Forestry Corporation of NSW

2024 Native Forest Harvest and Haulage Review and Benchmarking

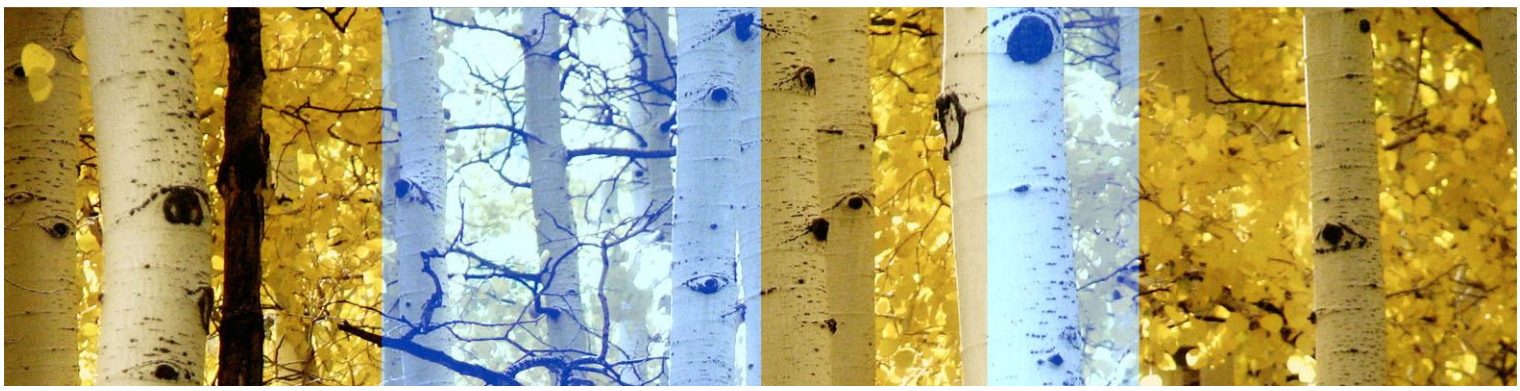
Part A

Final Report

6 June 2024

Melbourne

A23-22349



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EXECUTIVE SUMMARY

Key Findings

This review of harvesting and haulage costs has generally adopted a similar approach to previous reviews in consideration of cost benchmarking, market power assessment and Forestry Corporation of New South Wales (FCNSW) efficiency. One key change was necessitated by the limited new comparator data from other jurisdictions. Comparator costs were indexed from the previous review period to enable benchmarking of FCNSW costs.

There were significant impacts on the native forest industry during the review period including major bushfires in 2019/20 and subsequent wet weather events. This had an impact on the types and location of forests harvested by FCNSW contractors, and logs generally had to be transported over longer distances to ensure continuity of supply to FCNSW customers.

Harvesting costs declined overall by 1.3% per annum over the 2019-2022 review period, partly reflective of operating conditions undergoing harvesting. Whilst limited contemporary interjurisdictional data was made available for this review, it is apparent that there continues to be significant differences in commercial, regulatory and operating environments between the NSW and other native forest jurisdictions. FCNSW costs continue to be higher than elsewhere, h**owever** the difference between costs in NSW and other jurisdictions has been compressed.

Haulage costs increased by 5.2% per annum over the review period. This was due to increased transport distances, arising as a result of the impacts of fires and wet weather. Haulage costs per tonne kilometre remain within the benchmark range for other jurisdictions.

There is concentration in the provision of harvesting and haulage services in the northern markets of the state. This has been resolved to some extent by new contracts awarded post the review period. Pricing outcomes over the three years covered by the review do not appear to highlight potential abuse of market power within these more concentrated markets.

FCNSW costs of managing mill door sales has been estimated at $5.11 per gmt. The average operating margin (revenue less contract and administration costs) over the period is estimated to be $(4.67) per gmt. Despite delivery charges increasing (the payment to FCNSW from its customers), and average harvest costs decreasing over the review period, the margin has been impacted by higher haulage costs, the reduction in volume over the review period and the consequent impact on administration costs (on a unit cost basis).

Cost efficiencies may be further explored through considering operational performance data (such as harvester and truck GPS information), enhanced tactical planning information to better tailor work packages for harvesting and haulage operators, and the opportunistic use of higher productivity vehicles. There is expected to be upward pressure on costs over coming years as more difficult areas are harvested, and whilst there continues to be increased uncertainty in the industry in terms of available areas and harvesting prescriptions.

ES1. Introduction

Forestry Corporation of New South Wales (FCNSW) is a State-Owned Corporation (SOC), and the largest producer of commercial native and hardwood plantation forests in New South Wales (NSW). FCNSW have requested Indufor undertake a review of harvesting and haulage costs within the following scope.

For the period 1 July 2019 to 30 June 2022, for those native timber harvest and haul operations where FCNSW directly engages the contractor and establishes rates for service (i.e. 'mill door' sales):

i. *Benchmarking - comparison of FCNSW harvest and haul costs with those incurred by other organisations undertaking similar timber harvesting and haulage operations, and the analysis of various cost drivers to facilitate this process*

ii. *Market power – review industry structure, participation and the efficiency of cost discovery mechanisms*

iii. *Efficiency analysis – review administrative costs, cost recovery and opportunities for savings or efficiency improvements.*

Approach

With some exceptions, the approach for this analysis has largely followed that adopted for the previous reviews, utilising FCNSW sales data, contract payment data and procurement information. The exceptions were:

- Limited new data was available to support the development of productivity cost models. The previous models have been used to consider relevant cost drivers specific to the review period.
- Jurisdictional benchmarking – due to the lack of data provided by other comparator organisations, previous datasets were indexed to enable a reasonable comparison with new FCNSW data.
- Market assessment – the hardwood plantation harvesting and haulage services have been included in this analysis (plantation harvesting was previously excluded).

Nominal unit costs

Note that all costs in this report, unless stated otherwise are in nominal terms.

ES2. NSW native forest timber industry

The NSW native forest timber industry encompasses growing and harvesting of trees within the forest estate, and the transport of logs, manufacturing into timber products and distribution sectors. The industry includes harvesting operations within hardwood plantations and native forests, and these forests are located on state forest, other public land and private property.

FCNSW manages coastal native forest timber production on state forest public land across two broad geographic zones based on forests north of Sydney and those south to the Victorian border. The industry producing this native forest timber supplies finished products to domestic and international markets including sawn timber, plywood, pulp and paper, and firewood.

The primary commercial relationship underpinning log supply are supply contracts (Wood Supply Agreements) between FCNSW and log purchasing customers, where contractors are engaged to harvest and haul the logs from the forest to the various processing facilities.

The industry has been shaped by various trends and forces, locally, nationally and globally. Timber harvesting in NSW on crown land is regulated under the Integrated Forestry Operations Approval Framework (IFOA). A new Coastal IFOA (CIFOA) was introduced during the period of this review. The period also saw a number of disruptive events that created significant challenges for FCNSW in its ability to maintain supply. There were major fires across the entire native forest coastal estate in 2019/20, with ~47% of NSW multiple use forests impacted, and there were subsequent major wet weather events during 2021 – 2022.

ES3. Benchmarking Analysis

ES3.1 Unit Cost Comparison - A unit cost comparison of both contract rate schedules and actual unit costs was used to assess the rates used by FCNSW. Unit costs have been collated from FCNSW sales and contractor databases for the relevant period, and where available from comparator operations being the Forest Products Commission (FPC) of Western Australia, VicForests and Sustainable Timber Tasmania (STT).

3 year trend within FCNSW

Harvest costs - Harvest costs incurred by FCNSW for all products were derived for each of the three relevant years and are shown for the two major regions North and South. Over the three-year period, the unit harvest costs on average moved by -1.3% (CAGR[1]), with a fall in the north and a modest increase in the south.

Table ES1: Rate of Change – FCNSW Harvest Unit Costs ($/gmt)

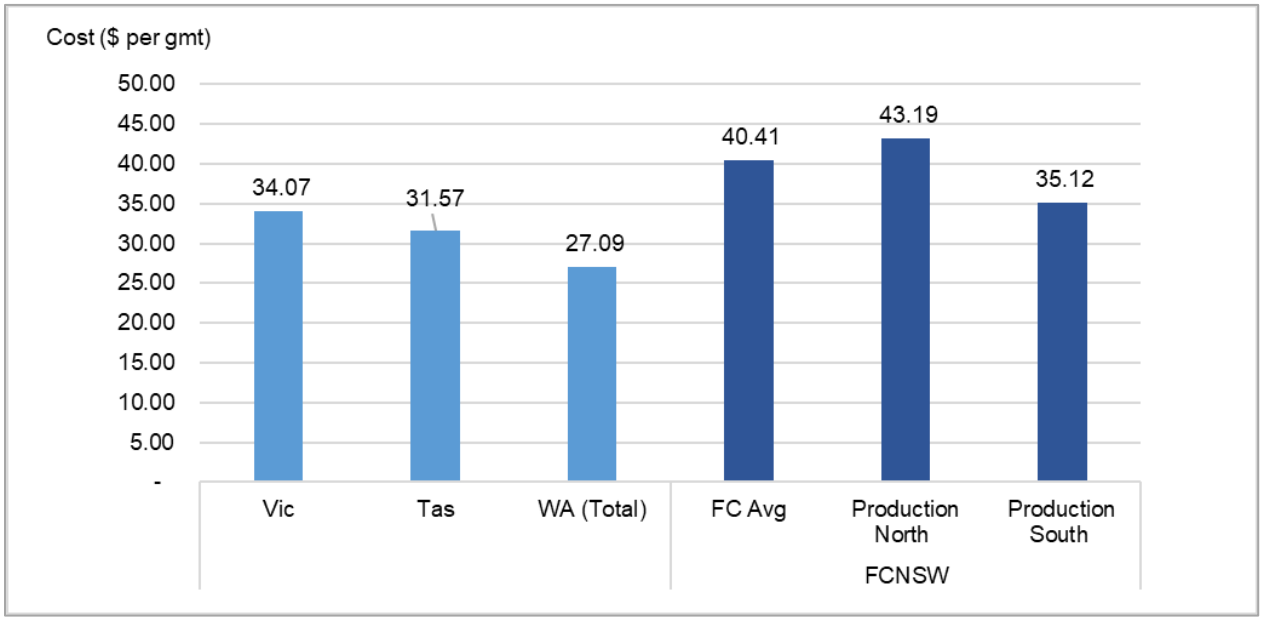
Region	2018/19	2019/20	2020/21	2021/22	CAGR
Production North	45.39	44.13	41.75	43.06	-1.7%
Production South	35.23	34.51	32.78	36.90	1.6%
Total	42.19	41.07	38.96	40.62	-1.3%

Source: FCNSW

The comparison range (weighted average for the 3 years) is from $27.09 per tonne for Western Australia to $43.19 per tonne for the NSW Production North region (see Figure ES1 below). The underlying drivers for much of this range include differences in operating environments and regulatory conditions, but most significantly in terms of yields per hectare harvested. Indufor note that this range has been compressed in comparison to the previous review, reflecting the decrease in FCNSW harvest rates relative to the expected indexation.

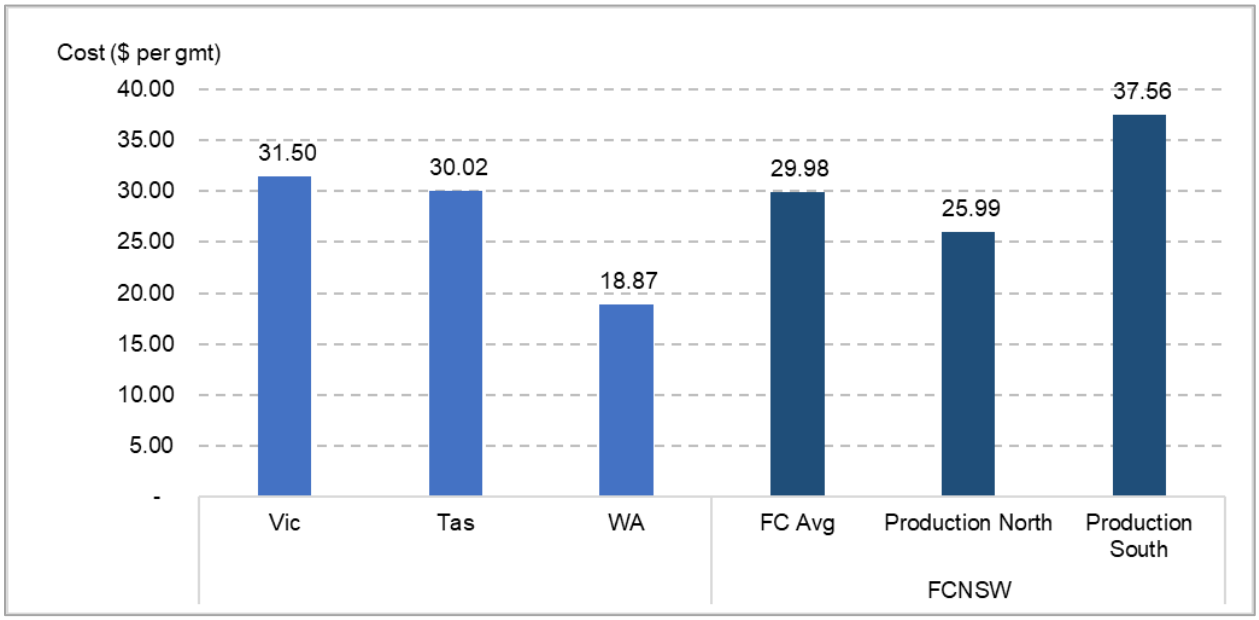
[1] Compound annual growth rate

Figure ES1: Harvest Unit Cost Comparison (FY2020–22)



Haulage costs - Average haulage unit costs increased by 5.2% (CAGR), where haulage cost is the weighted average cost for all products delivered in the three-year period. The rates applicable to FCNSW operations appear to be within the typical range of values elsewhere in Australia (see Figure ES2 below), notwithstanding differences in terrain, travel speeds and distance applicable in each jurisdiction. When units are converted to $ per tonne km (tkm), for the purposes of removing distance as a variable, the average annual rate adjustment across both regions is -1.0%.

Figure ES2: Haulage Unit Cost Comparison (FY2020–22)



ES3.2 Analysis of cost drivers - Previous benchmarking studies included an analysis of data and qualitative information that set out to identify the key components of costs that may assist with the comparison to other jurisdictions. The analysis considered drivers at the enterprise, crew and operational level for harvesting and haulage. Whilst the general cost drivers have not substantially changed from previous benchmarking studies, the review period has been profoundly impacted by disrupting events – fires and wet weather. This has resulted in the short-term allocation of harvest areas that have actually been cheaper to harvest, however logs have had to be transported over longer distances, incurring higher haulage costs, to minimise the supply volume impacts to FCNSW customers arising from these events.

ES4. Market Power Assessment

For the purposes of assessing the extent of any market power, we have considered the product dimension (what is typically meant by harvest and haulage services) and the geographic dimension – the area in which harvest and haulage services are provided.

A review of market power has been undertaken based on participant revenue, which shows that there is evidence of competition for the market for both harvest and haulage services across the four geographic markets for the preceding 14-year period, however there is market concentration for harvesting services in the Upper North and haulage in Upper and Lower North. This has coincided with a reduction in total volume harvested by around 50% over the same period. Whilst there are differences in unit cost increases between the identified markets, there is no evidence to suggest this is due to local market power influences.

Prices paid during the review period were a combination of open tender results and direct negotiations. New contracts have been awarded because of open tenders that take effect after the review period. The industry is undergoing significant instability resulting from regulatory changes and the ongoing impacts of bushfires which may reduce the competitive tension in the market over the coming years.

ES5. Efficiency Analysis

The analysis includes consideration of whether FCNSW recovers the full cost of harvest and haul expenses and the cost of administering these contracts under mill door sales (where the price customers pay for the logs includes the growing, harvesting and transport costs for logs delivered to the mill gate). The average estimated administration cost incurred by FCNSW equates to approximately $5.11 per gmt (compared to $3.73 per gmt in the previous review period). Despite a slight reduction in staffing costs, the unit rate has increased primarily due to the large reduction in annual volume, particularly immediately post the 2019/20 bushfires.

Changes in delivery charges can be a result of increased contract rates, as well as changes in operational factors such as longer (or shorter) transport distances or a higher proportion of difficult harvesting conditions. Overall, an average annual increase of 2.7% (CAGR) is evident from the data.

The average operating margin (delivery charge revenue less contract and administration costs) over the period is estimated to be $(4.67) per gmt. This compares to a margin of $(3.96) in the previous review. Despite delivery charges increasing, and average harvest costs decreasing over the review period, the margin has been impacted by higher haulage costs, the reduction in volume over the review period and the consequent impact on administration costs (on a unit cost basis).

There is a changing operating landscape that affects the costs on extraction of timber resources from native forests, compounded by the Black Summer bushfires. Given these challenges, ongoing cost pressures are likely to be sustained from modified harvesting prescriptions (such as increased levels of tree retention), uncertain operating plans, tighter supply constraints and operational disruptions such as protest action and wet weather.

Further opportunities to contain costs may be explored through considering operational performance data (such as harvester and truck GPS information) to continually look for more efficient operational systems (such as truck base locations), seeking opportunities to utilise Higher Productivity Vehicles and strengthened tactical planning information to allow the tendering of harvesting packages with specialised equipment where possible.

ES6. Findings and Recommendations

Findings

1. Despite limited data being made available from comparator parties for this review, it appears costs for harvesting services continue to be higher than that evident from inter-jurisdictional operations. However, rates appear to be reasonable on the basis that:
    - Operating conditions are significantly different within and between the jurisdictions, and appear to explain a proportion of the NSW higher costs
    - The market used by FCNSW for contracting these services appears to be reasonably competitive (with some exceptions) and FCNSW are actively managing procurement processes to seek price discovery and ensure contracted parties are operating efficiently
    - Harvesting unit costs decreased over the review period. This has largely been due to operating conditions being favourable regarding costs incurred in areas that were harvested during wet weather.
2. FCNSW costs for haulage services are commensurate with other native forest operations.
3. FCNSW administration costs appear to be commensurate with comparable operations but have increased significantly on a unit cost basis mostly due to the lower volumes harvested over the review period. Through the application of delivery charges, FCNSW have not recovered the entire cost of contractor and administration charges.

Recommendations

1. **Efficiency monitoring** – in the absence of updated comparative data for native forests, one option would be more regular independent assessments on harvest crews' productivity levels to ensure FCNSW operations are as efficient as possible. This could include monitoring of machine utilisation (FCNSW now collect temporal and spatial data from harvesting equipment that may be used to a greater extent to monitor productivity), systems of work, capital deployed and labour effectiveness.
2. Use of strengthened **tactical planning** information – this includes sourcing and utilising better data such as timber yields, level of tree retention, terrain, snig distance and slope, as well as roading requirements to allow the tendering of harvesting packages to attract specialised equipment where possible. This ensures contractors are appropriately geared for specific tasks to reduce costs associated with redundant or underutilised equipment.

    Furthermore, better information about the harvesting prescriptions and types of forest to be harvested over a given period would assist with being able to effectively and proactively forecast potential changes to costs and revenues. Delivery charges could then better reflect true costs and ensure the potential for cost recovery is improved.
3. **Future benchmarking** – maintain the current approach (through indexing available data and monitoring trends) but source alternative comparative data, such as from timber plantation operations (as native forest jurisdictional data will become less available and relevant).

Because of the differences in operating conditions, particularly between plantation and native forest operations in Australia, unit cost benchmarking should be supplemented by the collection and use of operational performance data to explore the reasonableness for any comparison.

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INTRODUCTION

1.1 Purpose of the Report

Forestry Corporation of New South Wales (FCNSW) is a State-Owned Corporation (SOC) and the largest producer of commercial native and hardwood plantation forests in New South Wales (NSW). The purpose of this report is to undertake a review and benchmarking of FCNSW's mill door native timber harvest and haul costs for the period 1 July 2019 to 30 June 2022. This review is a legislative requirement under Section 91 (1) of the Forestry Act 2012 and is the third such review following previous reports completed in 2017 and 2021.

> ***Harvesting and haulage costs review***
>
> *(1) As soon as practicable after the first 3 full financial years after the commencement of this section and every 3 financial years thereafter, the Corporation is to:*
>
> *(a) review its native timber harvesting and haulage costs, and*
>
> (b) *prepare a report on the results of the review that benchmarks those costs against the costs of similar organisations undertaking similar native timber harvesting and haulage operations.*

1.2 Scope

FCNSW have requested Indufor Asia Pacific (Australia) Pty Ltd (Indufor) to undertake a review of harvesting and haulage costs within the following scope.

- Comparison of FCNSW harvest and haul costs with those incurred by other organisations undertaking similar work. The report would meet the requirements of Section 91 of the Forestry Act 2012 and of the Independent Pricing and Regulatory Tribunal (IPART)
- Evaluation of the impact of operational constraints and each of the cost drivers. These may include yields, markets, harvest difficulty, transport distance and the regulatory environment in each jurisdiction.

Key tasks include:

- A review of previous relevant reports from Pöyry, IPART and Indufor, and leveraging the analysis and discussion completed with previous work and relevant reports, rather than repeating this work wherever possible
- Unit cost comparison including administration costs where available
- An examination of market power of the relevant parties to determine the efficiency of harvest and haulage cost discovery mechanisms
- Liaison with FCNSW and IPART personnel as required
- Preparation of a draft report, presentation to FCNSW and guests, and incorporation of feedback into final report.

The scope incorporated the following aspects.

For the period 1 July 2019 to 30 June 2022, for those native timber harvest and haul operations where FCNSW directly engages the contractor and establishes rates for service (mill door sales):

(i) Benchmarking - comparison of FCNSW harvest and haul costs with those incurred by other organisations undertaking similar timber harvesting and haulage operations, and the analysis of various cost drivers to facilitate this process

(ii) Market power – review industry structure, participation and the efficiency of cost discovery mechanisms

(iii) Efficiency analysis – review administrative costs, cost recovery and opportunities for savings or efficiency improvements.

Stumpage sales, whereby FCNSW customers engage contractors to undertake the harvesting and haulage tasks, are excluded from this review. This relates to all sales in Western Region and most of the sales within the Eden Forest Management Area. Mill door sales are included in the scope - these are administered using various types of sales agreements. FCNSW sales arrangements are described in more detail in Section 2.4.

1.3 Approach

In 2017, Indufor undertook the Section 91 review that considered harvest and haulage costs for the first three years of the Corporation (2013/14 to 2015/16) ('2013-2016 Benchmarking Study')[2], and again in 2021 ('2016-2019 Benchmarking Study')[3]. Key elements of the 2017 and 2021 Section 91 reports were incorporated and updated in preparing this 2024 report.

Key aspects of the previous reports have been incorporated into the Appendix for reference.

The general approach to this study is outlined below:

NSW native forestry overview

The preparation of an overview of the NSW native timber industry covering the following elements:

- Size and geographic location of the commercially available native timber resource in NSW
- Native timber products and customers
- The structure of the supply chain and commercial arrangements
- Key market trends and dynamics relevant to the current state and future of the native forestry sector.

Data collection and review

The collection and review of the identified data and information including:

- FCNSW sales data
- FCNSW cost data by activity to determine unit costs for harvest and haulage, as well as administration charges
- Cost data and contract information for other jurisdictions
- Procurement / tendering information and outcomes for both FCNSW and other available jurisdictions.

Benchmarking analysis

The industry benchmarking analysis has been undertaken in two parts:

- Unit cost comparison for the period FY2020-2022
- Analysis of cost drivers related to harvesting and haulage in native forests, noting any specific influences related to the review period.

Market power assessment

Assessment of the extent of any market power within local or regional markets for harvesting and haulage services, including the following elements:

- *Market definition* – description of the market for harvest and haulage services including the different dimensions of the market, structure, operating arrangements and barriers to entry
- *Market power assessment* – evaluating the extent of any market power in harvest and haulage services by assessing the structure of the market, trends in market concentration and commercial outcomes

[2] FCNSW-Report/Forestry-Corporation-of-NSW-HFD-Harvest-and-Haul-Audit-September-2017
[3] Forestry-Corporations-Benchmarking-Report.PDF

- *Cost discovery mechanisms* – review of the efficiency of tenders and other market processes including participation and outcomes.

Efficiency analysis

- *FCNSW administrative costs and the extent of cost recovery* – review actual costs incurred over the review period, the resources allocated to manage the mill door sales operation, and the extent to which these costs are either explicitly or implicitly recovered
- *Opportunities for cost savings* – review how the program is managed, compare to other similar operations and liaise with FCNSW regarding avenues for cost reduction.

Changes to the methodology from previous reviews

The approach for this analysis has followed that adopted for the previous reviews, with the following exceptions:

- No new data was available to support the development of productivity cost models. The previous models have been used to consider relevant cost drivers specific to the review period.
- Jurisdictional benchmarking – due to the lack of data provided by other organisations, previous datasets were indexed to enable a reasonable comparison with FCNSW data. Indufor understand that relatively few structural changes or market based procurement processes occurred in the other jurisdictions over the review period and indexed costs therefore provide an acceptable benchmark.
- Market assessment – the hardwood plantation harvesting and haulage services have been included in this analysis (plantation harvesting was previously excluded). The review period was significantly impacted by disruptive events, so the harvest and haul service providers transitioned between native forest and plantations during this period in order to ensure log supply was maintained to the greatest extent possible. As a result, the services (for native forest and plantations) are treated as a single market in each region.

