantation volumes).

This yielded the following:

- 10 year average hardwood production: ~850,000 m^3
- Hardwood plantation yield (in 2026): ~268,000 m^3
- Resulting in a required additional yield of: ~585,000 m^3

Figure 20: Historical and forecast future wood supply



Source: FCNSW sustainability report 2022-23, IPART private sawlog yield estimates, 5-year averages

Next, to determine the area of plantations required we use an estimate of yield from these plantations. Options include:

- Current yield of northern plantations – noting that fire damage may have reduced the observed yield of hardwood plantations.
- High, medium and low estimates of yield modelled previously in FCNSW hardwood plantations yield forecasting,[184] and
- Originally planned yield of northern plantation estate – without fire driven disruption.

We have used the latter estimate as a central estimate of yields, being 300,000 m^3 of timber products annually from a 34,000-ha plantation estate. This gives a yield rate of 8.8 m^3/ha/year, or MAI (mean average increment), and an estimated plantation requirement of ~66,000 ha.

Final potential employment estimate

Using an estimate of 66,000 hectares, giving a total plantation size of 100,000 hectares, we achieve the following high and low potential employment estimates to manage an increased hardwood plantation estate.

[184] FCNSW yield forecasts used MAI bands of >18m^3/year, 12-18m^3/year and <12m^3/year

- High estimate: 100,000 x 0.84 / 1000 = 84 FTE (55.7 FTEs from new plantations), and
- Low estimate: 100,000 x 0.14 / 1000 = 14 FTE (9.3 FTEs from new plantations)

Forest restoration

Forest restoration jobs are those generated by activities beyond national parks BAU to improve the quality of newly declared protected areas. Forest restoration job estimates are derived by the following formula:

$$jobs\ per\ hectare * national\ park\ size$$

The size of new national park is assumed to be the current state forest estate – approximately 2 million hectares.

A measure for the employment per hectare is sourced from the Labor Environmental Action Network National Forest and Workforce Plan for Australia,[185] giving 0.3 per 1000 hectares. The intensity of the restoration task required is not clear and this estimate is adopted to conservatively scale the employment task.

Multiplying these we get an estimate of 57 FTEs in forest restoration.

NPWS direct employment

The National Parks and Wildlife Service (NPWS) employ a range of staff for management and conservation of national park estate across NSW. NPWS direct employment was derived from the same formula as forest restoration:

$$jobs\ per\ hectare * national\ park\ size$$

The assumed protected area size is 2 million hectares. Three estimates for FTE numbers were used, a high, central and low estimate.

The high and low estimates are derived from 2017/18 FTE metrics from NPWS provided to Synergies and Verterra for analysis in their report.[186] The high and low estimates are:

- 0.30 FTEs / '000 hectares
- 0.23 FTEs / '000 hectares

The high estimate is drawn from a weighted average of FTE / '000 hectares for all districts.

The low estimate is drawn from the high estimate, less the Sydney North and Sydney South district FTE / '000 hectares. As public NFL is generally located in regional areas staffing numbers may not be as high as in national parks, the Sydney district FTE numbers were significantly higher than other districts, and therefore were removed to err toward conservative estimates. A central estimate was generated through an average of the high and low estimates.

[185] LEAN (2022), *A National Forest Protection and Workforce Plan for Australia*, A_National_Forest_Protection_and_Workforce_Plan_for_Australia_LEAN.pdf

[186] Synergies (2022), *Estimation of forest-dependent jobs in New South Wales*, https://www.nrc.nsw.gov.au/Social%20benefits%20-%20Project%20SE1%20-%20Interim%20method%20-%20Synergies%20-%20November%202022.pdf