Nominal unit costs

Note that all costs in this report, unless stated otherwise are in nominal terms.

1.4 Report Structure

The structure of this report is as follows:

- Section 2 provides an overview of the NSW native timber industry
- Section 3 details the benchmarking analysis
- Section 4 outlines the market power assessment and conclusions on the extent of any market power within local or regional markets for harvest and haulage services
- Section 5 provides comments on the efficiency of the administration of harvest and haul contracts and mill door delivery and the extent to which FCNSW recovers these costs
- Findings and recommendations are included in Section 6
- The Appendix provides further detail on specific issues referred to in the report.

2. NSW NATIVE FOREST TIMBER INDUSTRY OVERVIEW

The NSW native forest timber industry encompasses:

- growing and harvesting of trees within the forest estate, and
- transport of logs, manufacturing into timber products and distribution sectors.

The industry includes harvesting operations within hardwood plantations and native forests, and these forests are located on state forest, other public land and private property.

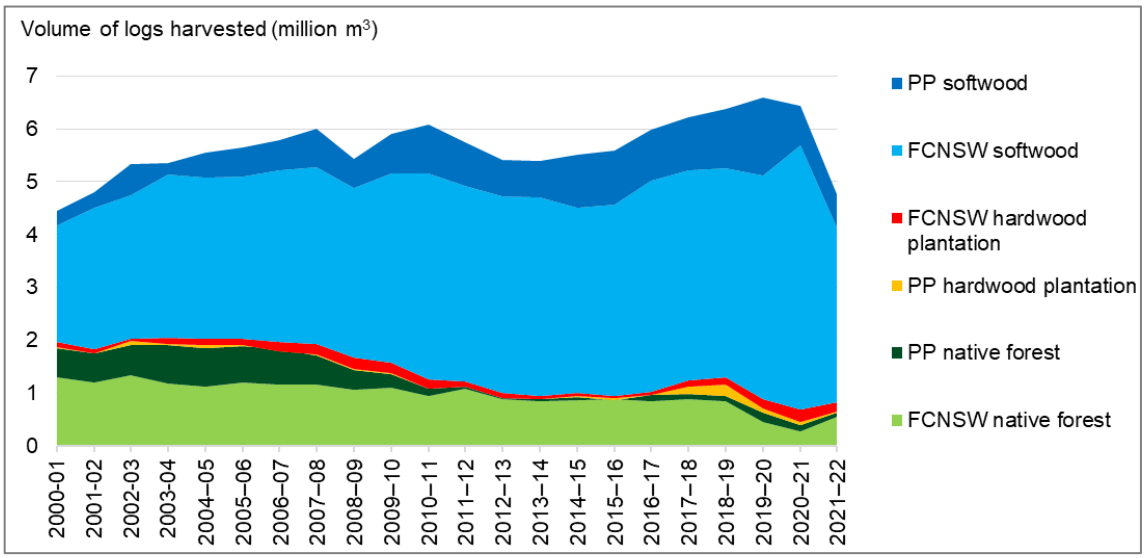
The previous reports (2013-2016 and 2016-2019 Benchmarking Studies) contain additional content that provides further insights into the timber industry in NSW (also refer to Appendix).

2.1 Resource

There are 26.5 million (M) hectares (ha) of forest in NSW, of which FCNSW manage 2.2M. Of this, approximately 0.24M ha is softwood and hardwood plantation, the balance being native forest. Approximately 1.3% of the native forest land within the FCNSW estate is harvested annually.

As is evident from Figure 2-1, of the total plantation and native forest log harvest in NSW, approximately 16% arises from harvesting of native forests. Of that, over 90% is supplied from public forests managed by FCNSW.

Figure 2-1: Total log harvest NSW 2000/01 – 2022/23*

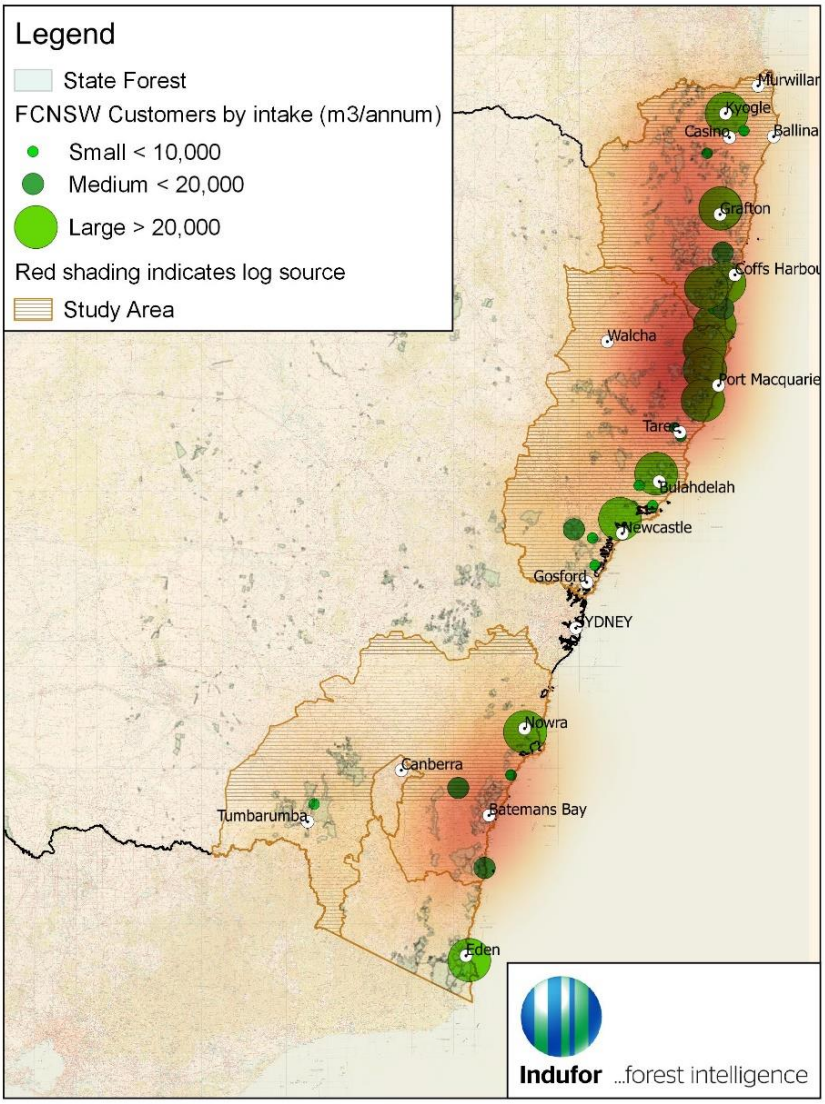


Source: ABARES, FCNSW

*Note – 'PP' refers to the private property native forests volume, that has been derived from the difference between the ABARES estimate of total native forest volume less log volume reported annually by FCNSW.

This study relates to harvesting of public native forests where FCNSW are responsible for the harvesting and haulage component. These types of operations are undertaken in the coastal forests of NSW. FCNSW manages this across two broad geographic zones based on forests north of Sydney, and those south to the Victorian border. Map 2-1 illustrates the distribution of customers and the red shade represents the log supply zones (where the darker red colour reflects increasing levels of activity).

Map 2-1: FCNSW native forest customers and log source by location*



Source: FCNSW *Note – excludes activity relating to sales sold on a stumpage basis, primarily at Eden, and Western Region

2.2 Products

The NSW forest industry supplies a number of finished products to domestic and international markets. The following table highlights the major finished products and related forest type from which the logs are sourced.

Table 2-1: Timber products

Product description	Hardwood (Native forest and plantation)	Softwood (Native forest and plantation)
Sawn timber	Heavy construction, flooring, furniture	Framing, industrial, furniture
Plywood	Flooring, construction	Construction, formwork
Composite products	Cladding	Particleboard, MDF
Pulp and paper	Fine paper (export markets)	Newsprint, packaging
Firewood and biofuel	Domestic, industrial	Industrial

For further details refer to the Appendix or the 2013-2016 and 2016-2019 Benchmarking Studies.

2.3 Timber Production Supply Chain

The supply chain for the industry constitutes:

- activities in forest management and growing
- log production operations including road and track construction, harvesting and haulage
- primary processing by sawmills, chipmills, pole producers
- secondary processing by board and paper manufacturers
- downstream processing by truss and frame producers, furniture manufacturers
- timber sales and distribution to wholesalers and retailers.

For further details refer to the Appendix.

2.4 Commercial Arrangements

The primary commercial relationship underpinning log supply are supply contracts between FCNSW and log customers that may range in term from casual – short term through to 20-year Wood Supply Agreements[4] (WSA). The key current native forest supply contracts in place are tabled below, along with the key products being sold, the contract terms and the basis of the sale.

2.4.1 FCNSW – Customer Arrangements

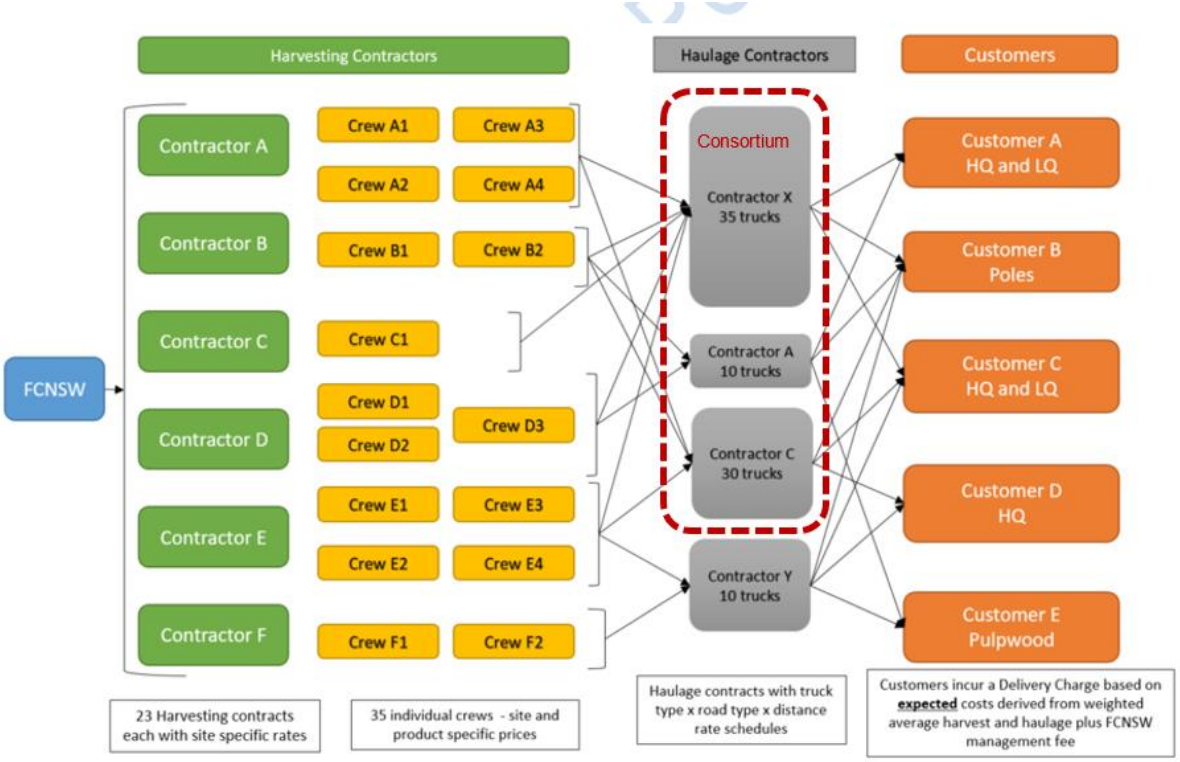
FCNSW log sales arrangements include wood supply agreements for long term (up to 20 years), and supply contracts encompassing parcel sales on a casual and short term basis. Long term agreements have arisen from tendered or negotiated outcomes. Shorter term agreements, particularly for low quality products can also be established following tenders and other forms of market exploration.

Key terms in this discussion include:

Term	Description
Stumpage (may also referred to as royalty)	The value of the logs at the stump (i.e. in the forest). Charged to the customers by FCNSW to reflect the cost of growing, managing and protecting timber resources.
Delivery Charge	A charge to customers that ostensibly covers harvesting, haulage and administration costs. Figure 2-2 below represents how **Delivery Charges** may be formed, comprising the estimated costs for a number of different assumptions regarding harvest and haul service providers.

[4] Wood Supply Agreement is the general term adopted by FCNSW for contracts that are for the supply of timber under Part 4 of the Forestry Act 2012

Figure 2-2: Conceptual Log Harvesting and Delivery Model*

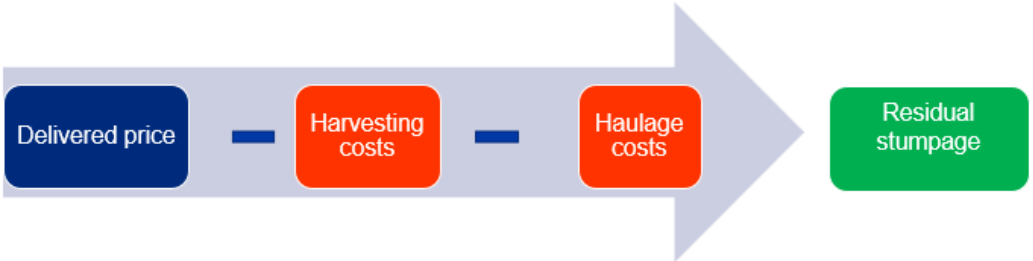


* Schematic represents a North Coast model, including the haulage consortium. The South Coast has linked harvest-haul contractors (i.e. the same party complete harvesting and haulage).

Delivered Price	The total price charged to customers encompassing administration (if applicable), stumpage and delivery charges

Commercial arrangements include three types of sales contracts, **Stumpage** and two types of Mill Door or Delivered Sales contracts (**Delivered Price** and **Delivery Charge + Stumpage**).

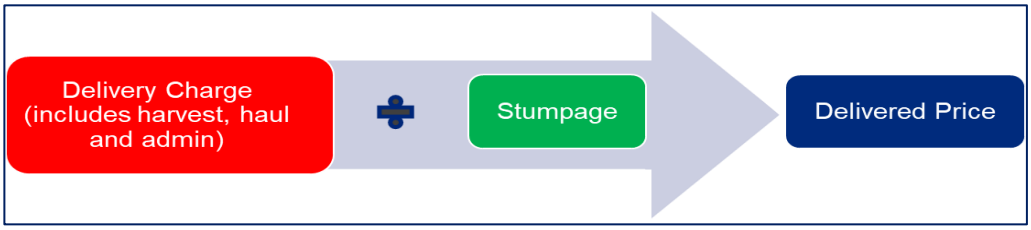
1. **Stumpage** - Provide for the customers to engage harvesting and haulage contractors directly, thereby purchasing logs purely on a 'stumpage' basis (this is the predominant form of sales in the Eden Management Area and Western Region)
2. **Delivered Price** - This typically applies to low quality products, where FCNSW negotiate a mill door price, where stumpage movements and delivery cost adjustments are generally combined. FCNSW absorb the risk of costs either being higher or lower than anticipated, and derive a residual **stumpage** based on the mill door price, less contract costs as demonstrated below. This is the predominant form of sales in the State.



Note that from an accounting perspective, FCNSW apply a **notional** Delivery Charge under Delivered Price contracts to cover harvest and haulage costs. The notional **allocation** of

the **Delivery Charge** and **Stumpage** components has no influence on the Delivered Price. Customer invoices generally do not itemise stumpage and delivery charge components.

3. **Delivery Charge plus Stumpage** - The third type of contract provides for prices for the two components to be established independently – stumpages resulting from pre-defined adjustment mechanisms that include market based indices, and **Delivery Charges** that are a function of estimated contracted costs for harvesting and haulage (and may also be adjusted to reflect cost indices). This is illustrated below as an example.



In this contract type, the customers wear the risk on increased or decreased costs where, for example, transport distances change from one period to the next (this relates specifically to the majority of HQ logs outside of Eden).

Table 2-2 provides current sale agreement details for FCNSW major customers, including the location and sale type. High Quality Sawlog customers generally have a Delivery Charge Plus Stumpage arrangement, whereas Low Quality Sawlog and Pulplog customers will have a Delivered Price contract in place. A number of customers will have a combination of the arrangements depending upon the mix of products purchased.

Table 2-2: Overview of FCNSW Native Forest Log Supply Arrangements

Company	Mill locations	Product	Term	Sale Type[1]	Annual allocation (m^3, gmt)
Allied Natural Wood Exports	Edrom	Pulplog	2029	S	**290 000**
Allied Natural Wood Exports (new agreement commenced 2019)	Edrom	High Quality Sawlogs	2030	S	**14 600**
Aquafern Pty Limited	Warrell Creek	Low Quality Sawlogs	2028	DP	**18 000**
Big River Group	Junction Hill	Veneer Logs	2028	DC+S	**16 502**
CJ & A Woods Pty Limited	Nambucca	High / Low Quality Sawlogs	2028	DC+S, DP	**17 170**
Coffs Harbour Hardwoods Pty Ltd	Glenreagh	Poles, Piles, Girders, High / Low Quality Sawlogs	2028	DC+S, DP	**7 508**
Dale & Meyers Operations Pty Limited	Nammoona (Casino)	Poles and Piles	2028	DC+S	**6 250**
Hayden Timbers Pty Ltd	Telegraph Point	Low Quality Sawlogs	2028	DP	**17 925**
Henson Sawmilling Operations Pty Ltd	Mountain View (Grafton)	Low Quality Sawlogs	2028	DP	**7 875**
Hurford Hardwood Kempsey Pty Ltd	West Kempsey	High / Low Quality Sawlogs	2028	DC+S, DP	**8 123**
Hurford's Building Supplies Ltd	Kyogle, Casino, Karuah, Tuncester	High / Low Quality Sawlogs	2028	DC+S, DP	**21 753**
Koppers Wood Products Pty Ltd	Junction Hill	Poles and Piles	2028	DC+S	**20 260**
Marshall Notaras Pty Ltd (ex- J. Notaras & Sons)	Grafton	High / Low Quality Sawlogs	2028	DC+S, DP	**16 579**
Newells Creek Sawmilling Co. Pty Ltd SA Relf & Sons Pty Ltd	Bulahdelah	High / Low Quality Sawlogs	2028	DC+S, DP	**24 807**
Pentarch Forestry (acquired from Boral in October 2021)	Koolkhan Herons Creek, Kyogle	High Quality Sawlogs	2028	DC+S	**116 000**
Ryan & McNulty Pty Ltd	Benalla	High Quality Sawlogs	2026	D	**12 500**
Sweetman Renewables Limited	Millfield (Cessnock)	High / Low Quality Sawlogs	2028	DC+S, DP	**8 243**
Thora Sawmilling Pty Limited	Thora	High / Low Quality Sawlogs	2028	DC+S, DP	**42 627**
Weathertex Pty Ltd	Heatherbrae	Pulplog	2028	DP	**15 000**
Williams Timber Pty Ltd	Bucca	Poles, Piles, Girders, High / Low Quality Sawlogs	2028	DC+S, DP	**5 035**

Source: FCNSW Note 1: (DP – Delivered Price, DC+S – Delivery Charge plus Stumpage, S – Stumpage)

2.4.2 FCNSW – Harvest Contractor Arrangements

Given the obligations assumed by FCNSW in respect to the quantum and grade of logs to be delivered to different customers, FCNSW engages harvesting and haulage contractors as part of the delivery arrangement. FCNSW is responsible for the planning of the harvesting compartments and making these available to the harvesting contractors. FCNSW is also responsible for the overall performance of the harvesting and haulage contractors in respect to environmental as well as health and safety performance. As part of their contractual arrangements with the harvesting and haulage contractors, FCNSW requires the contractors to attain a range of minimum performance standards.

FCNSW undertakes tenders and seeks to match harvest and haulage capacity with projected demand based on the existing and proposed long and short terms wood supply agreements and industry analysis. Typically, the contracts arise from open tenders with harvesting and haulage contractors that are generally up to five years in length and may include extension provisions. Shorter term contracts are employed to satisfy a temporary or unforeseen shortfall in capacity. Current harvesting rates generally result from the long-term harvest and haulage services procurement processes conducted by FCNSW. These are further discussed in Section 4.5.

Harvest and haulage agreements with FCNSW are typical of the broader Australian native forest industry in that they commonly have several key commercial terms:

- Contracts arising from open tenders are commonly up to 5 years in duration to facilitate financing of equipment
- Shorter term agreements may be employed where there is a specific capacity shortfall or uncertainty surrounds supply requirements
- Typical quantities for native forest harvesting are between 15,000 m^3 and 40,000 m^3 per annum
- Harvest rates are usually based on a matrix that accounts for the type of product and the difficulty class related to completing the operations, or an agreed target production rate. An example of a Difficulty Class Matrix is provided below.

Table 2-3: North Coast Difficulty Class Matrix

			Volume:	**over 40m³/ha**
Slope of Net Harvest Area (% slope):		'Moderate'	'Steep'	'Very Steep'
		0% - 29% is over 20°	30% - 60% is over 20°	61% - 100% is over 20°
Snig Distance (metres):	<150	A	A	A
	150-300	A	B	B
	301-500	B	B	C
	501-700	B	C	D

- Haulage rates are generally a function of distance and road type
- Contracts provide for rate adjustments that are generally based on changes in CPI and fuel costs / indices.

2.5 Trends and Dynamics of the Forest Sector

The industry has been shaped by various trends and forces, locally, nationally and globally. This relates to industry competitiveness encompassing ecosystem health, productivity of harvesting and haulage systems, efficient use of the harvested crop and effective forest management and policy.

2.5.1 Industry Competitiveness

The following factors largely determine the long term competitiveness of the timber industry[5]:

- Forest ecosystem health – forests must be productive and seek to produce the highest value products possible while providing significant environmental outcomes, which then provides the opportunity for industry to utilise in order to maintain a competitive advantage
- Productivity of harvesting and haulage systems - timber harvesting plays a critical role in broader industry competitiveness due its relationship between stumpage (the value of the crop), and the cost of inputs into the manufacturing sector (i.e. mill door price incurred for receipt of sawlog, pulpwood etc)
- Efficient use of the crop (value recovery) – converting standing volume into the highest possible value combination of products is essential in order to maximise stumpage to the grower and hence provide funds and incentives to reinvest into the regeneration of the forest values
- Effective forest management and policy – provides resource security, both in terms of volume and tenure, and providing the framework whereby the industry has a 'social licence' to operate on a sustainable basis, whilst maximising efficiencies.

2.5.2 Forces Shaping Industry Efficiency and Competitiveness

Productivity drivers in a general sense include research and development, education and training, health, safety and well-being, economies of scale, economic efficiency, labour management, social values, institutional arrangements and the legal framework within which the industry operates. Forest industry specific forces include forest access (infrastructure, topography and soils), labour availability and skills, machinery and equipment, transport systems, tree size and utilisation and skidding or extraction distances.

Timber harvesting systems employed in NSW and elsewhere in Australia reflect the regulatory, topographic, forest and market conditions within specific regions and catchments. There have been numerous forces shaping the way in which the industry operates today, including the social and political influences that have altered the nature of the resource available, the manner in which harvesting may occur, and the expectations in relation to worker and community health and well-being. The following are key overall forces influencing the efficiency of the timber harvesting supply chain.

Resource availability and structure

There has been a general decline in NSW native forest harvesting levels since the 1980's. Land tenure changes (e.g. conversion of State Forest to National Park), revised regulatory frameworks and forest structure, have all contributed to a decline in the available area for harvesting. This trend can be observed nationally and within NSW. The Victorian and Western Australian governments have both announced cessation of native forest harvesting altogether over 2023 and 2024.

While the total harvest volume has declined significantly, the nature of the available resource has also seen a shift from harvesting predominantly older forests with larger trees, to those with a higher proportion of regrowth stands or those occupying lower productivity sites. This has all led to a general trend towards smaller logs and commonly lower harvested yields on a per hectare basis.

[5] Ghebremichael, A.; Nanang, D.M. 2004. Inter-regional comparative measures of productivity in the Canadian timber harvesting industry: a multilateral index procedure. Nat. Resource. Can., Can. For. Serv., North. For. Cent., Edmonton, Alberta. Inf. Rep. OR-X-391.

This has an overall impact of reducing the scale of activity, at both the work site level as defined by a compartment, as well as the macro level as defined by overall harvest levels. These scale reductions impact of the efficiency of the harvesting and haulage arrangements.

Environmental regulation and the introduction of the Coastal IFOA

The primary instrument regulating timber harvesting in NSW on crown land (excluding plantations) is the Integrated Forestry Operations Approval Framework (IFOA). This is described below. Others include (but are not limited to) the Plantations and Reafforestation Act 1999, the Regional Forest Agreements Act 2002 (Cth), the Heavy Vehicle National Law (NSW) 2013, Work Health and Safety Act 2011 (NSW), State Owned Corporations Act (1989) and the Competition and Consumer Act 2010 (Cth).

The IFOA process considers proposed native forest harvesting activities in terms of the impact on soil and water, threatened species, fisheries and cultural heritage.

The approvals contain the terms of a licence under the Protection of the Environment Operations Act 1997, the Threatened Species Conservation Act 1995 and the Fisheries Management Act 1994. Enforcement of the licences is undertaken by the Environment Protection Authority and the Department of Primary Industry – Fisheries.

Source: EPA NSW

The current structure of the IFOA's for coastal forests has recently been recast with four previous IFOA's (Upper North East, Lower North East, Southern and Eden) brought in under a single Coastal IFOA (CIFOA). This process included a transition phase encompassing the period subject to this review.

The primary impacts of the CIFOA relate to instatement of revised environmental protections, including changes to reserved area arrangements and retention of particular tree types. These changes have the potential to impact harvesting costs, partly due to lower yields per ha accessed and additional tasks required by the harvesting operators.

The period of the CIFOA implementation also saw a number of disruptive events that created significant challenges for FCNSW in its ability to maintain supply. There were major fires across the entire native forest coastal estate in 2019/20, noting ~47% of NSW multiple use forests were impacted, and subsequent flooding events during 2021 – 2022. This had a substantial influence on the availability of timber harvesting and management resources, forest access and road infrastructure.

This is discussed further in Section 3.

Mechanisation

Timber harvesting has increasingly seen a transition away from motor-manual tasks such as tree felling with chainsaws to mechanised operations that include:

- Tree harvesters / fellers
- Grapple skidders that efficiently move multiple tree lengths from within the forest to the landing
- Processors or loaders that debark, cross-cut and sort logs at landing.

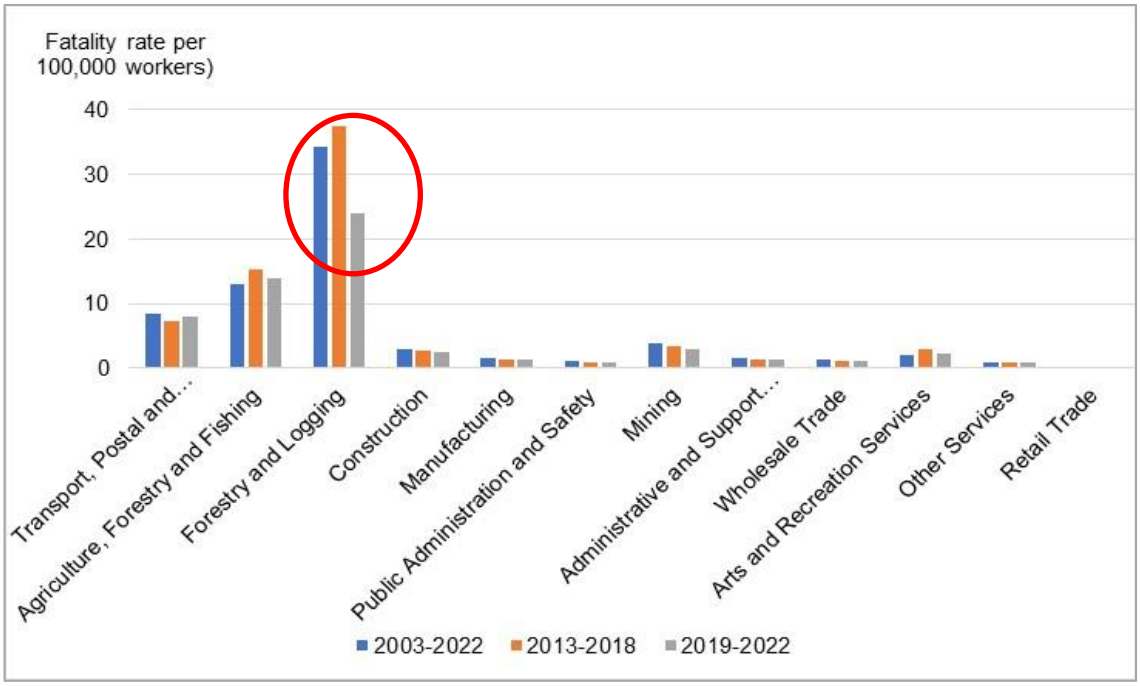
The driver for this change was primarily efficiency through improved technology, providing better access and productivity. In addition, health and safety reform has reinforced this mechanisation change. However, the consequences of this was a greater demand for capital in the form of machinery, requiring more sophisticated business structures, longer term contracts and increasing the exposure of the entities involved to fluctuating cashflow arising from changing demand, resource availability, and production capacity. This demand for capital is further noted as being for relatively highly customised machinery in respect to harvesting equipment.

Health and well-being

The timber industry has long been identified as a relatively high risk work environment (refer to Figure 2-3), and forms part of the agriculture, forestry and fishing sector that records the highest proportion of workplace fatalities in Australia.

In the NSW context, a series of fatalities within the industry in the early 2000's was the catalyst for a significant shift in the proportion of operations away from utilising hand fallers. Positive health and well-being outcomes associated with mechanisation have also been a force in the retention of existing and recruitment of new employees in the industry.

Figure 2-3: Worker Fatalities: Proportion by industry of employer



Source: Safe Work Australia / statistics

The operating environment for timber harvesting workers has been significantly changed over the last 20 years with greater mechanisation, particularly in relation to tree felling, with reductions in chainsaw operations in favour of specialised equipment such as feller bunchers. Improving safety outcomes in the workplace can come at a higher upfront cost in addition to that associated with higher capital requirements, including higher training standards, administration and management overheads, personal protective equipment (PPE) and fewer available productive work hours.

Transition to 'mill-door sales'

Over the last 20 years, many Australian forest growers have tended to manage the supply chain within the forest and arranged sale of the logs on a mill-door basis, rather than allocating stands to timber customers who may have contracted their own harvesting and transport, and paid the grower a stumpage fee.

The key drivers for this centred on:

- A better alignment of health and safety objectives
- More control of environmental and silviculture outcomes
- To assist with the transition to mechanised operations
- Better control of value adding / recovery operations within the forest through more sophisticated log grading procedures, market segmentation and product allocation
- Improved capacity to optimise the supply chain through making effective trade-off decisions in terms of forest infrastructure, recovered yield, harvesting costs and transport systems.

Markets

There has been a general decline in timber sales from native forests. Perhaps more significantly in terms of impacting on operating costs is the change year on year in demand for specific products and overall fibre. As native forests in NSW produce a range of products from high value poles and veneer logs, through to low quality sawlogs and pulpwood, and a wide variety of species and related timber quality, any loss or decline of a particular market can significantly impact on the unit production cost of the other products. This is particularly the case where access to pulpwood markets has been unavailable or constrained. The productive capacity of harvesting crews would be curtailed if only a small proportion of each tree, or trees within a stand contain merchantable material.

Corporate behaviour

Across Australia, native forest harvesting is now dominated by the supply arising from public native forests. This results in both the harvesting and haulage contractors, and processing customers having a high dependency on this supply for their businesses. Similarly, across Australia, most public native forest management agencies while being government entities have had an increasing focus and scrutiny on their commercial arrangements.

Most Australian public native forest management agencies are now in a corporatised form, resulting in increased transparency in their reporting arrangements, governance functions and financial performance. This trend was largely initiated in the mid-1990's and then became increasingly commonplace through the 2000s. This reflected public policy frameworks, given the functions of the management agencies included them being an arm of government with an overtly commercial interaction. In some circumstances, this resulted in the commercial arm being fully separated from the arms of government involved in the stewardship and protection activities of public land management (i.e. as observed in Victoria and Western Australia) or where a corporate entity is

formed with clear governance and financial frameworks but retaining the stewardship and commercial activities within the one organisation (i.e. NSW and Tasmania).

This corporate platform of clear commercial performance has resulted in the forest management agencies looking to establish both log pricing arrangements reflective of the capacity to pay in the market place, as well as efficient cost management so as to enhance the resource rent and capture of this rent to the owners of the resource, which is the representative of the respective State Government. Within this arrangement, the forest management agencies assess the potential risks and uncertainty to their financing, and seek to manage this as effectively as is reasonable given their governance arrangements and overall mandate.

An upshot of this increasing corporatisation of the behaviour of the forest management agencies is that the agencies dealings in the marketplace sought to reflect commercial arrangements as would be expected by private parties. This level of reflectance is influenced by the legacy arrangements and operating environment (i.e. planning or regulatory frameworks) in which the forest management agencies operate, as well as the mandates provided to them by their shareholders. Nevertheless, it is a complex operating environment. Governments typically expect a commercial return from the agencies, as well as desired social and political outcomes, while also continuing to effect the operations of the entity through changing regulatory frameworks that reflect changing community expectations.

3. BENCHMARKING ANALYSIS

This section discusses the approaches to the collection and analysis of data from FCNSW and comparator organisations, in order to provide a meaningful insight into costs within the industry during the period FY2020-22.

For this review, limited inter-jurisdictional data has been made available. The native forest industry is in a high state of flux in Victoria and Western Australia, with the respective state governments adopting a policy to cease native forest harvesting over the coming year. In that context, limited open market competitive processes have been enacted in these jurisdictions, with existing contract arrangements either terminated or extended via various indexation mechanisms.

Updated data from Tasmania was not provided for this review, however Indufor note that previous discussions with Sustainable Timber Tasmania have indicated that contracts have generally been extended via indexation mechanisms. In terms of other states, South Australia does not undertake native forest harvesting, and whilst Queensland undertake some native forest harvesting, it is managed by the Department of Agriculture and Fisheries (DAF) on a 'stumpage basis[6]. Hence, all harvesting and haulage contracts are held by relatively small, disparate individual businesses. Previous attempts to obtain benchmarking cost data from Queensland based private companies have not been successful.

On that basis, Indufor have reviewed previous inter-jurisdictional datasets and updated those costs via indexation to enable a degree of equivalency for the review period.

3.1 Background

The benchmarking analysis has been undertaken in two parts:

1. Unit cost comparison for the period FY2020-22

The intent of the unit cost comparison is to provide key benchmarks for comparison with other jurisdictions and identify the set of costs and associated parameters that will enable a detailed comparative analysis, whilst accounting for key cost drivers and influences.

Unit cost benchmarking is useful to the extent that operating conditions are significantly comparable, or cost drivers are relatively simple and transparent. Harvesting timber in Australian native forests is relatively complex for several reasons including:

- heterogeneous timber resource and silvicultural requirements
- different landforms and ground conditions
- variable markets
- contrasting regulatory environments.

This results in a relatively high degree of customisation of the product and related service provision, particularly with respect to harvesting arrangements. This customisation across forest harvesting arrangements can be observed through the machinery capital being deployed, the specific requirements of the human capital skills and the work methods being applied.

2. Analysis of cost drivers related to harvesting and haulage in native forests, noting any specific influences related to the review period

[6] All contracts are held by Timber Permittees, with DAF receiving a 'stumpage' or royalty only

Productivity cost models were developed for the 2013/14 to 2015/16 Benchmarking Study to identify the cost factors contributing to overall costs for each jurisdiction, and thus enable a reasonable comparison across differing environments. Each individual component of harvesting and haulage activities were described, and data sought to enable a relationship between operating conditions, productivity and costs to be established. Data limitations constrained the use of the models as a means of comparison. However, the description of the components of the activities provides a useful basis for understanding different operating conditions. An example is timber yield (refer to Appendix 4.4).

3.2 Procurement Processes for FCNSW and others

A summary of the various processes FCNSW have employed to access the market for harvest and haulage services is detailed in Section 4.5. The current contracts have been achieved through a combination of open tenders and direct negotiations with new and existing entities.

As a comparison (and noting the current changes to the industry in Western Australia and Victoria), the WA Forest Products Commission (FPC) have generally conducted open tenders for the majority of the harvest and haul services required, with terms of up to 9 years, aligned with the Western Australian Forest Management Plan (FMP). In Victoria, VicForests have tended to go to the market for harvest and haul services every four or five years and offered 3 to 5 year contract terms. They have been usually open tenders however the most recent was a selective process.

In Tasmania, the industry was substantially restructured in 2010/11, resulting in over 50% of the contracting capacity exiting, with an undertaking to not re-enter the industry for at least 5 years. Since then, Tasmanian harvesting and haulage charges have largely been derived from direct negotiations with the remaining parties and adjusting prices via indexation mechanisms.

3.3 Unit Cost Comparison

A unit cost comparison of both contract rate schedules and actual unit costs was used to assess the rates used by FCNSW. Rate schedules have been sourced from current contracts and periodic rate reviews. Unit costs have been collated from FCNSW sales and contractor databases for the relevant period, and where available from comparator operations, VicForests, FPC and Sustainable Timber Tasmania (STT).

Production data for NSW is reported by region (Production North for the north coast, Production South for south coast (excluding Eden) and Tumut. The data is presented for the three relevant years.

In this report, the following terms are used:

- *Unit costs* – the unit cost is derived by dividing the total expenditure by the number of tonnes of product produced. This has been reported for total quantity of all products, as well as by individual product and contractor groups.
- *Unit rates* – the unit rates are those specified in individual contracts. Generally, Indufor notes the limitations of contract rates as a means of comparison as they may not directly reflect operating conditions or parameters relevant for the review period.

Where possible, unit costs have been used for comparison purposes as this measure accounts for different margins applied to difficulty classes, products and other variables. It is also an actual measure of costs across the operation of interest. As an example, the margins applied to each product in FCNSW contracts reflect the additional costs associated with producing high quality logs, but also to offer the contractor an incentive to maximise the production of high value products. Thus,

the average cost will vary depending upon the proportion of each product produces from any one operation (refer to Table 3-4 below).

The comparison of unit costs throughout this document includes the 3 years within the review period (2019/20 – 2021/22) and the final year of the previous review period. This is necessary to calculate movement from the base period. The indices, or unit costs from the previous review period are stated in blue text.

Commonly, FCNSW contracts have annual indexation measures that incorporate CPI (Table 3-1) and fuel (Table 3-2) as the key indexation indicators. The changes in these indices over the relevant period are presented below.

Table 3-1: CPI June 2019 - 2022

Period	Index	Annual Change
June 2019	115.9	
June 2020	114.7	-1.04%
June 2021	119.4	+4.10%
June 2022	125.7	+5.28%
Total		*+8.46%*
Annual average		*+2.78%*

Source: ABS. Note - Sydney (all groups)

Table 3-2: Average Diesel Terminal Gate Price (Sydney) FY2019 – FY2022

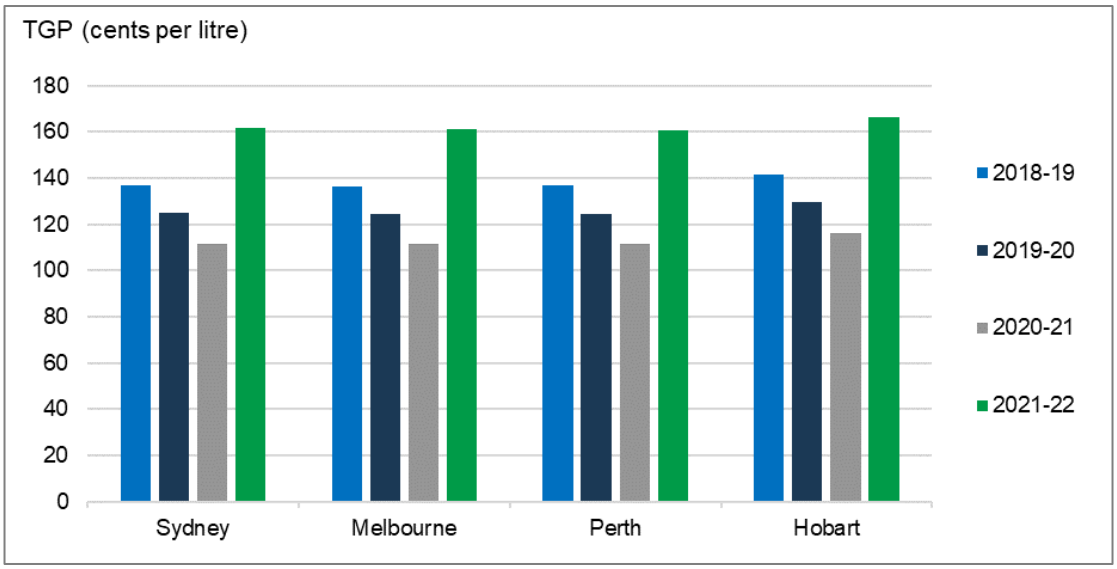
Period	Price - cents per litre (12-month average)	Annual Change
FY2019	136.85	
FY2020	124.87	-8.75%
FY2021	111.74	-10.51%
FY2022	161.51	+44.54%
Total		*+18.02%*
Annual average		*+8.42%*

Source: AIP - http://www.aip.com.au/pricing/tgp/

Figure 3-1 shows the difference in diesel prices (TGP[7]) by Australian city. Note the Sydney price change is used to index contracts related to FCNSW. It would be expected that the relative movement in fuel prices would have a degree of consistency across jurisdictions.

[7] Terminal Gate Price

Figure 3-1: Average Terminal Gate Price for Diesel by City FY2019 - FY2022



Source: AIP - https://www.aip.com.au/pricing/terminal-gate-prices

3.3.1 Unit Costs – Harvesting

3 year trend within FCNSW

Harvest costs incurred by FCNSW for all products were derived for each of the three relevant years and are shown for the two major regions North and South. Over the three-year period, the unit harvest costs on average moved by -1.3% (CAGR[8]), with a fall in the north and a modest increase in the south.

Table 3-3: Rate of Change – FCNSW Harvest Unit Costs ($/gmt)

Region	2018/19	2019/20	2020/21	2021/22	CAGR
Production North	45.39	44.13	41.75	43.06	-1.7%
Production South	35.23	34.51	32.78	36.90	1.6%
Total	42.19	41.07	38.96	40.62	-1.3%

Source: FCNSW

As stated above, in order to provide an incentive for harvesting contractors to produce high value products, and to provide recognition of added production costs, FCNSW apply the following product pricing differentials in each of the regional production zones tabled below.

[8] Compound annual growth rate

Table 3-4: Pricing Differential Applied to Base Rates

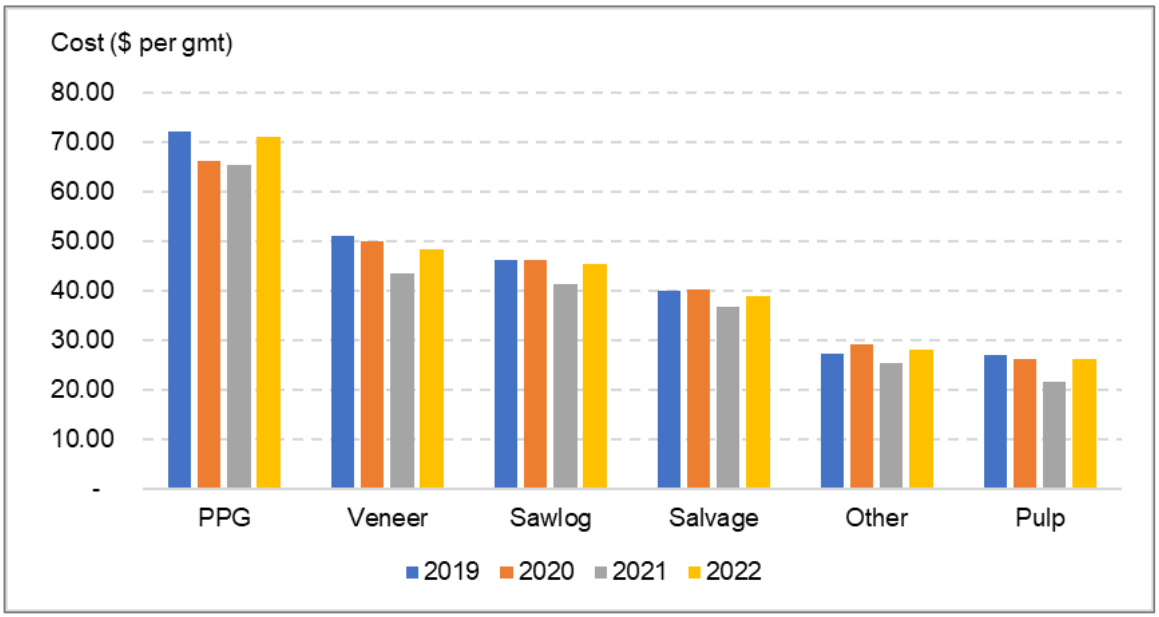
Product	North Coast	South Coast
Poles and Piles	150 - 200%	175%
Girders and Veneer	125 - 150%	150%
High Quality Sawlogs	100%	100%
Low Quality / Salvage Sawlogs	80 - 85%	85%
Pulpwood	65%	70%
Firewood / Other Pulp/Residue	65%	70%

Source: FCNSW

This has the impact of the harvest rate distribution across the different product types as demonstrated in Figure 3-2. Note, these costs are also impacted by localised harvesting conditions, including the mix of products, such that small volume lines such as PPG (piles, poles and girders) will vary from year to year more significantly than primary products such as HQ sawlog and pulp.

Assessing the change in unit costs by FCNSW product group over the review period indicates that changes generally are similar for each product (Figure 3-2).

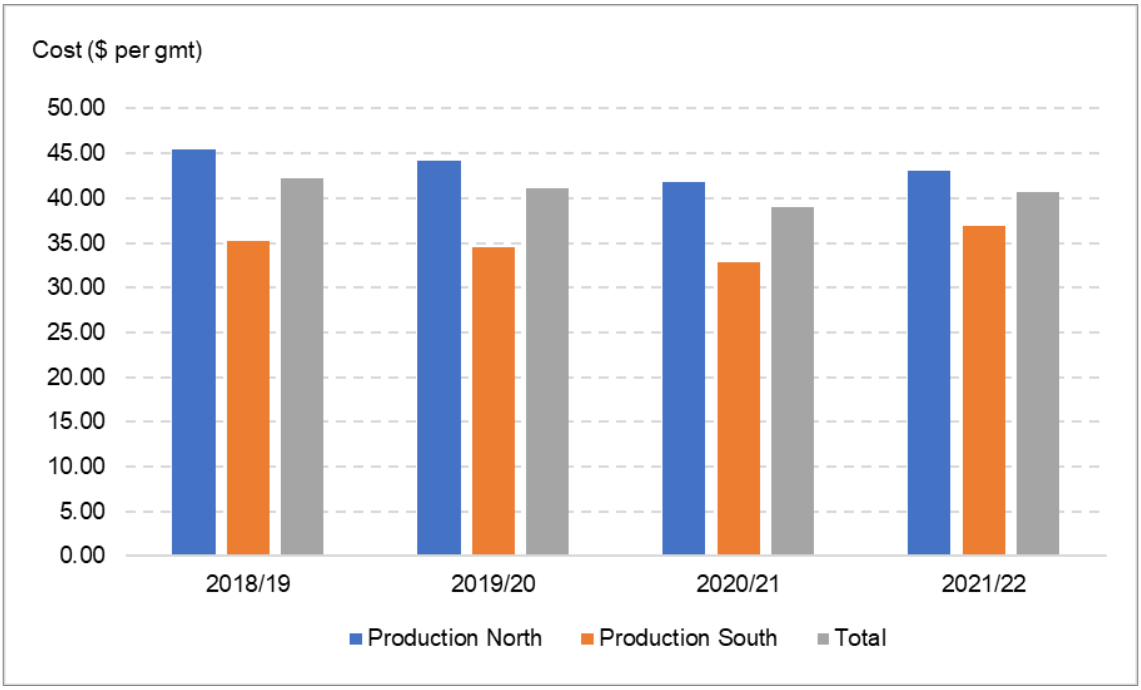
Figure 3-2: Average Harvest Cost by Product Group FY2019 compared to FY2020-2022



Source: FCNSW

The total harvest costs in each Region are presented below in Figure 3-3 below. This shows the relatively higher costs incurred on the North Coast, which is consistent with observations previously made.

Figure 3-3: Average Harvest Cost by Region FY2019-2022

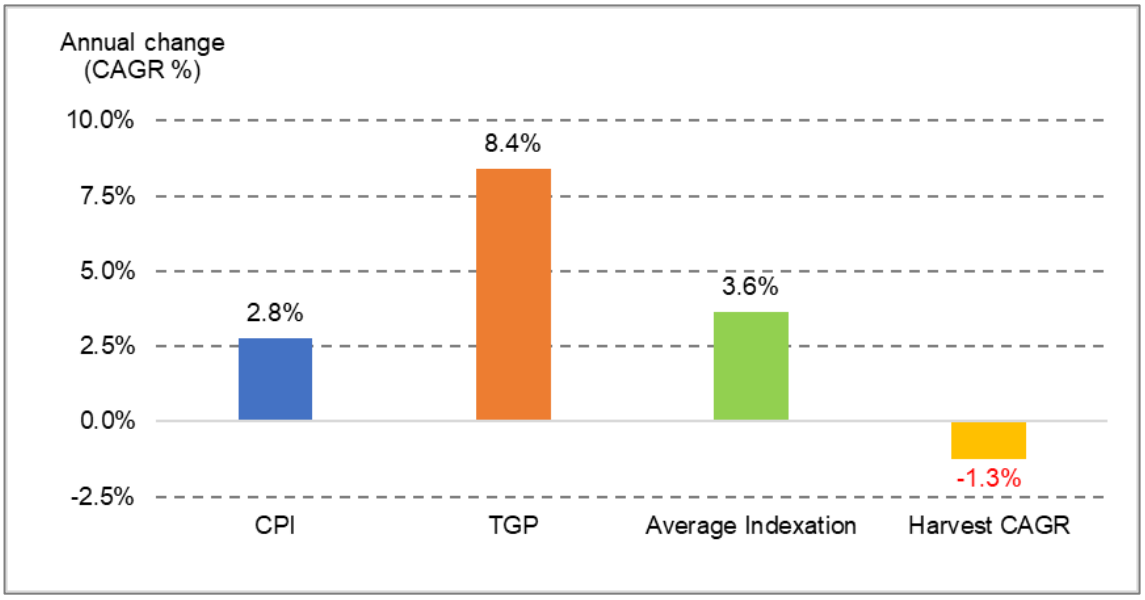


Source: FCNSW

Figure 3-4 below considers the overall movement in harvesting rates (CAGR) of all regions relative to CPI and fuel (using TGP as a base) over the same period. This supports the view that overall harvesting rates have fallen relative to CPI and fuel. Within the review period, the indicator price of fuel (see Table 3-2) increased by an average of 8.4% per annum.