Figure 21: NPWS employment

Table 5 Direct employment metrics for NPWS forest-related activities by district

District	Forest-related wages	Forest-related FTEs	Forest cover (hectares)	Forest-related FTEs per '000 hectares
Blue Mountains	$18,190,435	182.6	829,975	0.22
Central Coast-Hunter Range	$13,877,897	139.3	430,544	0.32
Far South Coast	$10,554,075	105.9	456,053	0.23
Far West	$675,530	6.8	117,274	0.06
Hunter	$11,704,590	117.5	210,386	0.56
Mid North Coast	$6,114,239	61.4	181,972	0.34
North Coast	$18,618,861	186.9	366,560	0.51
Northern Plains	$5,145,532	51.6	380,246	0.14
Northern Rivers	$9,269,109	93.0	143,691	0.65
Northern Tablelands	$8,309,939	83.4	589,085	0.14
Snowy Mountains	$10,928,716	109.7	399,994	0.27
South Coast	$11,045,092	110.9	381,953	0.29
South West Slopes	$7,799,997	78.3	391,125	0.20
Sydney North	$11,430,187	114.7	34,439	3.33
Sydney South	$16,108,098	161.7	81,009	2.00
Upper Darling	$3,619,531	36.3	357,901	0.10
Western Rivers	$5,259,700	52.8	209,532	0.25
Totals	**$168,651,528**	**1,692.8**	**5,561,739**	**NA**

Source: Synergies and Verterra analysis of 2017/18 FTE and expenditure data provided by NPWS.

Source: Synergies (2022), Estimation of forest-dependent jobs in New South Wales

Final potential employment estimates

The three cases generated job estimates of:

- High estimate – 578 FTEs,
- Central estimate – 520 FTEs, and
- Low estimate – 462 FTEs

The high, central, and low estimates fall within the range suggested by extrapolating the current NPWS figures. For example, an estimate closer to 0.3 FTE/ '000 hectares, the central estimate of 520 FTEs aligns well with current employment levels. The high and low estimates represent scenarios of increased or reduced staffing needs which will be driven by the need to maintain national park facilities, and the visitation they receive.

Wood product manufacturing employment

Wood product manufacturing employment is the estimate of potential employment in the downstream production industry after the cessation of native forest logging. These are driven by estimates of the efficiency of resource use – in m^3 of timber per FTE, and the resource available – using assumptions of what percentage of current hardwood supply is offset by either imports into NSW or expansion of private supply before new hardwood plantation supply becomes available.

These estimates are summarised in the table below.

Table 8: Wood product manufacturing employment assumptions

Component	Low	Central	High
M^3 per FTE	1000	1000	800
Additional wood supply	0%	25%	50%

Remaining timber supply

Remaining timber supply is calculated as:

- The current sawlog supply from private sources, per the 2021-22 ABARES wood processors survey: 183,000 m^3,
- The expected sustainable yield of plantations: ~268,000 m^3, giving
- A total wood supply of 451,000 m^3

This provides an estimate of potential remaining output today, however there is a likelihood that supply may increase as imports increase and private supply from farm and agroforestry expands to meet an expected reduction in supply after the cessation of NFL.[187]

Additional supply

We take three cases the proportion of long-term supply sustainable yield that is obtained from other sources. (see Figure 20). These scenarios represent the ability for industry to source additional supply, through either increased domestic supply, from certified private source, or from import. There are different employment implications from each of these sources, with domestic supply providing additional employment in forest management, harvest and haulage, however these are excluded from this analysis.

The three cases are 0%, 25% and 50% immediate offsetting of NFL resource. These are theoretical estimates used to see the impact of different substitution options.

Resource utilisation

High and low cases

- High – 800 m3 per job,
- Central – 1000 m3 per job, and
- Low – 1000 m3 per job

This is based off sawmill and wood-based panel employment, with the assumption that under a lower wood supply scenario the more jobs dense, higher value add employment types would be the ones prevailing in the transition, lower value applications such as chipping, which has employment density in the order of 1 FTE per 3000 m3 would be more likely to cease.

[187] Studies into private forestry have noted there are many private landowners with highly suitable land for private wood supply, but they have not registered for a PNF plan.

Final potential employment estimates

The resulting employment numbers for mill employment based on the resource utilisation estimates are:

- High estimate – 884 FTEs,
- Central estimate – 579 FTEs, and
- Low estimate – 450 FTEs

The central and low estimates here are representative of a future industry that scales in line with the remaining wood supply, with the low case assuming employment remains consistent with current job density and the medium case assuming some optimisation of wood utilisation occurs. The high case assumes that job density increases with a maximisation of high value add products.

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