FCNSW have stated that fuel accounts for between 11% and 15% of harvest costs in terms of annual indexing mechanisms within harvest contracts. The 'Average Indexation' shown in the figure is the index change incorporating CPI and Fuel (TGP) and weighting them according to the proportions stated in the review provisions of the contracts. This provides an indication as to how indexation would have affected the rate of change in cost. The actual CAGR of harvest costs (the yellow column) is significantly lower than the derived average index change of 3.6% in this comparison, falling by 1.3%.

Figure 3-4: Annual Harvesting CAGR, TGP (Fuel), CPI and Average Indexation FY2020-22[9]



Source: FCNSW, ABS

Critically, this points to other factors influencing harvest costs (negatively) over the review period. Indufor understands that the impacts of the 2019/2020 bushfires, subsequent wet weather events and changes to the regulatory environment led to the short-term concentration of harvesting operations in areas comprising easier terrain and higher yields. This is discussed further in Section 3.5 below.

Comparison with other jurisdictions

A direct comparison of average harvest rates between native forest operations across Australia is of some potential benefit. However, care needs to be taken due to the variation in operating conditions and hence factors that affect productivity are significant. Additionally, and as noted above, the data for Victoria, WA and Tasmania has been indexed from the previous review dataset. Indufor understands that this would be a reasonable approximation of rates for the current review period.

The basis of indexation is shown below. FPC provided the indexation stated in Table 3-5 that applied to their harvest contract rates from 2019 – 2022. This was used as the basis for updating the WA data supplied for the previous review for the current review.

Table 3-5: FPC Average Contract Indexation

Period to	Harvesting indexation
CAGR (2019 – 2022)	4.26%

Source: Forest Products Commission (WA)

In lieu of any indexation information from Victoria or Tasmania, the previous datasets were updated using the indexation that applied to the FCNSW contracts over the same period.

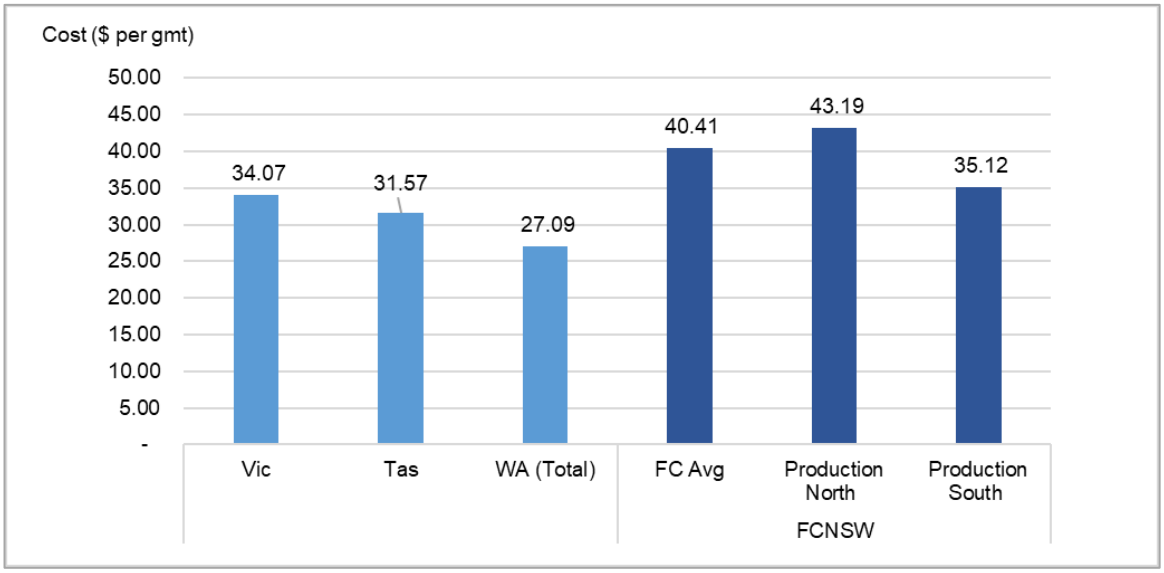
[9] Harvest contracts include price review provisions that adjust base rates to reflect changes in CPI and fuel over the review period. For harvest contracts this index change in generally weighted at approximately 85% CPI to 15% Fuel. This index change is calculated accordingly.

Table 3-6: Victorian and Tasmanian Indexation (based on NSW indexation for same period)

Period to	Indexation
CAGR (2019-2022)	3.60%

A comparison of the four jurisdictions harvest rates across all operations is provided in Figure 3-5. The range is from $27.09 per tonne for Western Australia to $43.19 per tonne for the NSW Production North region. The underlying drivers for much of this range are described in Section 3.4. Critically, Indufor note that this range has been compressed in comparison to the previous review, reflecting the decrease in FCNSW harvest rates relative to the expected indexation.

Figure 3-5: Harvesting Unit Cost Comparison - Jurisdictional (3 Year Average)



Source: FCSW, STT, FPC, VF

3.3.2 Unit Costs – Haulage

3 year trend within FCNSW

Average haulage unit costs increased at an average rate of 5.2%, where haulage cost is the weighted average cost for all products delivered in the three-year period (Table 3-7).

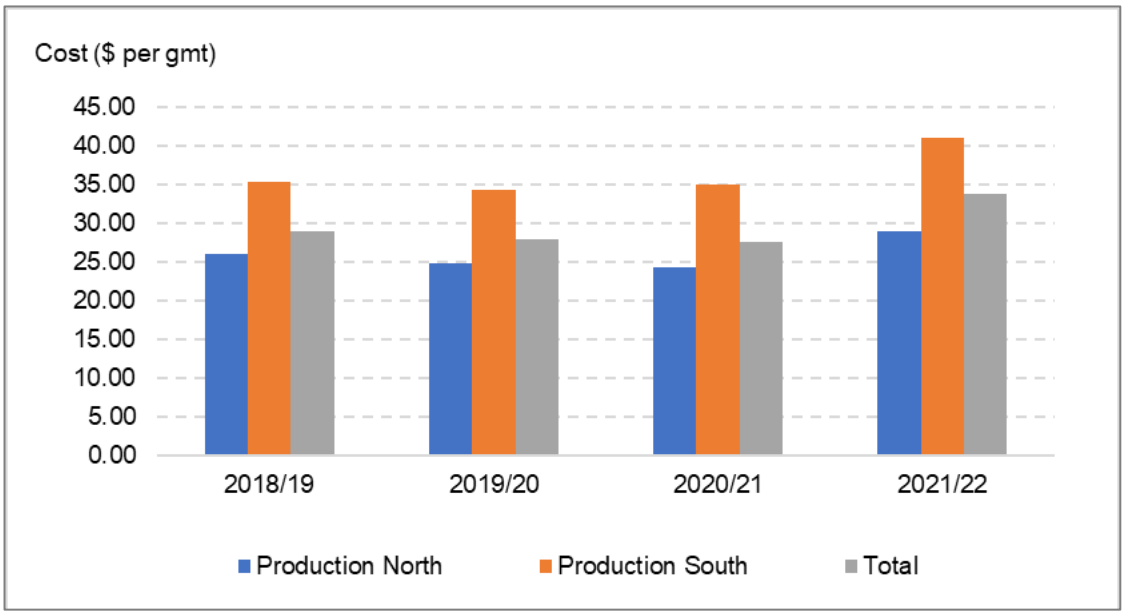
Table 3-7: Rate of Change – FCNSW Haulage Unit Costs

Haulage ($ per gmt)					
Region	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Production North	26.03	24.78	24.18	28.95	3.6%
Production South	35.30	35.42	34.95	40.89	5.0%
Total	28.95	28.17	27.53	33.69	5.2%

Source: FCNSW, ABS

Basic cost drivers including transport distances will have a masking effect on other underlying factors, such that average costs per tonne provide limited insight into market rates. However per tonne costs do reflect the impact on total delivered cost to the customer. Average transport distances increased from 130km to 145km compared to the previous review. These factors are further considered in in Section 3.4.

Figure 3-6: Haul Cost by Region FY2019-22



Comparing total haulage costs can be misleading in terms of benchmarking efficiencies as transport operators have no real control over how far logs must be transported. When units are converted to $ per tonne km (tkm), for the purposes of removing distance as a variable, the average annual rate adjustment across both regions is -1.0% (Table 3-8).

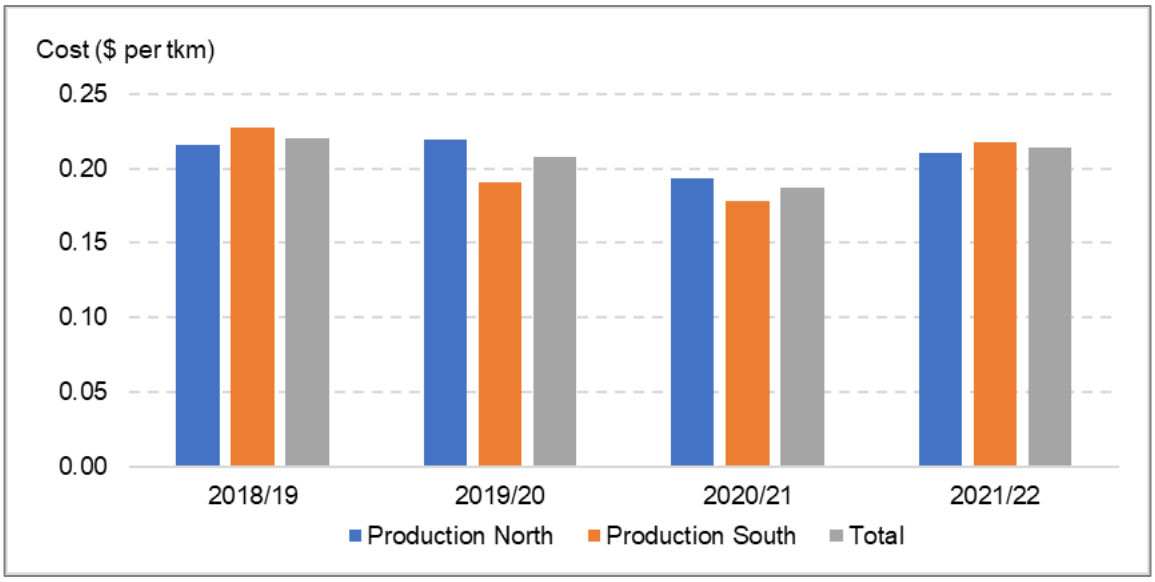
Table 3-8: Rate of Change – FCNSW Haulage Unit Costs (per tonne km)

Haulage ($ per tkm)					
Region	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Production North	0.2161	0.2197	0.1936	0.2102	-0.9%
Production South	0.2276	0.1906	0.1781	0.2179	-1.4%
Total	0.2204	0.2078	0.1872	0.2139	-1.0%

Source: FCNSW

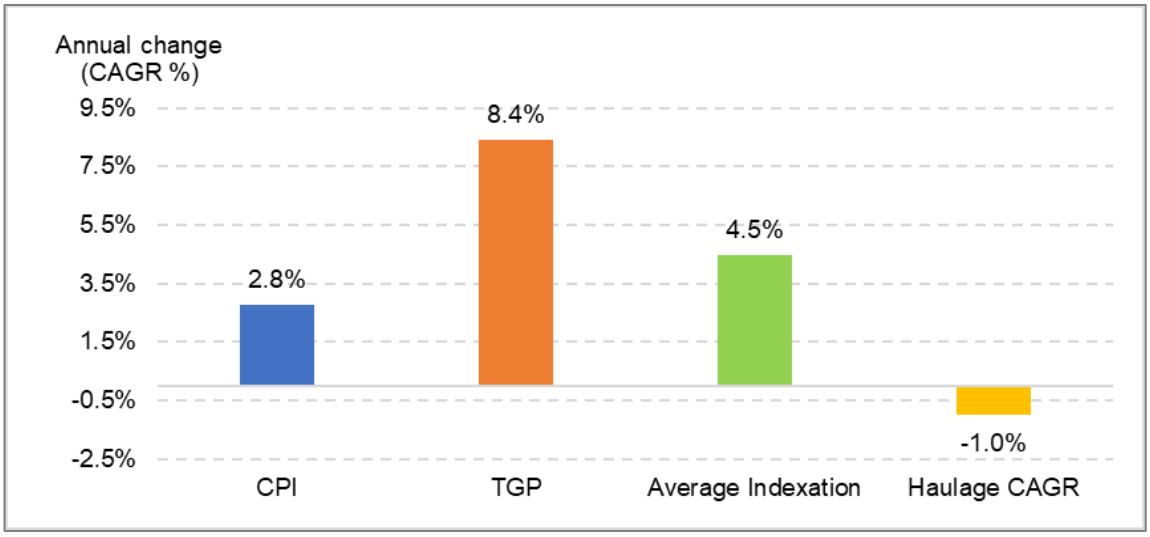
The actual unit costs and changes in key cost drivers (CPI and fuel) are charted in Figure 3-7 and Figure 3-8.

Figure 3-7: Haul Unit Cost by Region FY2019-22 ($ per tonne kilometre)



In the following figure, the 'Average Indexation' is the index change incorporating CPI and Fuel, weighted according to the proportions stated in the price review provisions of the FCNSW contracts. In this instance, the CAGR of haulage costs incurred has declined relative to what may have been expected based on contract mechanisms, indicating other drivers of costs may be influencing costs across the review period.

Figure 3-8: Annual Haulage CAGR, TGP (Fuel), CPI and Average Indexation FY2019-22[10]



Source: FCNSW. Note haulage CAGR in this chart represents costs per tonne km.

[10] Haulage contracts include price review provisions that adjust base rates to reflect changes in CPI and fuel over the review period. For haulage contracts this index change in generally weighted at approximately 70% CPI to 30% Fuel. This index change is calculated accordingly.

Comparison with other jurisdictions

As noted above, the data for Victoria, WA and Tasmania has been indexed from the previous review dataset. Indufor understands that this would be a reasonable approximation of rates for the current review period.

FPC provided the indexation stated in Table 3-9 below and applied to their contract rates from 2019 – 2022. This was used as the basis for updating the WA data supplied for the previous review for the current review.

Table 3-9: FPC Average Contract Indexation

Period to	Haulage indexation
CAGR (2019 – 2022)	4.26%

Source: Forest Products Commission (WA)

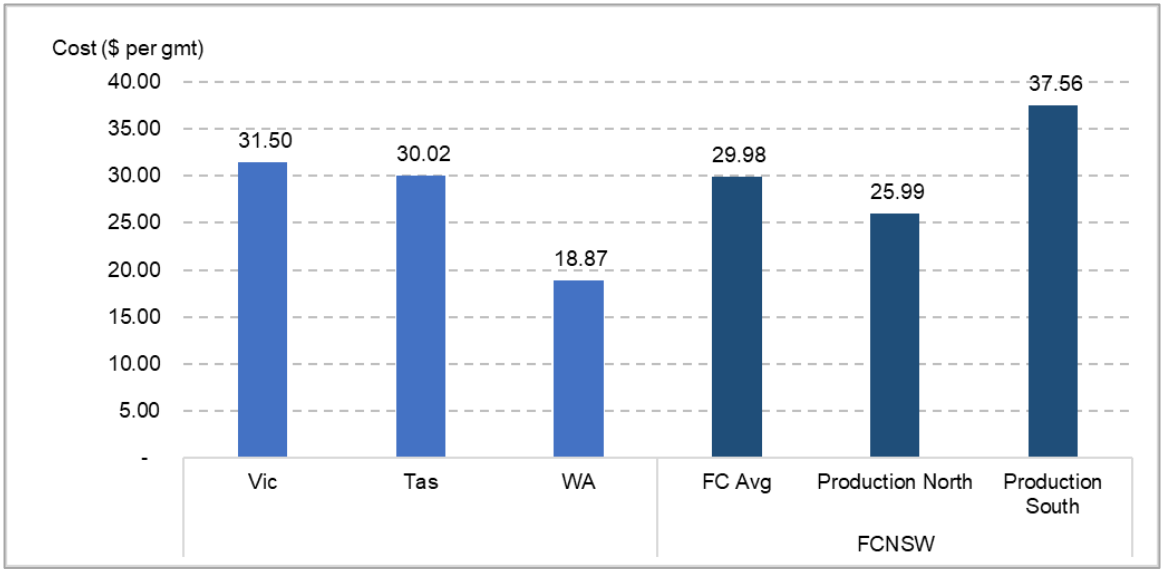
In lieu of any indexation information from Victoria or Tasmania, the previous datasets were updated using the indexation that applied to the FCNSW contracts over the same period.

Table 3-10: Victorian and Tasmanian Indexation (based on NSW indexation for same period)

Period to	Indexation
CAGR	4.50%

Whilst operating conditions for haulage costs are more comparable across jurisdictions compared to harvesting costs, a simple comparison of transport unit costs with other forest owners needs to be carefully considered and requires an understanding of market rates as operating parameters can be significantly different. This includes differing average haul distance. Unit costs for each forest manager are demonstrated in Figure 3-9.

Figure 3-9: Haulage Unit Cost Comparison FCNSW (FY2020–22)

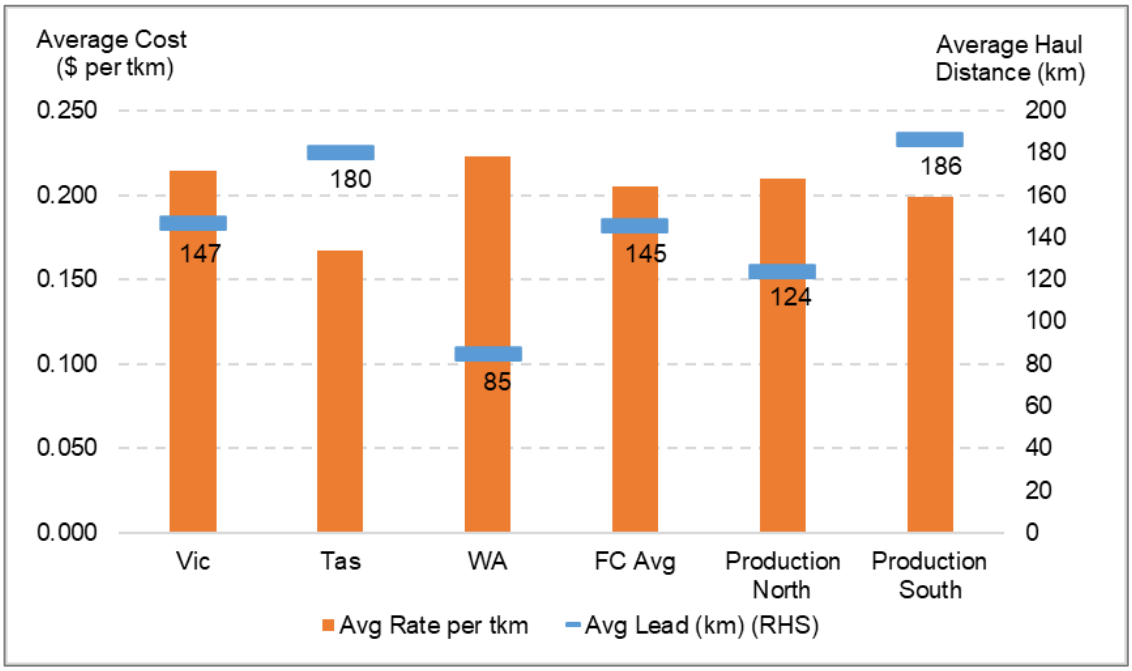


Source: FCNSW, STT, VF. FPC

A more meaningful comparison is often cost per tonne km, removing transport distance as a variable. Comparing total haulage costs can be misleading in terms of benchmarking efficiencies as transport operators have no real control over how far logs must be transported. This is a function of the location of the forests, the location of the processing facilities and various constraints imposed by the forest owner.

However total haulage cost is important in terms of total delivered cost. On this basis, the comparison is presented below. The blue bars refer to the average transport distance (lead km), scaled on the right-hand axis.

Figure 3-10: Haulage Unit Cost and Haul Distance (RHS) Comparison (FY2020-22)

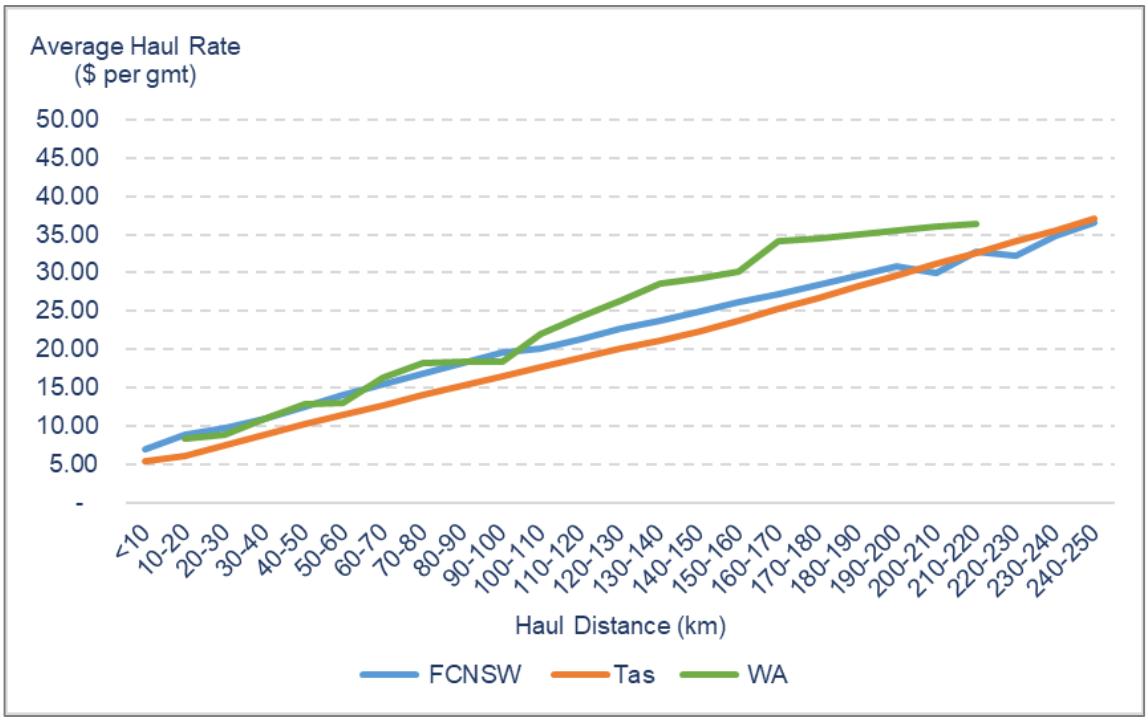


Source: FCNSW, VF, STT, FPC

Longer lead distances in Tasmania, combined with a higher proportion of B-double vehicles offer the opportunity for reduced rates on a tonne km basis. The rates applicable to FCNSW operations appear to be within the typical range of values elsewhere in Australia, notwithstanding differences in terrain and travel speeds applicable in each jurisdiction.

A comparison of rate schedules is provided below (Figure 3-11), showing WA and Tasmanian direct comparison.

Figure 3-11: Comparison of Average Haulage Rate Schedules



Source: FCNSW, STT, FPC

This suggests the FCNSW rates fall within the range for the comparator jurisdictions, although are incurring slightly higher rates on short distances, apparently offset at distances over 190km. This is the same conclusion as the previous review as the same rate schedules have been used with indexation applied as discussed above.

3.3.3 Customer Delivery Charges

As discussed in Section 2.4, FCNSW sell logs on a stumpage or mill door basis. For the majority (by revenue) of mill door sales contracts, a stumpage component of the total price is included to recognise the cost of growing the timber, and a delivery charge applies to cover the cost of harvesting and transporting the logs. The delivery charge is the amount received by FCNSW from its customers and is intended to be comprised of the estimated contracted harvesting and haulage costs, and an administration charge incurred by FCNSW in completing its delivery functions.

The 3-year trend is provided below. Across all operations, the delivery charge average annual increase of 2.7% was slightly less than Consumer Price Index (CPI) [11] of 2.8% for the same period.

Note that the delivery charges and FCNSW costs are further explored in Section 5.

[11] CPI – All Groups – Sydney (ABS)

Table 3-11: FCNSW Delivery Charge

Delivery Charge ($ per tonne)					
Region	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Production North	70.03	70.32	69.17	72.69	1.3%
Production South	64.43	67.20	66.75	76.19	5.7%
Total	68.30	69.32	68.42	74.08	2.7%

Source: FCNSW

Interjurisdictional data for delivery charges was not available for comparative purposes, with most agencies selling logs on a pure mill door price basis (and therefore do not differentiate between the 'delivery charge' and the 'stumpage') as described in Section 2.4.

3.4 Economics of Harvesting and Haulage

To facilitate meaningful benchmarking, Indufor has sought to complete an analysis that provides an evaluation of the key cost drivers within the timber harvesting and haulage industry. We have attempted to analyse and contrast costs at three levels, being the:

- Enterprise/business level;
- Harvesting crew or truck level; and
- Operational level.

Refer to the Appendix for details regarding the previous analysis. The critical elements of the analysis included the following:

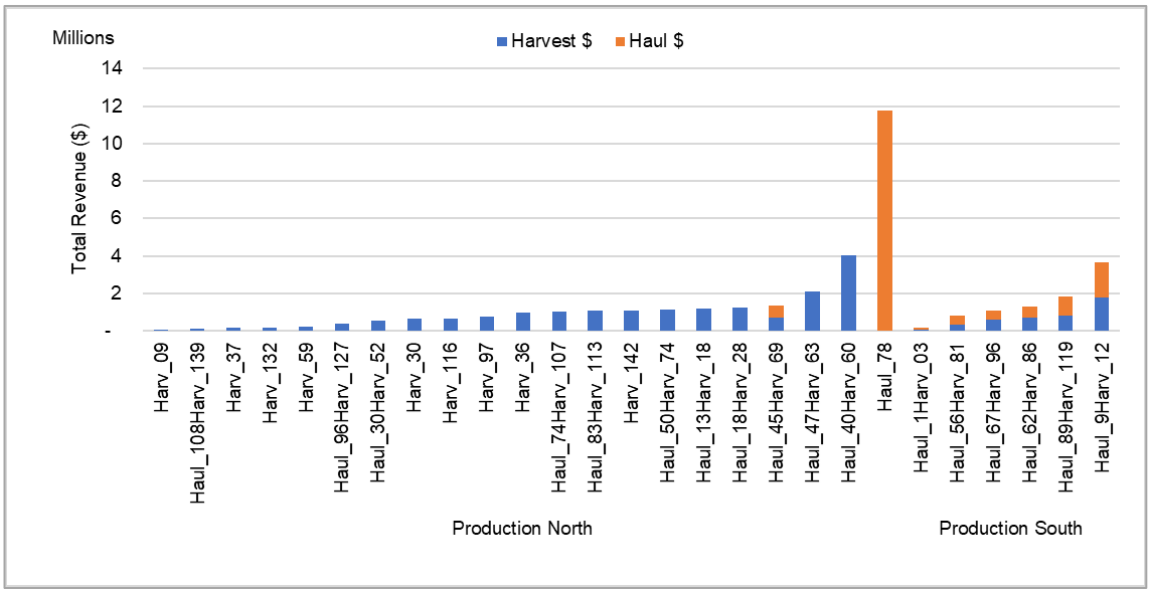
Enterprise Level Cost Drivers

Timber harvesting and log haulage companies across native forest operations in Australia are generally small to medium sized enterprises, often family based, and employing less than 20 staff. As can be seen from Figure 3-12, in the period 2019/20 – 2021/22, businesses providing harvesting and haulage services to FCNSW generally had total annual revenues less than $2M, with three having combined revenues less than $4M, with only one business generating combined revenue of close to $12M. This larger haulage entity was a consortium of several haulage service providers who contracted through a single enterprise.

This chart provides a general indication of the range of business sizes within the scope of the study, and indicates many of these businesses would be classified by the Australian Tax Office as being small businesses. The underlying reasons for this are discussed in more detail in 4.1. Also of note is of the twenty seven contract entities, only one provides specialist haulage services, with the larger transport operators within the consort commonly also actively involved in harvesting[12]. All operators in Production South undertake both harvest and haulage.

[12] Note that the haulage consortium comprises companies that also provide harvesting services.

Figure 3-12: FCNSW Harvest and Haul Contractor Revenue by Enterprise (FY2020-22)



Source: FCNSW

Given the business size profile, it would be reasonable to expect that operational support, management and administration costs would differ between organisations, with the larger entities offering a degree of economies of scale. There was insufficient data from other jurisdictions to contrast enterprises within FCNSW relative to elsewhere.

High level business cost drivers are tabled below. The study used this as a basis for comparing and contrasting enterprises within NSW and comparator regions.

Table 3-12: Level 1 – Enterprise Cost Drivers

Level 1 - Enterprise Level Cost Drivers		
Item	Measure	Consideration
Fixed capital (other than crew level)	$	Plant and equipment, infrastructure, business size
Working capital	$	Business size, payment terms, cashflow
Management and supervision	$ per year	Number of staff / crews, geographic spread, complexity
Administration	$ per year	Complexity
Total revenue	$ per year	

Crew Level Cost Drivers – Harvesting

At a crew or truck level, costs are attributed to capital, labour, repairs and fuel. The factors that will influence unit costs are table below.

Financing costs will vary depending upon equipment needs, contract terms and business risk.

Table 3-13: Crew Level Cost Drivers

Level 2 - Crew / Truck Level Cost Drivers		
Item	Measure	Consideration
Fixed capital	$	Machine requirements / specifications / contract terms (depreciation schedules)
Labour	$ per year	Level of mechanisation / labour market
Repairs and Maintenance	$ per year	Age of equipment, serviceability
Fuel	$ per year	
Work days per year	Days per year	Relocation, Wet Weather (Seasonal/ad hoc), planning delays, protests
Work hours per day	Hours per day	Travel
Annual production	tonnes	
Average price per tonne	$ per tonne	

Operational Cost Drivers – Harvesting

Site and market specific considerations heavily influence the underlying economics of felling, extraction, processing and loading. For example, average daily production (m^3 per day) can vary significantly between different locations as a result of access, topography, forest condition, forest treatment (see Appendix 4.4 for discussion on silviculture) and in particular the market availability for residues such as pulpwood. The following table describes the operational factors that have the greatest impact on productivity and thereby costs.

Table 3-14: Operational Factors Influencing Harvest Costs

Level 3 - Operational Cost Drivers (Harvesting)					
Function	Activities		Cost Driver		
	Primary	Secondary	Primary	Secondary	Non-productive time (NPT)
Harvesting	Falling	Travelling	Total Recoverable Volume per day	Distance (stems per ha)	Operator availability
		Falling and Heading		Trees per day	
				TRV per tree	
	Extraction	Grappling	Total Recoverable Volume per day	Utilisation level, payload / loads per day	Waiting for stock, operator availability
		Travelling (loaded)		Utilisation level, distance, terrain, speed	
		Travelling (unloaded)		Distance, terrain, speed	
	Processing (Log Making)	Trimming		Tree size / utilisation level	Waiting for stock
		Debarking			
		Log Making Analysis		Defect level, grading complexity	
		Log Making		Utilisation level, piece size, servicing requirements	
		Grading / marking		Grading complexity, marking, tagging requirements	
		Sorting and stacking		Sorting requirements, distance, room at dump	
	Loading	Sorting	Total Volume loaded per day	Sorting requirements, piece size	Waiting for stock
		Loading			Waiting for truck

Harvesting includes the following activities:

Felling - resources required for felling trees can be a single chainsaw operator (‘hand faller’), or a specialised machine. Productivity is primarily dependent upon forest conditions (terrain, understorey), and the amount of total recoverable volume (TRV).

Extraction of logs to a roadside landing is generally undertaken in eastern native forests in Australia with skidders. Productivity is directly related to log size, the average snigging distance required, and travel speed, which in turn is a function of ground conditions, terrain and slope in particular.

Processing - most hardwood logs in Australia are required to be debarked. This is followed by 'crosscutting' to generate logs from the main stem that are appropriate size and quality to meet a particular market segment, and are suitable for transport. Productivity is related to tree size, the complexity of grading, and the level of defect in the trees that require servicing.

For felling, extraction and processing, TRV per ha is the key driver of productivity. Low yielding sites, due to either or both few commercial trees or a limited number of smaller trees, require more trees to be felled, further distances for logs to be snigged, and will tend to consist of smaller trees therefore increasing the number of pieces required to be handled by each phase.

Loading is undertaken with wheeled or tracked loaders. The time taken to load a truck is related to the average log size, and the waiting time between trucks.

The productivity of each phase or activity is also related to non-productive time. Operations that maximise productivity through effective synchronisation of production phases tend to be the most efficient and cost competitive. Non-productive time resulting from fires, wet weather, relocation, operator travel time, and machine breakdown can also have profound impacts on productivity and thereby costs.

Truck Level Cost Drivers – Haulage

Haulage includes scheduling and despatch of trucks, travelling unloaded to the forest, loading of logs, strapping down of logs, transport to mill, and unloading (unloading usually performed by mill).

The following factors influence the total cost and unit costs within each jurisdiction.

Equipment – prime movers and log trailers. There has been an increasing demand for specialist equipment to improve health and safety outcomes for log transport. This includes trucks with appropriate guarding, measurement scales, and GPS capability, and trailers with measurement scales, road-friendly suspension, auto-load tensioning systems, electronic braking systems and a design to meet vehicle stability requirements.

The factors influencing haulage costs are listed in below.

Table 3-15: Operational Factors influencing Haulage Costs

Level 3 - Operational Cost Drivers (Haulage)					
Function	Activities		Cost Driver		
	Primary	Secondary	Primary	Secondary	Non-productive time
Haulage	Empty	Travelling empty	Volume x Distance per day	Payload	Waiting for loader
	Loading	Loading		Loaded running	Congestion at dump
		Strapping down		Total kms per day	Congestion at mill
	Loaded	Travelling loaded		Hours per day available	Driver hours - fatigue
		Unloading		Hours per day utilised (planned and unplanned NPT)	Whole load requirements (complete trips)

The key operational cost driver is the quantity transported daily. This is a function of distance, road condition, terrain, loading and unloading time, and payload.

Truck utilisation is dependent upon the non-productive time. This includes waiting to be loaded or unloaded, but can also include time where the truck is not utilised due to wet weather, or to constraints on drivers such as fatigue management restriction.

Efficiency gains can be made through effective scheduling whereby backloading or cross- loading occurs (loaded running). This fundamentally means that the distance a truck is loaded exceeds the unloaded distance, so that assuming all other things are equal, the truck is spending a higher proportion of the day moving logs and generating revenue to cover both fixed and operating costs.

3.5 Unit Cost Benchmarking Analysis – cost drivers

Previous benchmarking studies included an analysis of data and qualitative information that set out to identify the key components of costs that may assist with the comparison to other jurisdictions. The analysis considered drivers at the enterprise, crew and operational level for harvesting and haulage. The conclusion from the 2013-2016 Benchmarking Report was that:

Harvesting costs are related to number of factors, however the level of variation and uncertainty in predicting the variables constrains the potential to develop a definitive relationship between ***harvest cost*** *and* ***slope****,* ***yield*** *and* ***snig*** *distance. From the data provided…..yield per hectare is the parameter that varies most significantly within FCNSW's and across comparator operations, and provides the most significant source of rate variation. It is also the most readily available measure, being a value that forest growers generally track.*

These factors are described in Table 3-14 above and are classified as 'Operational Cost Drivers'.

With the exception of the two elements described below, no new conclusions have been drawn for this review, with operating conditions and business structures relatively unchanged since the initial benchmarking review was conducted. The operational cost drivers would have remained reasonably static across the review period with the exceptions related to the 2019/20 fires and subsequent wet weather events, which resulted in periodic severe disrupts to harvesting operations and log supply.

The inability to maintain harvesting operations over this period necessitated the FCNSW issuing of Force Majeure[13] notices under its wood supply agreements and harvest and haulage contracts. This prolonged period further required FCNSW to continue to have an increased reliance of supply originating from hardwood plantations and coastal regrowth forests. These events resulted in:

i. An upward pressure on costs would have arisen from significant unproductive time associated stand downs and relocations due to both fires and wet weather. Contractors could either not work at all at various times or were on reduced hours. This may not be apparent in actual harvest and haul rates during the review period being offset by other cost drivers such as increased operations in hardwood plantations. This impact may also arise as a lag between businesses being impacted by non-productive time and this being reflected in higher rates tendered through subsequent competitive processes or negotiated outcomes. Moreover, some of these costs would have been offset by harvesting the lower cost forests described next. Non-productive time is classified as a 'Crew Level Cost Driver' in Table 3-13 above.

ii. As discussed in Section 2.4, harvesting rates for any individual operation in Production North are designed to reflect the mix of terrain, snig distances and yields per hectare (i.e. Difficulty Class). Difficulty Classes are not evenly proportioned across the estate, with higher classes

[13] Force Majeure clauses in supply agreements provide for the parties' obligations to be suspended under conditions out of the control of either party

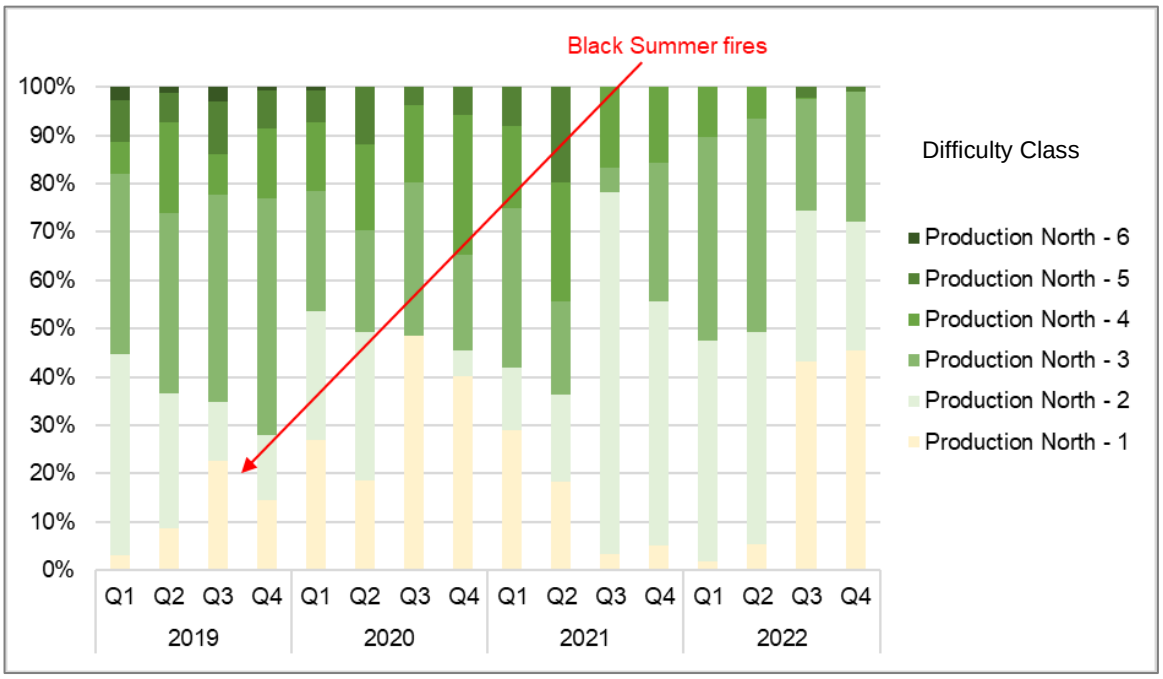
occupying a relatively lower portion of the estate. Subject to available equipment and suitable weather conditions, FCNSW would normally seek to ensure that the Difficulty Class areas harvested in any one year reflect the overall average proportions of each Difficulty Class to ensure harvest schedules are sustainable and that costs are evenly spread from year to year.

iii. Due to a range of factors including the Black Summer fires, wet weather and new environmental regulations, there has been a concentration of activities in coastal native forests and plantations. Coastal native forest areas available for harvesting in this period (i.e. less impacted by the fires, more resilient to operating in wet conditions) tended to be on the more productive sites with easier access over this period (i.e. lower Difficulty Class). This resulted in lower costs being incurred over the period.

Indufor note the availability of the lower cost areas are limited, and FCNSW have effectively reduced costs in the short term with corresponding increases to be expected in the following years, as the more difficult sites are required to be accessed in order to maintain supply.

Figure 3-13 demonstrates this impact. Prior to the 2019/20 Black Summer bushfires, a significant proportion of the harvested volume on the North Coast was from the higher Difficulty Classes (DCs, refer to Section 2.4), whereas early in 2020, and again following subsequent wet weather in 2022, no DC6, and only minimal DC4 and 5 areas were harvested.

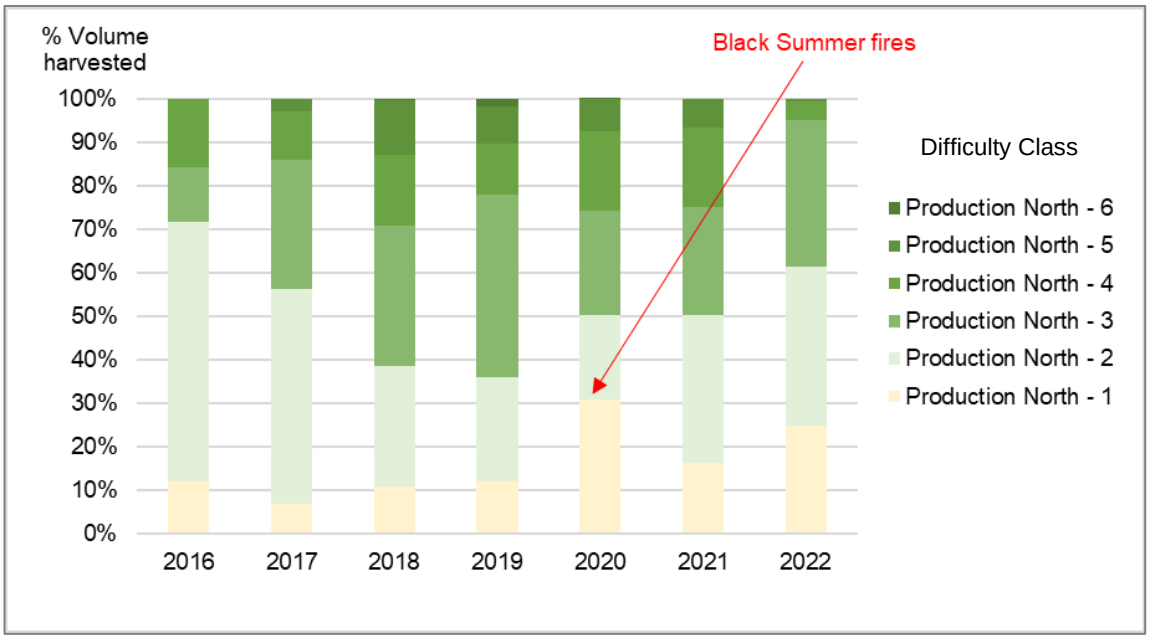
Figure 3-13: North Coast Harvest Volume by Difficulty Class (FY2019 – 2022)



Source: FCNSW

Figure 3-14 presents a longer-term trend with the DC1 and DC2 areas evidently greater in 2020 and 2022 compared to any other period since 2016.

Figure 3-14: North Coast Harvest Volume by Difficulty Class (FY2015 – 2022)



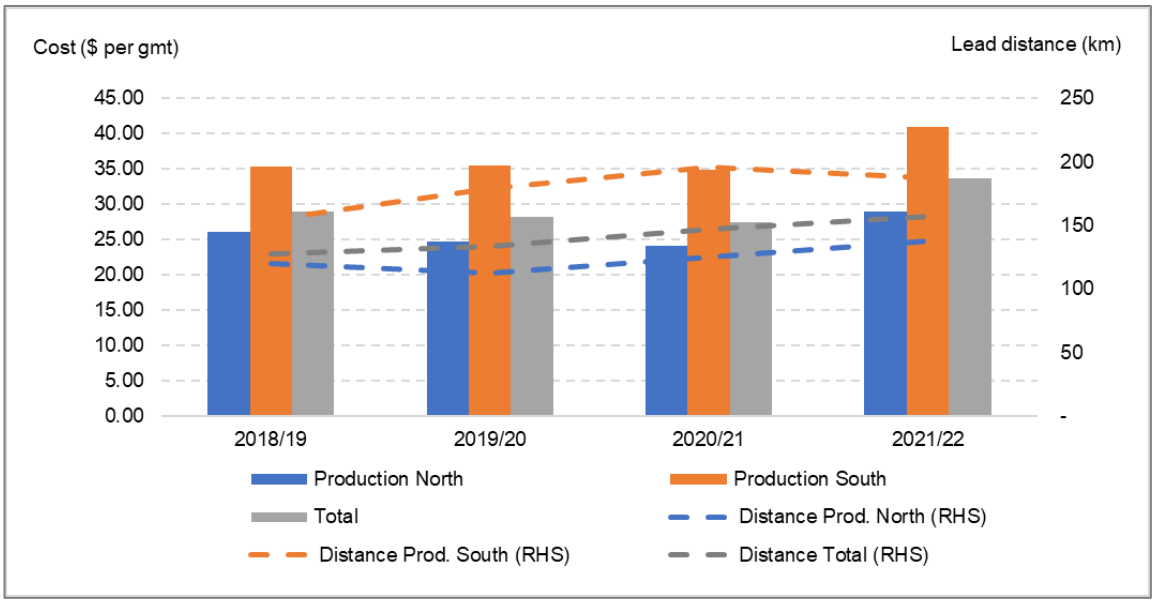
Source: FCNSW. Note that DC definitions changed in 2015 so there is little value in earlier comparisons

As described in Section 3.4 a key operational cost driver is the quantity transported daily and the impact on haulage costs. This is a function of distance, road condition, terrain, loading and unloading time, and payload.

Whilst haulage costs declined by 1.0% on a tonne per km basis, the actual delivered costs increased by 5%. This was due to the increased **distance** logs were transported in response to managing supply shortfalls and constraints imposed by fires and wet weather in terms of where harvesting occurred.

Figure 3-15 demonstrates this for each region, with average distances increasing by 23% in FY2022 compared to the previous review period (FY2019).

Figure 3-15: Average Haul Cost and Lead Distance by Region FY2019 - 2022



Source: FCNSW

In summary, whilst the general cost drivers have not substantially changed from previous benchmarking studies, the review period has been profoundly impacted by disrupting events – fires and wet weather. This has resulted in the short-term allocation of harvest areas that have actually been cheaper to harvest, however logs have had to be transported over longer distances, incurring higher haulage costs, to minimise the supply volume impacts to FCNSW customers arising from these events.

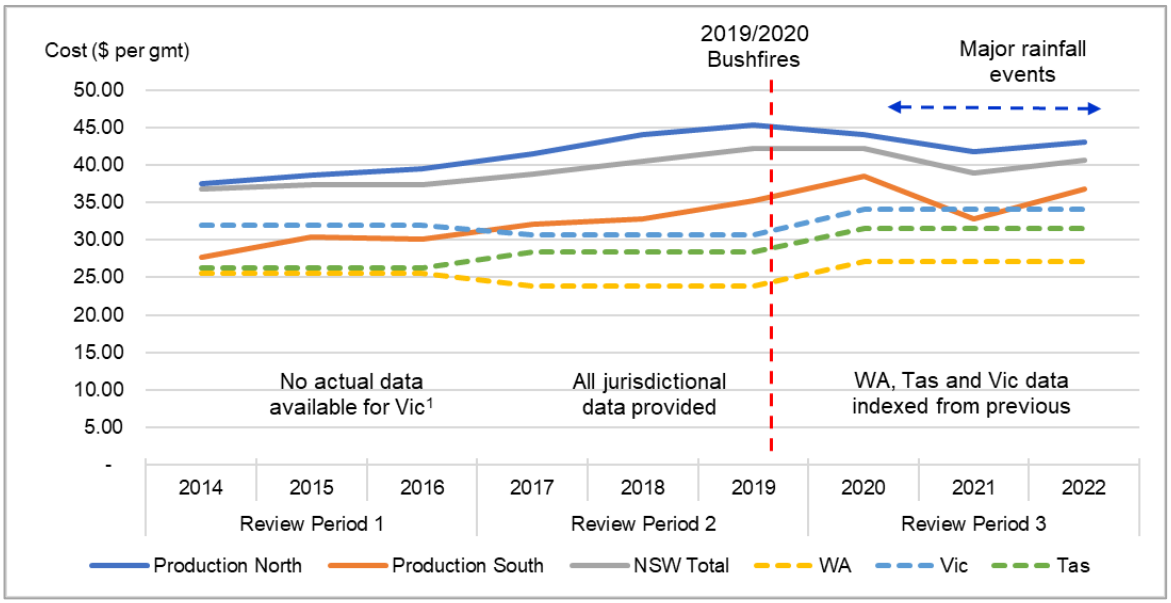
3.6 Long term analysis of harvest and haulage costs

The following analysis considers cost trends for harvesting and haulage over the period 2013/2014 to 2021/2022, covering the years subject to the previous and this benchmarking study.

Figure 3-16 illustrates the movement in average overall harvesting costs incurred by FCNSW customers over time since 2013/2014. This represents an average nominal increase of 1.2%, compared to an average increase in CPI of 2.2% over the same period. The decrease associated with harvesting lower cost sites immediately after the 2019/20 bushfires, and the subsequent wet weather events is also evident.

The comparison to jurisdictional data is also presented with an indication of how data was used from the comparator organisations.

Figure 3-16: Average Harvest Cost[2] by Region and Jurisdiction FY2014 - FY2022

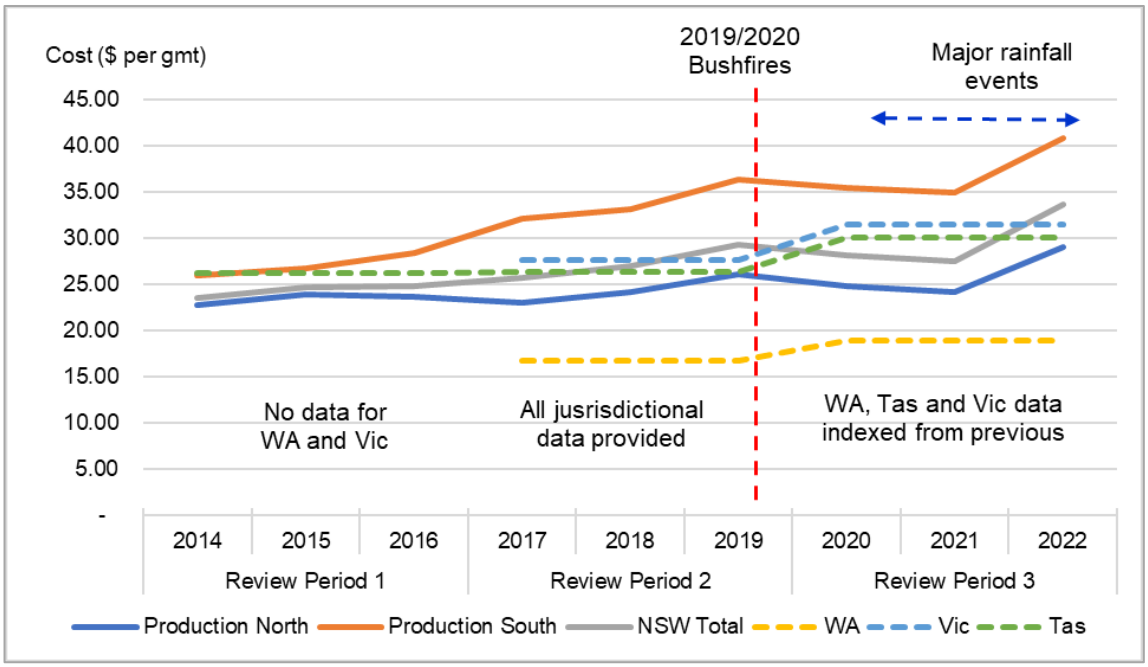


Note 1 – for the initial benchmarking review, Victorian harvest costs were estimated from a publicly available cost model

Note 2 – all costs presented as nominal

Haulage costs for the equivalent period are presented below in Figure 3-17 below. The significant increases particularly associated with the post-fire impact of longer transport distances is evident. This represents an average nominal increase of 5.0%, compared to an average increase in CPI of 2.2% over the same period.

Figure 3-17: Average Haulage Cost[1] by Region and Jurisdiction FY2014 - FY2022



Note 1 – all costs presented as nominal

The approach in determining unit costs for FCNSW over each of the 2013-2016, 2016-2019 and 2020-2022 Benchmarking Studies has not changed. In each case, the unit cost is simply calculated as the total cost for the population of transactions being considered per total volume (gmt).

3.7 Future Benchmarking Options

The analysis undertaken for the 2013-2016, 2016-2019 and 2020-2022 Benchmarking Studies has sought to identify factors within the FCNSW operating and commercial environment that are likely to impact harvest and haulage costs. Where possible, inter-jurisdictional data has been sought to provide an additional comparison of costs being incurred elsewhere for similar operations.

As discussed above, inter-jurisdictional data from public forests is increasingly difficult to obtain due to:

i. The native forest industry is in a high state of flux in Victoria and Western Australia, with the respective state governments adopting a policy to cease harvesting of public native forests.

ii. South Australia does not undertake native forest harvesting

iii. Queensland undertakes some native forest harvesting, but it is managed by the Department of Agriculture and Fisheries (DAF) on a 'stumpage basis[14]. Hence, all harvesting and haulage contracts are held by relatively small, disparate individual businesses. Previous attempts to obtain benchmarking cost data from private companies have not been successful.

[14] All contracts are held by Timber Permitees, with DAF receiving a 'stumpage' or royalty only

iv. It is anticipated Tasmania will continue to harvest native forests in the foreseeable future, and may provide the only substantial benchmarking data, notwithstanding the significant differences in operating conditions (refer to Appendix 4.4)

v. Operations conditions in native forests outside Australia are so significantly different in terms of terrain, seasonal conditions, species and product mix, regulatory conditions, health and safety requirements and business structures that they would be unlikely to offer a reasonable basis for comparison.

vi. Private native forests are harvested in Tasmania, NSW and Queensland. However, again, previous attempts to source commercially sensitive data for this exercise from private companies has not been fruitful to date.

Within this context, the following options may be considered for future benchmarking studies.

Option	Advantages	Disadvantages
1. Maintain the current approach using indexed data.	Maintains consistency between reviews. Data is readily available (from FCNSW), whilst existing inter-jurisdictional data can be indexed.	Any inherent gaps in the benchmarking data are not resolved. Significant changes to operating conditions must be quantified and ranked in terms of potential impacts.
2. Maintain current approach (through indexing available data and monitoring trends) but source alternative comparative data, such as from timber plantation operations.	Maintains some consistency, whilst broadens the benchmarking data sets to other timber harvesting activities in Australia. Data is readily available for plantation operations.	Direct comparisons need to be qualified in that plantation operations tend to be much more productive, consistent, less subject to regulatory constraints and generally simpler to manage.
3. Benchmark the efficiency of operations through further analysis of operational data involving regular independent assessments on harvest crews' productivity levels. For example, use temporal and spatial data from harvesting equipment and utilise truck despatch data in Production North to monitor productivity.	Data is largely already available. Would provide data across the broad operating conditions of FCNSW.	Would require a reasonable level of interrogative capacity and an understanding of the operational context of each dataset. Would not provide any comparative basis outside FCNSW operations, unless data was also sourced from comparable operations.

It is suggested that a combination of Option 2 and Option 3 provides the most readily available pathway for ensuring future benchmarking studies are performed consistently, whilst utilising available comparative data. Because of the differences in operating conditions, particularly between plantation and native forest operations in Australia, unit cost benchmarking should be supplemented by the collection and use of operational performance data to explore the reasonableness for any comparison.

4. MARKET POWER ASSESSMENT

The scope of this review includes consideration of the extent of any market power within local or regional markets for harvesting and haulage services. The key steps in the approach adopted for assessing market power were the following:

- *Market Description*
- *Market Power Assessment*
- *Cost Discovery Mechanisms*

4.1 Market Description

Defining the relevant market is key to considering the issue of market power as it provides the basis for isolating potential competition or market power issues and also potential constraints on market participants.

Section 2 of this report provided an overview of the native timber industry and supply chain in NSW. For the purposes of assessing the extent of any market power in the harvest and haulage component of this supply chain, we have focused on two market dimensions:

- *Product dimension* – what is typically meant by harvest and haulage services
- *Geographic dimension* – the area in which harvest and haulage services are provided.

4.1.1 Product Dimension

Harvest services

As discussed previously, harvest services comprise tree felling, extraction, log making and storage. In native timber operations, harvest operations typically include the loading onto trucks for transport to timber mills. Harvest operations are defined within FCNSW's standard Harvest Agreement with suppliers as meaning the following:

"Harvest Operations" means the felling of trees, servicing of trees into Log Products and Residue Products, extraction of trees or Log Products and Residue Products to Log Landings, segregation and stock piling of Log Products and Residue Products at Log Landings, and ancillary works including Loading Operations, track and Log Landing construction, and the moving of Equipment between Harvesting Units.

Haulage services

Haulage services relate to the transport of logs to timber mills. Haulage operations are defined within FCNSW's standard Haulage Agreement with suppliers as meaning the following:

"Haulage Operations" means transportation of Log Products from Harvesting Unit to a Product Destination.

Inclusion of hardwood plantations harvest and haulage services

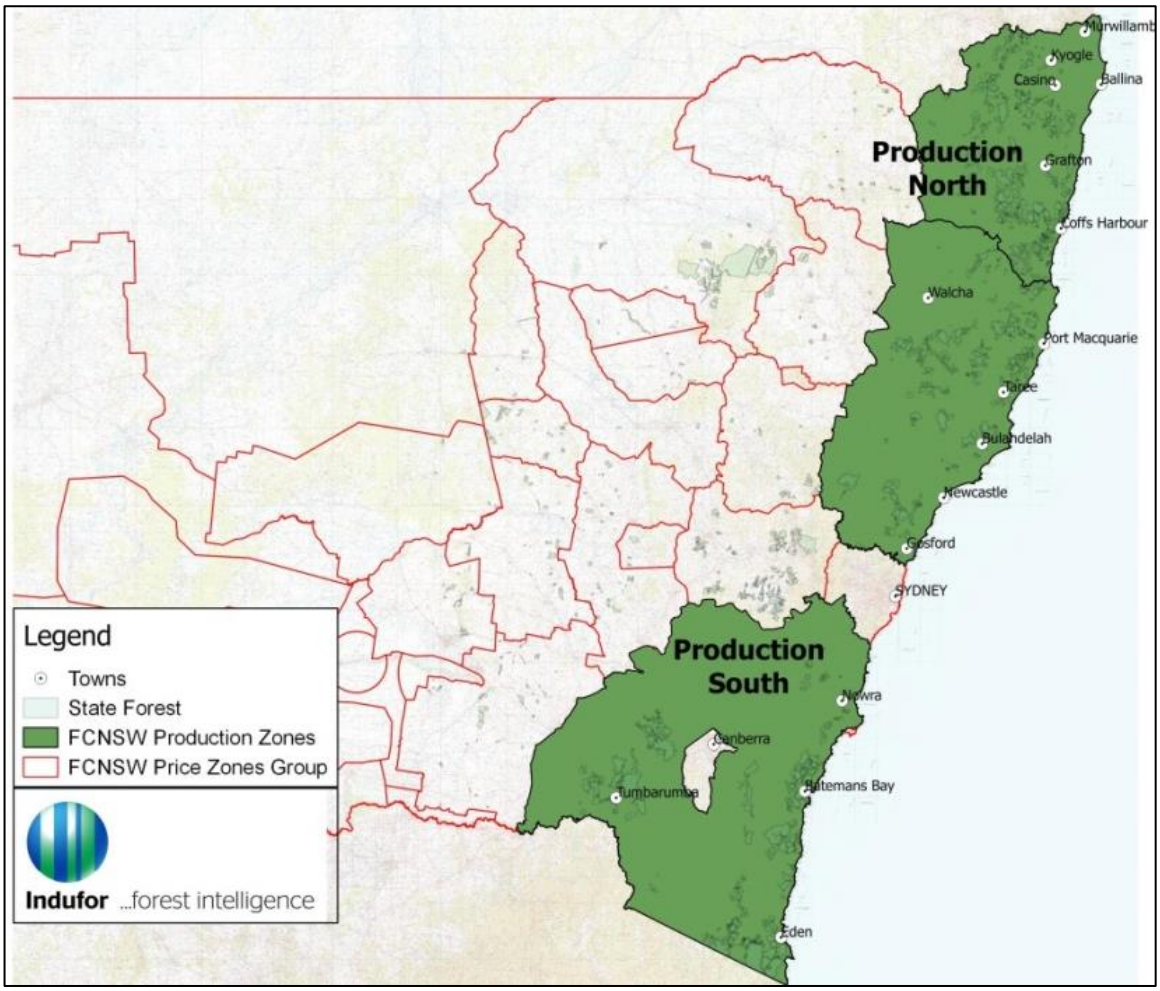
Hardwood plantation harvesting and haulage services have been included in this analysis (plantation harvesting was previously excluded). As discussed in Section 2, the review period was significantly impacted by both the Black Summer fires of 2019/20, and subsequent periods of wet weather and flooding. The harvest and haul service providers were transitioned by FCNSW between native forest and plantations during this period, more so than at any other time, in order to ensure customer log supply was maintained to the greatest extent feasibly possible. As a result, the services (for native forest and plantations) will be treated as a single market in each region for this review.

4.1.2 Geographic Dimension

A key factor in market definition is also defining the boundaries of the market and any geographic dimension to the market. As illustrated below, geography is a key factor in FCNSW's operational management structure for native timber production is based on two regional geographic zones:

- Production North – with annual production of around 460,000 m^3 per annum
- Production South – annual production of 150,000 m^3 on a mill door basis plus 260,000 m^3 stumpage.

Figure 4-1: FCNSW Regional Production Zones (Coastal only)



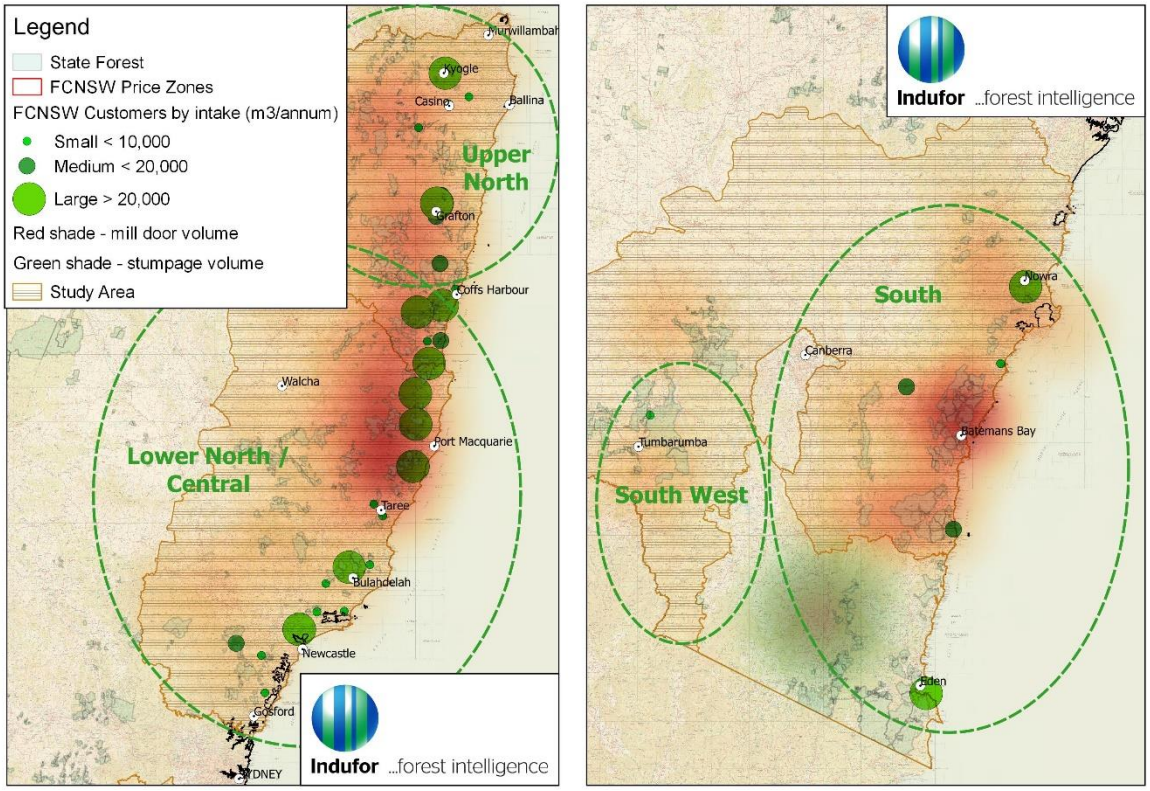
Source: FCNSW

As illustrated in Figure 4-2, FCNSW manages the provision of harvest and haulage services on the basis of four separate geographic areas (note these have been termed by the authors based on the market analysis and do not reflect FCNSW administrative units):

- Upper North;
- Lower North/Central;
- South (includes the market supplying services under stumpage arrangements); and

- South West.

Figure 4-2: Geographic Boundaries of Harvest and Haulage Services Market



Source: FCNSW. Note Eden MA has been excluded due to the predominance of Stumpage Sales, however the ANWE facility at Eden is a major customer for Mill Door Sales from the South Coast.

We understand that the determinants of these geographic boundaries are a result of the following:

- *Customer location* – proximity to native timber customers with an operational management target of product being harvested and transported from a location within ~200 km of the customer (timber mills), and /or the contractors' home base. Distance from customer drives haulage costs and the delivered price to FCNSW's native timber customers; and
- *Underlying business economics of harvest and haulage operators* – the economics and operational requirements of harvest and haulage operators both in terms of travel time for labour and also proximity to enable management oversight of operations.

4.1.3 Market Participants and Market Share

Based on the information provided by FCNSW for the period 2019/20 to 2021/22 the current participants (contractors) and market shares for each of the four geographic markets for harvest and haulage services are detailed in Table 4-1. The 'Alias' assigned to each entity is based on either a harvest only, haul only, or where they have conducted both harvest and haulage operations at some stage since 2003, a harvest and haul 'id' has been assigned.

Table 4-1: Market Share Analysis for Harvest and Haulage Services (all years FY2020-22)

Alias	Rev (%)	Rev ($)	Alias	Rev (%)	Rev ($)
Upper North - Harvest			**Upper North - Haul**		
Haul_40Harv_60	51%	11 788 591	Haul_78	88%	14 118 263
Haul_18Harv_28	16%	3 766 270	Haul_45Harv_68	12%	2 003 064
Haul_45Harv_68	9%	2 034 772			
Haul_30Harv_52	7%	1 595 384			
Harv_97	6%	1 338 432			
Haul_96Harv_127	5%	1 071 383			
Harv_59	3%	677 161			
Harv_37	2%	416 973			
Haul_108Harv_139	1%	324 662			
Total		23 009 552			16 107 402
Lower North / Central - Harvest			**Lower North / Central - Haul**		
Haul_47Harv_63	20%	6 275 966	Haul_78	100%	21 203 131
Haul_13Harv_18	11%	3 482 096			
Haul_50Harv_74	11%	3 406 080			
Harv_142	11%	3 290 589			
Haul_83Harv_113	10%	3 143 038			
Haul_74Harv_107	10%	2 986 820			
Harv_36	9%	2 855 885			
Harv_116	6%	1 903 882			
Harv_30	6%	1 863 757			
Harv_97	3%	869 050			
Harv_132	1%	431 817			
Haul_40Harv_60	1%	270 913			
Harv_09	0%	110 871			
Total		30 890 764			21 203 131
South - Harvest			**South - Haul**		
Haul_9Harv_12	35%	2 554 465	Haul_9Harv_12	30%	2 045 388
Haul_62Harv_86	29%	2 116 737	Haul_62Harv_86	26%	1 794 168
Haul_67Harv_96	24%	1 748 990	Haul_56Harv_81	22%	1 489 615
Haul_56Harv_81	12%	890 927	Haul_67Harv_96	22%	1 473 128
Total		7 311 120			6 802 299
South West - Harvest			**South West - Haul**		
Haul_9Harv_12	50%	2 718 271	Haul_9Harv_12	52%	3 675 154
Haul_89Harv_119	46%	2 467 005	Haul_89Harv_119	44%	3 060 614
Haul_1Harv_03	4%	216 660	Haul_1Harv_03	4%	270 826
Total		5 401 937			7 006 593

Source: FCNSW Note: Includes native and plantation service providers

A summary of the number of operators and vertically integrated operators (providing both harvest and haulage services) is outlined in Table 4-2 below.

Table 4-2: Harvest and Haul Contractor Numbers FY2020-2022

Number Contractors	Upper North*	Lower* North/Central	South	South West
Harvest only	8	13	0	0
Haulage only	1	1	0	0
Vertically integrated	2	0	4	3

*Includes 3 contractors that have formed a haulage consortium but are described here as being integrated with harvesting.

To assess longer term trends, a summary of the number of contractors including operators entering and exiting the market in the period 2010 to 2022 is outlined in Table 4-3 below. Note this relates to native forests and hardwood plantations.

Table 4-3: FCNSW Harvest and Haul Contractor Participation Trends FY2010-2022*

Number Contractors	Upper North	Lower North/Central	South	South West
Harvest - Total	28	26	21	5
Haulage - Total	13	11	25	6
Harvest - Entering	18	12	10	2
Harvest - Exiting	22	13	17	2
Haulage - Entering	5	2	15	2
Haulage - Exiting	11	10	21	3

Source: FCNSW. *Logic applied to this assessment - if a contractor harvested volume any year from 2010-2021, but not in 2022 they had 'exited' or if they harvested any volume 2011-2022 and none in 2010 they had 'entered'

Note – the pre-2019 contractor numbers have been adjusted from the previous report as the market has been calculated based on where timber has been harvested, rather than where it was assumed the contractor was based. As a result, contractors may participate in multiple markets – for example in both the Upper North and Lower North markets.

Noting that total harvest volume has declined by around 50% over this period, the number of contractors, and the market liquidity evident from the number of firms entering and exiting, illustrates that there is evidence of a degree of market competition for both harvest and haulage services across the four geographic markets for the period 2010 to 2022. This is further illustrated in Section 4.1.4 below.

4.1.4 Barriers to Entry

Harvest services

The harvest services market is characterised by predominantly a number of smaller geographically based operators. The current profile (by revenue and volume) of harvest operators across the four geographic markets for the three years comprised one large, five medium and 27 smaller businesses. A total of eight businesses provide both harvest and haulage services.

The barriers to entry into the harvest services market include the following:

- Equipment – specialised plant for felling, snigging and processing logs
- Labour – machine operators, chainsaw operators and ancillary staff
- Expertise – knowledge of environmental regulations, log and market specifications, and safety requirements
- Location – accessibility to forests for transport of equipment, labour and management oversight.

In terms of substitutability, whilst there is some evidence of harvesting service providers operating in both the native forests and plantation forests, to a large extent equipment and expertise are not readily interchangeable.

There is some evidence of capital mobility, with three contractors based in Tasmania and Victoria respectively securing harvest contracts in NSW in recent years. However this has been relatively limited and FCNSW have advised that whilst interest from interstate parties has occurred from time to time, rarely has this translated to a sustained presence in the NSW native forest sector market.

Haulage Services

The current profile (by revenue and volume) of haulage operators across the four geographic markets for the three years comprised one large (a consortium of 3 independent companies), 4 medium and 5 smaller businesses. A total of eight businesses provide both haulage and harvesting services.

The barriers to entry into the haulage services market include the following:

- Equipment – prime movers and log trailers
- Labour – truck drivers and ancillary staff
- Knowledge and expertise
- Location – accessibility to forests for transport of equipment, labour and management oversight.

In terms of substitutability, prime movers can be deployed to a limited number of non-forest sector users but while some trailers can be utilised for plantation logs, most trailers used in native timber haulage are designed specifically for native timber logs.

4.2 Market Power Assessment

The analysis outlined in Section 4.1 above indicates that the market for both harvest and haul are competitive based on the analysis of the number of active operators providing services in the geographic markets identified. Evidence of a competitive environment is also supported by the analysis of the contractor number trends including entry and exit over the previous 13 years detailed in Table 4-3 above.

Whilst the activity and trend data indicate the harvest and haulage services markets are contestable, to consider whether there may be market power within local or regional markets for harvest and haul services we have taken into account the following:

- The trends in market concentration for the provision of both harvest and haulage services in the identified geographic markets
- The current market structure and basis on which harvest and haulage services are procured by FCNSW
- Pricing for harvest and haulages services over the three-year period.

4.2.1 Trends in Market Concentration

Data provided by FCNSW provided the basis for tracking the trends in contractor market shares over the last 13 years. This provides a basis for identifying whether there may be any indication of market power within the four geographic markets based on changes to harvest and haulage contractor market share.

Harvest contractor market share trends

Based on data provided by FCNSW, the market share trends for native forest harvest contract services over the past 12 years is provided in Table 4-4 below. Note the colour shading indicates high (dark green) and low (yellow / white) market share.

Table 4-4: Harvest Contractor Market Share Trends FY2010-FY2022

Alias	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Upper North													
Haul_40Harv_60	33%	37%	41%	46%	50%	51%	51%	50%	51%	43%	48%	49%	58%
Haul_18Harv_28	28%	26%	20%	15%	12%	12%	12%	10%	11%	11%	13%	15%	22%
Haul_5Harv_05	4%	5%	4%	8%	9%	9%	8%	9%	10%	5%	0%	0%	0%
Harv_97	0%	0%	3%	6%	8%	8%	6%	5%	8%	6%	8%	8%	0%
Harv_37	0%	0%	4%	5%	5%	6%	8%	7%	6%	6%	4%	0%	0%
Haul_45Harv_69	0%	0%	0%	0%	0%	0%	0%	0%	4%	14%	8%	13%	6%
Harv_41	0%	0%	0%	3%	8%	9%	8%	9%	4%	0%	0%	0%	0%
Haul_108Harv_139	0%	0%	0%	1%	4%	5%	6%	5%	5%	3%	3%	0%	0%
Haul_96Harv_127	0%	0%	2%	2%	0%	0%	0%	0%	1%	8%	4%	0%	11%
Harv_94	13%	11%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_70	7%	8%	5%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_30Harv_52	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	9%	9%	1%
Harv_98	4%	6%	5%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_59	3%	1%	0%	0%	0%	0%	0%	1%	0%	0%	3%	5%	1%
Harv_32	0%	0%	2%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_91	0%	2%	4%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_85	0%	3%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_15	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_47Harv_63	0%	0%	0%	0%	0%	0%	2%	1%	2%	1%	0%	0%	0%
Haul_61Harv_84	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_142	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Harv_42	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_36Harv_56	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_72	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_126	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_10	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_103Harv_135	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_34	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lower North / Central													
Haul_47Harv_63	21%	20%	18%	20%	22%	24%	22%	24%	25%	24%	21%	20%	20%
Haul_13Harv_18	20%	19%	16%	18%	9%	14%	14%	11%	14%	14%	13%	11%	10%

Alias	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Haul_74Harv_107	18%	17%	16%	12%	14%	14%	14%	10%	11%	12%	10%	9%	10%
Haul_50Harv_74	11%	9%	10%	10%	11%	11%	10%	12%	11%	9%	10%	14%	10%
Harv_142	8%	9%	8%	7%	9%	9%	11%	11%	11%	10%	10%	12%	10%
Haul_83Harv_113	0%	0%	3%	7%	10%	13%	11%	11%	9%	10%	11%	10%	9%
Harv_36	0%	2%	3%	4%	5%	6%	9%	9%	8%	8%	10%	8%	9%
Harv_30	1%	2%	2%	2%	4%	3%	3%	5%	5%	4%	6%	6%	7%
Harv_67	7%	7%	6%	7%	8%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_116	0%	0%	0%	0%	0%	0%	0%	2%	6%	8%	8%	9%	2%
Harv_01	4%	3%	3%	4%	5%	5%	5%	2%	0%	0%	0%	0%	0%
Harv_91	4%	4%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_132	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%
Harv_97	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	1%	7%
Haul_68Harv_99	0%	0%	4%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_90	3%	2%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_43Harv_64	0%	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_77	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_134	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_40Harv_60	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	2%
Harv_43	0%	0%	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_96Harv_127	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_128	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_09	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Haul_52Harv_75	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_136	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South													
Haul_62Harv_86	1%	18%	22%	21%	26%	26%	31%	32%	30%	31%	32%	13%	31%
Haul_9Harv_12	0%	0%	11%	15%	22%	23%	25%	29%	36%	37%	41%	41%	25%
Haul_67Harv_96	11%	11%	10%	9%	11%	11%	17%	20%	20%	18%	16%	46%	26%
Haul_53Harv_76	12%	14%	13%	14%	15%	11%	11%	6%	0%	0%	0%	0%	0%
Haul_98Harv_129	15%	12%	13%	12%	14%	8%	0%	0%	0%	0%	0%	0%	0%
Haul_56Harv_81	0%	0%	0%	0%	0%	0%	0%	13%	13%	14%	12%	0%	17%
Haul_15Harv_22	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_103	0%	1%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_35	4%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_71Harv_101	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_82	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Haul_110Harv_140	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_92	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_67Harv_96	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_25	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harv_55	1%	18%	22%	21%	26%	26%	31%	32%	30%	31%	32%	13%	31%
Haul_43Harv_64	0%	0%	11%	15%	22%	23%	25%	29%	36%	37%	41%	41%	25%
Haul_72Harv_102	11%	11%	10%	9%	11%	11%	17%	20%	20%	18%	16%	46%	26%

Alias	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Haul_111Harv_141	12%	14%	13%	14%	15%	11%	11%	6%	0%	0%	0%	0%	0%
Haul_21Harv_38	15%	12%	13%	12%	14%	8%	0%	0%	0%	0%	0%	0%	0%
Harv_93	0%	0%	0%	0%	0%	0%	0%	13%	13%	14%	12%	0%	17%
South West													
Haul_89Harv_119	33%	40%	100%	100%	100%	100%	100%	100%	100%	85%	71%	58%	28%
Haul_9Harv_12	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%	29%	42%	64%
Haul_71Harv_101	48%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_1Harv_03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Haul_53Harv_76	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: FCNSW

Where the markets are closely related, as is the case for Upper North and Lower North / Central, contractors operate across both markets as is evident in this table.

Based on the data provided by FCNSW, and recognising that harvested volume has declined over this period by around 50%, it appears that the market share captured by contractors providing harvest services continues to move over time indicating a degree of competition operating within the service markets, with the possible exception noted below.

In the Upper North market, a continuing trend has been the concentration of the market through the rising market share of the largest operator, who has recently undertaken up to 58% of the contract harvesting in the market. It is relevant to explore what has driven this competitive position relative to other contractors in Upper North market (and the combined markets as a whole). We understand from FCNSW that the factors driving this market position include the following:

- This has been a long standing family based business who has been vertically integrated at times into harvesting and haulage
- With the firm having demonstrated an ongoing high level of expertise in native forests harvesting and haulage, the firm have been competitive on price but also highly flexible in terms of location, large working circle and backup equipment and surge capacity
- Finally, FCNSW have provided evidence[15] that the firm has a proven track record of meeting production targets and other non-price criteria.

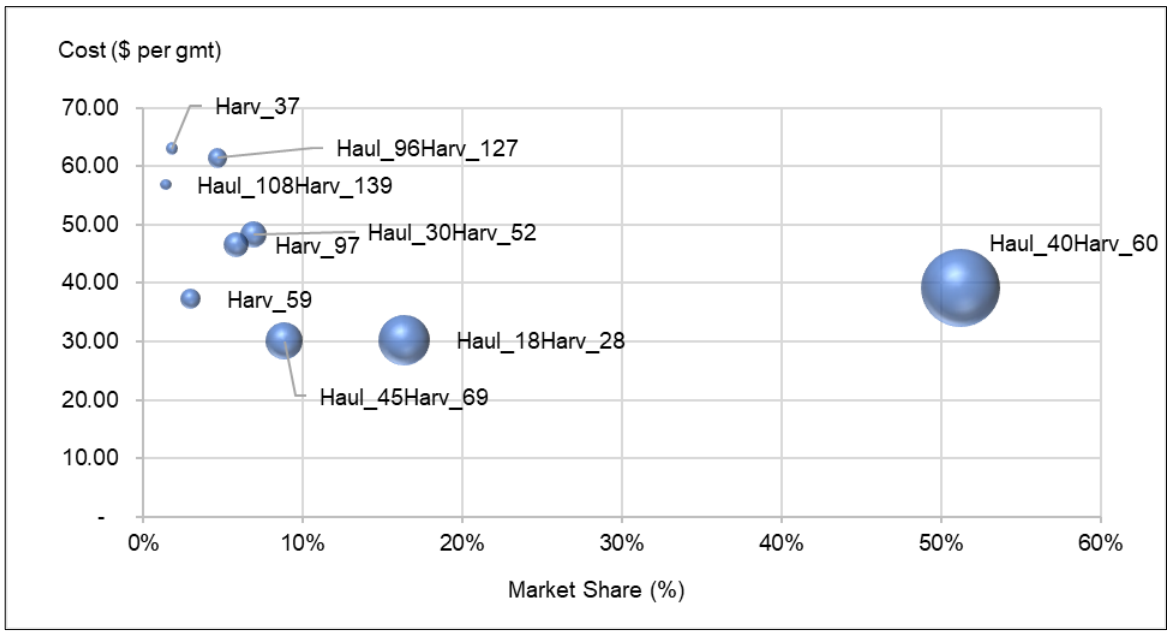
However, whilst this level of market concentration remains high, FCNSW will continue to be exposed to potential cost increases and harvesting capacity impacts if this entity were to either withdraw or reduce the levels of service offered.

For the review period, the average unit cost for each contractor has been analysed in terms of the market share held by the firms in the areas where market share is more concentrated (Upper North and Lower North). Figure 4-3: below demonstrates that for the Upper North, despite the large market share held by a single firm, the average rates for this entity sit well below the majority of entities with smaller share. This suggests that that the larger firm generally tends to have a cost competitive advantage, rather than leveraging their market share to obtain above market rates.

Note that all costs in the following analysis reflect combined native forest and hardwood plantation operation during the review period.

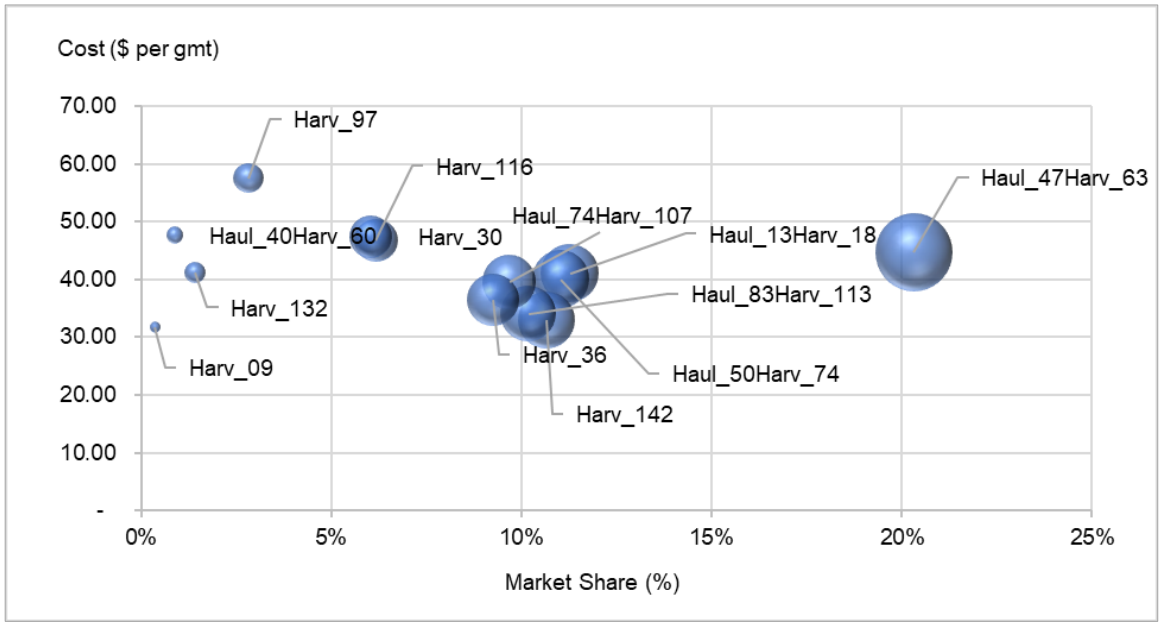
[15] Includes '*COMPANY' KPIs F19-F23.xls* – demonstrating an average performance score of 95.9% encompassing production, safety and environmental factors

Figure 4-3: Average Harvest Cost by Market Share by Contractor (FY2020-22) – Upper North



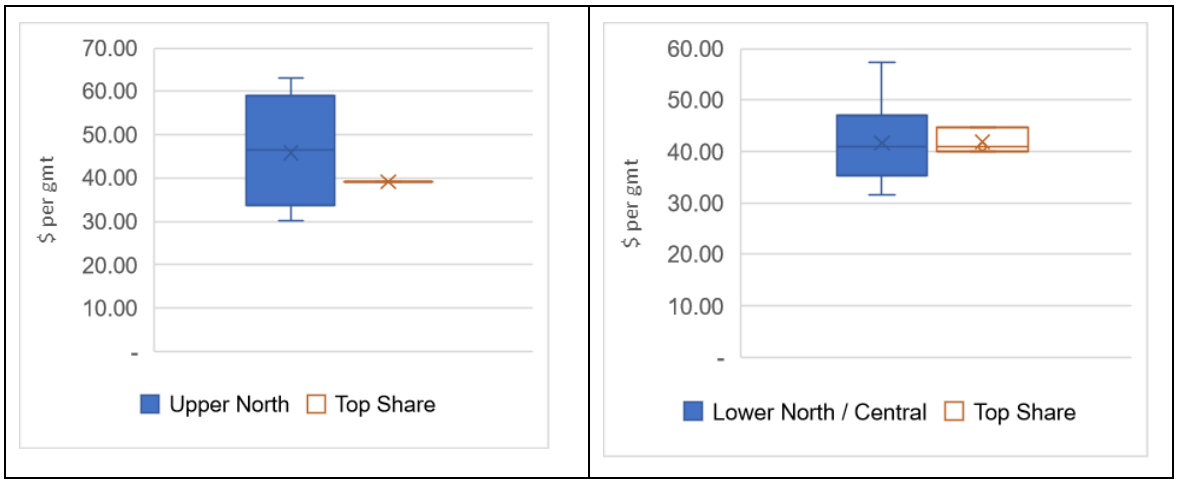
For the Lower North (Figure 4-4) the spread of the market share is more even, while the larger players' average costs sit within the range of all the firms involved.

Figure 4-4: Average Harvest Cost by Market Share by Contractor (FY2020-22) – Lower North



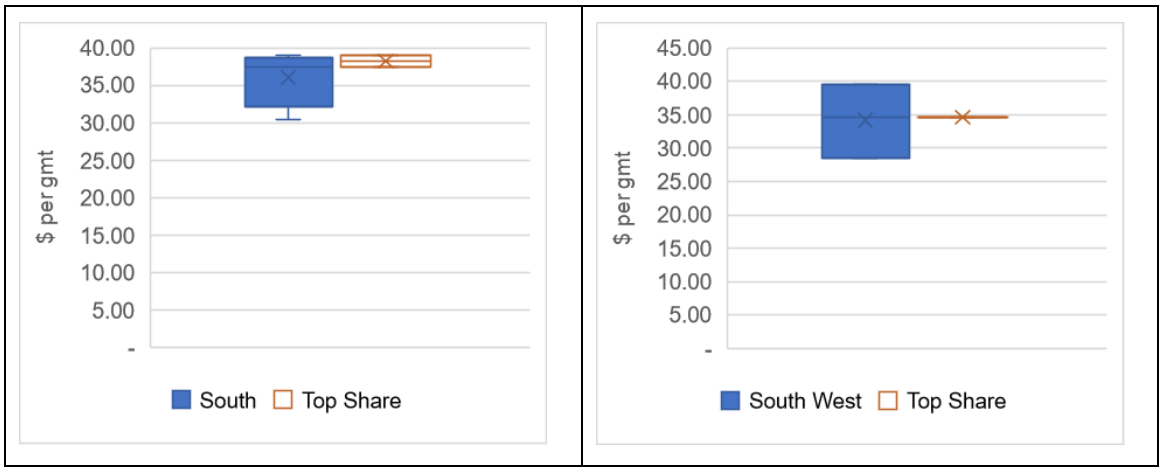
The analysis below (Figure 4-5) provides further evidence that the market share held by a single entity in the Upper North is not necessarily placing upward pressure on unit costs, with that entity in the lower quartile of average unit costs in the market. In the Lower North, there is a narrower spread of rates, with the three contractors holding the largest market share within the 3rd quartile.

Figure 4-5: Box-plot Analysis of Market Share Impact on Harvest Costs (Production North)



In the South (Figure 4-6), the largest market share is in the upper quartile of unit costs, however there is a relatively narrow spread, with only 4 entities within the analysis. In the South West, the analysis is limited with only two entities generating meaningful average costs within the review period.

Figure 4-6: Box-plot Analysis of Market Share Impact on Harvest Costs (Production South)



Given the relatively small market, few entities and spread of costs, there is no evidence that market concentration is putting upward pressure on costs to date.

Haulage contractor market share trends

Based on data provided by FCNSW, the market share trends for native forest haulage contract services over the past 12 years is provided in Table 4-5 below.

Table 4-5: Haulage Contractor Market Share Trends FY2010-FY2022

Alias	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Upper North													
Haul_78	0%	0%	0%	0%	0%	0%	32%	100%	90%	76%	85%	86%	93%
Haul_40Harv_60	58%	57%	60%	66%	68%	65%	44%	0%	0%	0%	0%	0%	0%
Haul_18Harv_28	35%	34%	29%	23%	21%	21%	17%	0%	0%	0%	0%	0%	0%
Haul_45Harv_68	0%	0%	0%	0%	0%	0%	0%	0%	10%	24%	15%	14%	7%
Haul_5Harv_05	3%	3%	3%	7%	6%	8%	4%	0%	0%	0%	0%	0%	0%
Haul_94	3%	4%	5%	3%	5%	5%	2%	0%	0%	0%	0%	0%	0%
Haul_61Harv_84	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_50Harv_74	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_74Harv_107	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Haul_36Harv_56	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_13Harv_18	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_30Harv_52	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_103Harv_135	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lower North / Central													
Haul_78	0%	0%	0%	0%	0%	0%	30%	100%	100%	100%	100%	100%	100%
Haul_13Harv_18	13%	44%	39%	42%	37%	40%	26%	0%	0%	0%	0%	0%	0%
Haul_74Harv_107	0%	34%	33%	35%	45%	40%	29%	0%	0%	0%	0%	0%	0%
Haul_50Harv_74	2%	16%	16%	17%	17%	18%	13%	0%	0%	0%	0%	0%	0%
Haul_68Harv_99	3%	2%	8%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_40Harv_60	2%	2%	2%	2%	1%	2%	2%	0%	0%	0%	0%	0%	0%
Haul_47Harv_63	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_96Harv_127	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_18Harv_28	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Haul_52Harv_75	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South													
Haul_15Harv_22	25%	32%	36%	36%	41%	42%	23%	0%	0%	0%	0%	0%	0%
Haul_67Harv_96	21%	11%	7%	10%	15%	16%	19%	20%	19%	18%	17%	40%	22%
Haul_9Harv_12	0%	0%	0%	0%	0%	0%	12%	24%	34%	34%	34%	37%	22%
Haul_62Harv_86	0%	0%	0%	0%	0%	0%	13%	33%	26%	27%	28%	14%	28%
Haul_60	17%	22%	21%	25%	24%	16%	18%	10%	0%	0%	0%	0%	0%
Haul_56Harv_81	0%	0%	0%	0%	0%	0%	0%	13%	22%	21%	21%	9%	28%
Haul_85	15%	14%	17%	10%	14%	20%	14%	0%	0%	0%	0%	0%	0%
Haul_71Harv_101	8%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_27	5%	4%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_37	0%	0%	0%	3%	6%	6%	2%	0%	0%	0%	0%	0%	0%
Haul_8	0%	0%	5%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_20	1%	3%	3%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_16	4%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_87	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Alias	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Haul_110Harv_140	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_7	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_43Harv_64	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_72Harv_102	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_28Harv_49	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_104	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_21Harv_38	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_111Harv_141	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_33	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_106Harv_138	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_97	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South West													
Haul_89Harv_119	32%	39%	100%	100%	100%	100%	100%	100%	100%	81%	69%	56%	26%
Haul_9Harv_12	0%	0%	0%	0%	0%	0%	0%	0%	0%	19%	31%	44%	66%
Haul_71Harv_101	53%	61%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_1Harv_03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Haul_60	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Haul_15Harv_22	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: FCNSW

Comment on market share trends for haulage contractors

Again, recognising that the volume hauled over this period has declined by around 50%, it does appear that the market share captured by contractors providing haulage services have moved over time indicating a degree of competition across all markets, with the obvious exception being the consortium ('Haul_78') in the Upper North and Lower North / Central Markets.

The consortium, established in 2016 was comprised of incumbent haulage contractors. The consortium setup resulted from a direct negotiation between FCNSW and these contractors. The driver for this direct negotiation process was the high level of tendered prices for the Upper and Lower North market in the 2015 tender process, and that the consortium was able to provide more competitive pricing for haulage services in this market. A review of this operation was completed in 2018 and indicated that savings had been made that would be shared between FCNSW and the customers.

The introduction of the consortium also brought with it the establishment of a centralised despatch operation. This works to improve the efficiency of the fleet through a dedicated scheduling team directing trucks so as to maximise both loaded kilometres and minimise unproductive time, using real time truck GPS and log stock information. Each truck is tracked and productivity metrics closely monitored.

Post this review period, Indufor understands that FCNSW report re-tendering the haulage services for the North Coast, which has resulted in a more diverse allocation of work across multiple businesses. Furthermore, the centralised despatch operation that underpinned the efficiencies achieved through the haulage consortium has been brought in-house (rather than the consortium manage the despatch operation it has been brought directly under FCNSW control).

This has provided a greater level of transparency to FCNSW, and an improved knowledge of the tasks, and associated costs. FCNSW believe this will enable them to provide better packaging of work in the future, that could assist with driving further efficiencies and cost reduction. As an example, understanding where trucks are based, and their capacity to undertake particular haulage tasks can help FCNSW tailor a work package that can be best suited to that truck, or trucking fleet.

4.2.2 Influence of Market Structure

The structure of the market for harvest and haulage services is highly relevant for considering the extent to which there may be market power issues in local or regional markets for harvest and haulage. As previously discussed in Section 3, there are structural features of the harvest and haulage market that are relevant for considering the issue of market power in the harvest and haulage market, these are:

- The role of FCNSW as the dominant purchaser of harvest and haulage services
- The countervailing power from FCNSW's timber customers in respect of the potential to negotiate regarding the capacity to pay for log supply.

These features are considered below.

4.2.3 FCNSW's Procurement Strategy

FCNSW procurement strategy has evolved over time, adapting to changing markets, service requirements, probity constraints and the corporate operating environment. Since transitioning from a GTE to State Owned Corporation in 2013, there has been a stronger commercial oversight and a more flexible approach to procurement, whilst still being subject to ICAC Guidelines.

Because of the extremely wide variation in operating conditions and hence productivity, for a period of time FCNSW chose to work with operators to manage the risk of volatile productivity levels, calling for bids based on a crew day rate (CDR) – that is, a rate for the supply and maintenance of labour and equipment on a daily basis. Tenders on Sample Compartments stated CDR and Daily Production Rates (DPR) and from there, prior to commencing each harvesting area, the contractor and FCNSW would estimate the daily production rate to then derive an individual harvest rate for that area.

Whilst this process achieved one objective in terms of improving the understanding of productivity and pricing, and deriving a rate appropriate for a specific circumstance, from a price setting perspective there were shortcomings in that bidders, particularly from outside the industry, did not have a strong understanding of productivity drivers and the sample harvest areas were not described accurately in all cases. This led to a time consuming and complex process to establish rates for individual areas.

FCNSW has since returned to open tenders for unit pricing. Where response is limited, FCNSW engage with direct negotiations with prospective service providers.

FCNSW procurement policy enables direct negotiations after considering the following:

- Are existing contractors performing to contract requirements?
- Has the supply base in the market substantially changed?
- Has the technology employed substantially changed?
- Does the supplier costs remain competitive?

During the review period there was limited market-based processes concluded due to the disruptions from the 2019/20 fires and the impact on long term supply, and the capacity for FCNSW being able to confidently offer certainty in long term supply levels. Most of the tenders conducted through 2022 have translated to new contracts, finalised through 2022/2023, outside the review period.

In summary, FCNSW procurement strategy needs to address an increasing complexity of the operating environment (regulatory, nature of resource and risk), and in what is in essence a managed market[16] and balance the appropriate allocation of risk between FCNSW and the suppliers, a constrained market for services, whilst ensuring there is sufficient competitive tension to achieve cost competitive prices. FCNSW believe this is achieved through working closely with suppliers in managing risks, whilst ensuring there is sufficient competitive tension in periodic market based processes.

It is expected that future contracts will be awarded through a combination of market exploration via tenders and expressions of interest, and direct negotiations where required in order to contain costs.

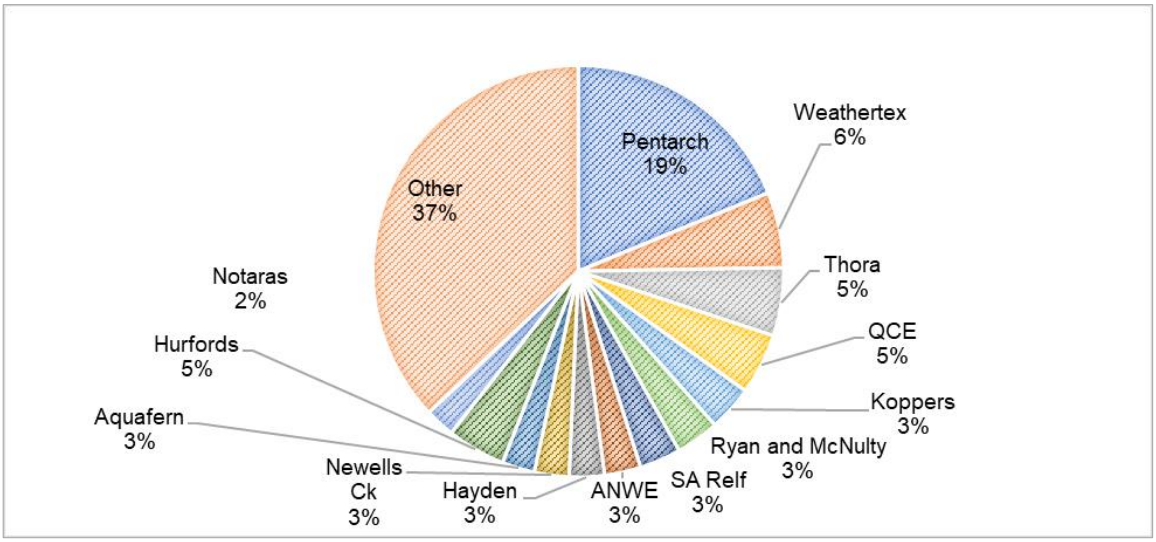
4.3 Countervailing Power of FCNSW's Timber Customers

As detailed in Figure 4-7 below, FCNSW's native timber customers include a number of larger businesses, with Pentarch receiving over 19% of logs by volume from FCNSW forests (excluding stumpage operations) over the 3-year review period. Note that the majority of ANWE volume is harvested on a 'stumpage' basis and is thus subject to a different market dynamic - in that ANWE have direct commercial relationships with the harvest and haul contractors. It should also be noted that ANWE is a subsidiary of Pentarch.

Due to the acquisition of Boral Ltd timber assets by Pentarch Group in 2021, some consolidation of FCNSW customer base has occurred during the review period.

[16] There is effectively one party procuring services (FCNSW) and are relatively few participants, in that they have dealings with a single entity in the dominant form of FCNSW. In addition there is a reasonable level of mutual insight into the other parties' business operations, and there tends to be a degree of cooperation between FCNSW and the suppliers in terms of managing supply risks to the FCNSW customer base.

Figure 4-7: FCNSW Customer Allocation (Top 20, FY2020-23, excludes stumpage sales)



Source: FCNSW. Note: Pentarch Group acquired Boral Ltd timbers assets in 2021.

As discussed previously, FCNSW's supply agreements with its native timber customers provide for dispute over the level of harvest and haulage prices. As harvest and haulage costs are estimated to comprise approximately 58% of the delivered price of native timber, the overall level of harvest and haulage costs significantly impact commercial outcomes both for FCNSW and its log customers. FCNSW's customers have a degree of countervailing power through contractual recourse in relation to harvest and haul costs if they consider the pass through costs for harvest and haulage are not reasonable in respect to the contracted arrangements.

In addition, over 50% of the log volume sold by FCNSW annually is under a mill door price arrangement (refer to Section 2.4) - where FCNSW negotiate a mill door price, and stumpage movements and delivery cost adjustments are generally combined. FCNSW absorb the risk of costs either being higher or lower than anticipated, and then derive a residual stumpage based on the mill door price, less contract costs. Therefore, there is a market incentive on FCNSW to minimise harvest and haul costs and thereby maximise residual stumpage.

4.4 Pricing Outcomes

Another potential indicator of the extent of any market power in local or regional markets for harvest and haulage are pricing outcomes.

Table 4-6 below details the average unit prices that have been paid by FCNSW for harvest contracts over the three year period covered by this review for each market. As discussed in Section 3.3, overall harvesting rates have been kept below the range that the changes to CPI and fuel may have been expected. Whilst there are differences in unit cost increases between the identified markets, there is no evidence to suggest this is due to local market power influences. From the data available, it is more likely to be a consequence of changes in operating conditions within each market.

Table 4-6: Rate of Change – FCNSW Harvest Unit Costs by Market

Harvest Cost ($ per gmt)					
Market	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Upper North	49.63	49.07	42.64	46.11	-2.4%
Lower North / Central	42.31	41.86	41.21	41.76	-0.4%
South	36.88	41.30	37.51	41.64	4.1%
South-west	29.47	30.73	30.39	32.95	3.8%

Source: FCNSW

Note: In this analysis only native forest harvesting costs have been included

Table 4-7 below details the average unit prices that have been paid by FCNSW for haulage contracts over the three year period covered by this review. As discussed in Section 3.3, these increases are broadly in line with changes in CPI and fuel. Whilst there are differences between the markets, these can be largely explained in the impact of transport distances changing over the review period. There is no evidence to suggest market power of any entity is unduly influencing these outcomes.

Table 4-7: Rate of Change – FCNSW Haulage Unit Costs by Market

Haulage Cost ($ per gmt)					
Market	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Upper North	25.25	24.59	24.62	24.06	-1.6%
Lower North / Central	26.60	24.86	23.91	31.05	5.3%
South	35.36	33.93	28.60	36.89	1.4%
South-west	35.11	39.38	38.16	44.20	8.0%

Source: FCNSW

Note: In this analysis only native forest haulage costs have been included

It was not within scope of the study to compare longer term trends and therefore the impact of market power on pricing outcomes over a longer period of time.

4.5 Efficiency of Cost Discovery Mechanisms

FCNSW has developed different approaches to the market to adapt to changing conditions, technological change and to encourage new investment, with the following procurement processes since 2006. This period is considered relevant to the study period as the prices paid for services from FY2020-22 resulted from both older contracts won via tender, contracts rolled over or negotiated, or new contracts awarded during the study period.

Prices paid during the study period were a combination of open tender results and direct negotiations arising from the processes described below (Table 4-8).

Table 4-8: Timeline of Procurement Processes

Period	Procurement action / process
Pre-review period	
2006/2007	Tender for harvest and haul for Central (North Coast), North East (North Coast), Southern (South) Tender for South Coast
2010	External review of FNSW contract and procurement (Duggan Report) Recommendation for improved commercial basis for establishing harvest Tender for South Coast
2011/2012	Tender for North Coast based on sample harvest units and crew day rates
2013-2015	Crew day rates/negotiated pricing Tender for Southern NSW – resulted in direct negotiation outcomes and linked harvest and haul contracts. Direct negotiation for Northern contracts
2016/2017	New harvest contracts established, return to difficulty class pricing, consolidation of haulage contractors on North Coast to facilitate centralised despatch operation 333,500 gmt of harvest capacity secured through direct negotiations of 12 contracts 449,000 gmt of haulage capacity secured through direct negotiation 203,500 gmt of harvest and haulage capacity secured through direct negotiations of 5 contracts
Review period	
2019	59,225 gmt of haulage capacity secured through direct negotiations of 3 contracts
2019/20	Black Summer fires delayed the award of new contracts resulting from significant changes to operating environment
2020-2022	Various direct negotiations and extensions to existing contracts have occurred - no open tenders or EOI's conducted (due to impact of fires, floods and changing operating conditions) Tenders conducted in Feb 2022 for harvesting (NC), 22 harvesting packages, mostly completed
Post-review period	
2022/23	Tenders for haulage (NC) commence June 2022, 6 work packages offered, 5 currently filled Truck scheduling (centralised despatch) has been brought in-house by FCSW South Coast agreements still under extension to Dec 2023

Source: FCNSW

The combination of direct approaches to existing participants and periodic open market tenders appears a reasonable balance of encouraging new entities to enter the market whilst ensuring existing capital and expertise deployed within the sector is fully utilised.

4.6 Conclusions

The assessment of market power for this review points to similar conclusions as were drawn for the 2013-2016 and 2017-2019 Benchmarking Studies. The activity and trend data in relation to the number of operators participating in FCNSW's procurement processes indicate a level of contestability for the provision of harvest and haulage services in the markets identified, within what

would be termed a managed market. To consider whether there may be significant market power within local or regional markets for harvest and haulage services we have considered the following:

- The trends in market concentration for the provision of harvest and haulage services in the identified geographic markets;
- The current market structure and basis on which harvest and haulages services are procured by FCNSW; and
- Pricing for harvest and haulage services over the three-year period considered for this review.

Based on the available data and information in relation to these three areas, while FCNSW is the predominant purchaser of these services, it would appear that the market for the provision of harvest and haulage services in the identified geographic markets continue to result from a generally contestable process. Notwithstanding the reduction in harvested volume over the last 13 years, there is evidence of increased market concentration of harvest services in one of the four regional markets, and haulage in two of the four markets. However, pricing outcomes over the three years covered by the review do not appear to highlight potential abuse of market power by these service providers in these markets, and FCNSW is contracting at rates reflective of both the larger more dominant service providers and smaller enterprises.

FCNSW have however noted that the industry is undergoing significant instability resulting from regulatory changes and the impacts of the Black Summer bushfires on supply dynamics. The degree to which this reduces the competitive tension in the market will need to be monitored over the coming years.

5. EFFICIENCY ANALYSIS

5.1 Background

As discussed in Section 2.4, FCNSW sells logs under different arrangements to a number of customers across the state. The majority of the timber supplied by FCNSW from native forest is sold on a 'mill door' or 'delivered' basis – that is, the price customers pay for the logs includes the growing, harvesting and transport costs to the mill gate. This is referred to as a 'Mill Door' sale in this report.

In some cases, FCNSW commercial arrangements provide for the customers to engage harvesting and haulage contractors directly, thereby purchasing logs purely on a 'stumpage' basis.

The project scope required an analysis of whether FCNSW recovers the full cost of harvest and haul expenses and the cost of administering these contracts under mill door sales.

In calculating the delivery charge, FCNSW will estimate the harvest and haul costs that will be incurred in the delivery of logs during the period, and where provided for in contracts, an additional administration charge. This analysis tests whether these estimated costs are being recovered through the revenue derived from the delivery charges.

Terms used in this section include:

Administration cost – the calculated cost per gmt based on FTE allocations for FCNSW to manage and administer harvest and haulage services (estimated to be $5.11 per gmt in FY2022 based on the methodology described below)

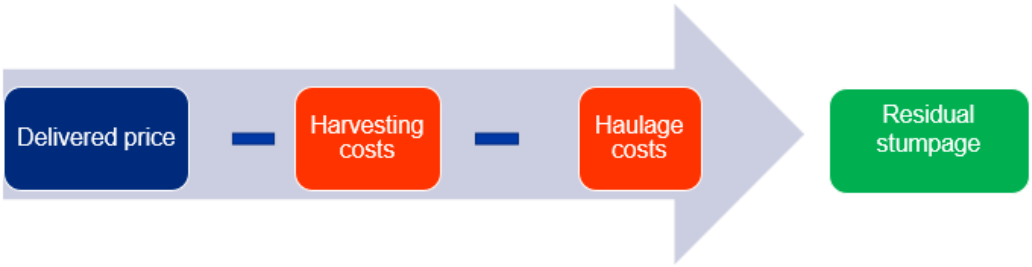
Administration charge – the amount FCNSW may charge customers to manage and administer harvest and haulage services. This amount is specified in most supply contracts. These are indexed annually and applied at the rate of $3.86 per gmt in FY2022

Contract costs – contractor payments for providing harvest and haul services

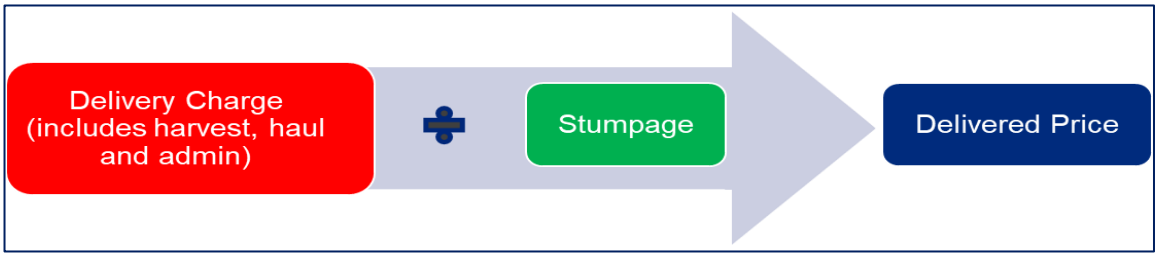
Delivery charge – part of the total charge (in addition to stumpage) to customers that ostensibly covers contract costs and administration charges.

> For **Delivery Charge plus Stumpage contracts** the delivery charge is a fixed, negotiated and transparent component of the overall delivered log price
>
> For **Delivered Price contract** customers the delivery charge is a notional allocation of a portion of the total log price for FCNSW accounting purposes. The breakdown of **Delivery Charge** and **Stumpage** is not apparent in customers invoices (they see the **Delivered Price** only) and in some cases the allocation of the Delivery Charge may have been insufficient to cover contracted costs and administration.

Delivered Price contracts - This typically applies to low quality products, where FCNSW negotiate a mill door price, where stumpage movements and delivery cost adjustments are generally combined. FCNSW absorb the risk of costs either being higher or lower than anticipated, and derive a residual stumpage based on the mill door price, less contract costs as demonstrated below.



Delivery Charge plus Stumpage - This type of contract provides for prices for the two components to be established independently – stumpages resulting from pre-defined adjustment mechanisms that include market based indices, and delivery charges that are a function of estimated contracted costs for harvesting and haulage. In this contract type, the customers wear the risk on increased or decreased costs where, for example, transport distances change from one period to the next.



Operating margin – delivery charge revenue less administration and contract costs.

This analysis does not consider revenue associated with the stumpage component of the customer charge, nor any consideration of FCNSW costs other than those directly related to contract harvesting and haulage, and internal administration and management of those contract services.

5.2 FCNSW Staffing Costs

FCNSW provided an organisation structure which identifies the roles of staff, and their potential involvement in managing the harvesting operations. The positions identified in FCNSW organisational structure that are relevant to managing harvesting operations are outlined in Table 5-1. Of note is that these positions involve undertaking the management and supervision of harvesting crews that encompass production, safety and environmental compliance. As such, attributing the cost of these positions purely to production – that is, the 'mill door' component – is problematic. FCNSW does not attempt to account for these costs separately.

There are 14 dedicated staffing positions in the structure such as the Sales and Distribution Managers that would not be required under stumpage sales, and 17 positions whose tasks would still be required to be fulfilled in part in order to implement FCNSW role as a forest owner. These positions have had costs attributed to managing harvest and haul operations at between 30% and 60% per FTE.

On this basis, a breakdown of positions and an estimate of wages, support costs and overheads applied in this analysis is shown in the table below.

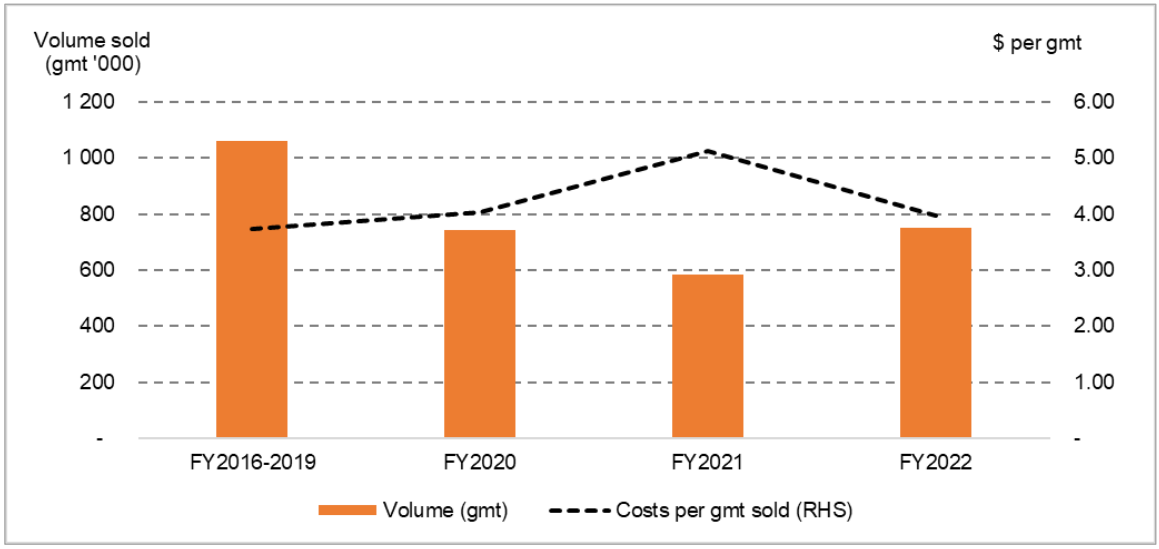
Table 5-1: FCNSW Harvesting and Delivery Personnel and Associated Annual On-Costs

Position	%	FTE Count	$
Dedicated Managers	100%	2.0	
Dedicated Coordinators	100%	12.0	
Admin - partial	15% - 30%	1.8	
Coordinator - partial	30% - 60%	2.4	
Manager - partial	30% - 60%	1.6	
Supervisor - partial	30% - 60%	1.4	
Capital related items (depreciation and interest)	None advised		
Total		21.2	2 993 975

Source: FCNSW – FY2021 (mid-point) Estimate (based on CPI indexation)

With an average annual volume in the order of 570,000 gmt, the average estimated administration cost would equate to approximately $5.11 per gmt (compared to $3.73 in the previous review period). Despite a slight reduction in staffing costs, the unit rate has increased due to the large reduction in annual volume, particularly immediately post the 2019/20 bushfires. This is evident in Figure 5-1 below, where the total employee costs relative to the harvested volume demonstrates the impact of the post-fire decline in volume.

Figure 5-1: FCNSW Employee Costs and Cost per unit Sold FY2016-19 - FY2022



Source: FCNSW.

Note – includes all harvesting and marketing staff. Sales include logs from stumpage and plantation operations.

Assuming the post-fire period is an outlier, Indufor considers this is within the range expected for typical management costs in the industry, particularly associated with native forest operations, in terms of both a unit cost and volume per FTE basis. A comparison of VicForests and Sustainable Timber Tasmania is provided in Table 5-2 below.

Table 5-2: Comparison of volume sold per FTE (2019/2020)[17].

Entity	FTE Count[1]	Volume sold (m^3)	'000m^3 sold per FTE
FCNSW	57	743 090	13 037
Sustainable Timber Tasmania	148	1 577 609	7 359
VicForests	130	956 689	10 660

Note 1 – FCNSW numbers exclude corporate staff. The comparator FTE counts include management, administration and other functional staff.

Indufor also notes that FCNSW have limited capacity to reduce administration costs during periods of disruption given the costs are largely fixed via salaries and overheads.

5.3 Revenue

As discussed in Section 2.4, in determining the total charge applied to logs sold to customers on a mill door basis, FCNSW will calculate:

1. The stumpage component that reflects the cost of growing and managing the forest,
2. The delivery charge that includes:
   a. An estimate of contract harvest and haul costs for a given period (generally a financial year). There are uncertainties encapsulated in these estimates, including which contractor completes the work and therefore which rates will precisely apply to a specific harvesting area. In addition significant changes to regulatory requirements, wet weather, and forest activism (i.e. public protests) also increase the risk of plans changing significantly.
   b. Where applicable, an administration charge. Log supply contracts for HQ sawlog deliveries on the North Coast, and for most grades on the South Coast provide for the inclusion of an administration charge. These are indexed annually and were stated by FCNSW as being $3.86/gmt in FY2022. Average delivery charges and changes over the review period are detailed below.

Table 5-3: Average Delivery Charges 2019 – 2022

Delivery Charge ($ per gmt)					
Region	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**CAGR**
Production North	70.03	70.32	69.17	72.69	1.3%
Production South	64.43	67.20	66.75	76.19	5.7%
Total	68.30	69.32	68.42	74.08	2.7%

Source: FCNSW

Changes in delivery charges can be a result of increased contract rates, as well as changes in operational factors such as longer (or shorter) transport distances or a higher proportion of difficult harvesting conditions. Overall, an average annual increase of 2.7% is evident from the aggregated data.

[17] Refer to VicForests Annual Report 2019/2020 and Sustainable Timber Tasmania Annual Report 2019/20

5.4 Cost Recovery

FCNSW are entitled to recover costs of harvesting and haulage services and the administration of those services.

The delivery charge revenue, accruing over the 3-year period, is detailed in Table 5-4. As discussed, the delivery charges may include the administration fee that recognises FCNSW costs noted in Section 5.1. However, FCNSW accounts do not identify where the administration fee is applied.

When FCNSW revenue is compared with the contract costs incurred by FCNSW over the same period, the average operating margin over the period is estimated to be $(4.67) per gmt. This compares to a margin of $(3.96) in the previous review. Despite delivery charges increasing, and average harvest and haul costs decreasing over the review period, the margin has been impacted by the reduction in volume over the review period and the consequent impact on administration costs.

Table 5-4: Operating Margin by Region FY2020-22

FY	Region	Costs ($'000)			Margin ($'000)	% Margin	Margin ($ per gmt)
		Contract	Costs* (Admin)	Rev			
2020	Production North	20 558	1 543	20 986	-1 115	-5.3%	-3.69
	Production South	9 610	710	9 247	-1 074	-11.6%	-7.73
	Total	30 168	2 253	30 232	-2 189	-7.2%	-4.97
2021	Production North	11 729	929	12 291	-367	-3.0%	-2.02
	Production South	5 358	414	5 283	-489	-9.3%	-6.04
	Total	17 087	1 343	17 573	-856	-4.9%	-3.26
2022	Production North	16 585	1 184	16 751	-1 018	-6.1%	-4.40
	Production South	11 481	755	11 247	-989	-8.8%	-6.70
	Total	28 066	1 939	27 997	-2 007	-7.2%	-5.29
Total		75 321	5 535	75 803	-5 053	-6.7%	-4.67

Source: FCNSW (* note that admin costs have been calculated at the derived rate of $5.11 per gmt)

In summary from the data available, the full complement of third party contract and administration costs are not being recovered by FCNSW from the delivery charge (note that this analysis excludes consideration of stumpage movements). There are a number of possibilities that could contribute to this outcome including that whilst FCNSW may include administration charges in the calculation of total delivered log prices for some customers, the accounting methodology may only allocate contract costs to the delivery charge of the total log price. If this is the case, administration costs may be covered by changes in the log stumpage component.

To expand on this point, as described in Section 5.1, for Delivered Price customers there is only a notional allocation of the total price allocated to cover contract charges. The customer is privy only to the negotiated **Delivered Price**. In effect, any **Residual Stumpage** may potentially cover administration costs, fire protection, roading and other operational expenses. However in terms of FCNSW accounting methodology, and this analysis, only the notional delivery charges are used to determine operating margin.

FCNSW have advised that delivery charges are being consistently reviewed to ensure a sufficient margin is being achieved on deliveries to cover contract and administration charges. Log prices are set through the wood supply agreements, and feature adjustment mechanisms negotiated by the parties at the time of entering into the agreement. These mechanisms reflect changes in overall inflation, in costs and in finished timber prices. These arrangements are established to provide the contracted parties with a relatively efficient price adjustment mechanism which is in place for the term of the contract (i.e. most wood supply agreements run to 2028).

However these arrangements limit the ability for the parties to markedly re-set delivered log prices, and particularly where FCNSW is seeking to meet contracted volume during a period of significant supply disruptions. Therefore the ability to negotiate higher log prices is limited with persistent supply challenges over the review period, with an imperative to meet contractual supply volume obligations rather than seeking higher prices from current customers or having uncontracted volume that might alternate markets.

Furthermore, in order to meet contractual log supply volumes, fixed margins have been challenged by longer haulage distances. Whilst, harvesting costs have been contained largely due to the favourable types of areas harvested, this will be necessarily reversed in future years as more difficult areas must be accessed to sustain supply. FCNSW will need to incorporate the future higher costs into financial plans and where possible delivery charges negotiated with customers.

5.5 Opportunities for Improved Efficiency

There continue to be a number of key challenges facing the industry in NSW. These include a changing environmental, social and political landscape that has an impact on the ability to efficiently extract timber resources from native forests and to make timber available to customers. This has been compounded by the Black Summer bushfires that have imposed an altered regulatory regime in addition to impacts on the short and medium term yield of resource.

Given these challenges, ongoing cost pressures are likely to be sustained from the following:

- In response to the fires and ongoing threatened species management requirements, the harvesting prescriptions have led to higher tree retention and lower yields
- Tighter supply constraints that necessitate sub-optimal transport arrangements leading to longer than preferable transport distances and related higher haulage costs.
- More broadly, uncertainty in the industry in the event harvest volumes following the Black Summer Fires decline which in turn would decrease interest / competitiveness by suppliers for harvest and haul services
- Reduced flexibility to manage prolonged wet weather due to high level of reliance on harvesting accessible areas since 2020 in plantations and coastal forests.

Indufor would observe that overall, FCNSW approach to securing harvest and haulage services seeks to achieve a balance between leveraging existing expertise and capital while also exposing the market to new entrants to ensure some competitive tension is maintained across most of their operating markets. The evidence of this is that most rates have been held below the expected impact of both CPI and fuel over the review period.

Further opportunities to contain costs maybe explored through:

1. Using the data generated from the centralised truck despatch model to continually look for more efficient operational systems (such as truck base locations)

2. Seeking opportunities to utilise Higher Productivity Vehicles such as A-doubles[18] or road train configurations, where roading infrastructure and regulations allow
3. Strengthened tactical planning information to allow the allocation or tendering of harvesting packages with specialised equipment where possible. Ensuring contractors are appropriately geared for specific tasks may reduce the costs associated with redundant or underutilised equipment. As an example, FCNSW may require most harvesting crews to be able to operate on moderately steep slopes and in a range of forest types so as to provide flexibility. This flexibility is required when there is uncertainty about where and when operations will be conducted.

Better tactical planning information (related to terrain, yield, roading, silvicultural and regulatory constraints) can reduce the need for this flex in operation type for differing contractor, and allow equipment to be tailored to specific tasks. Where possible, capital costs may be reduced as machines maybe smaller, and expensive equipment (that can be very flexible) is less prone to being underutilised.

Furthermore, better information about the harvesting prescriptions and types of forest to be harvested over a given period would assist with being able to effectively and proactively quantify potential changes to costs and revenues. This then helps to inform decision making regarding operational impacts or management costs.

An example would be the introduction of new harvesting prescriptions to manage threatened species. Ideally, the impacts on timber yields, harvesting productivity and therefore costs could be readily quantified with good tactical planning information. This information could be incorporated into the policy development process that is seeking to increase protection for threatened species, rather than simply trying to mitigate the impacts after the changes to prescriptions have already been introduced.

[18] Refer to HVNR - Classes of heavy vehicles in the Heavy Vehicle National Law

6. FINDINGS AND RECOMMENDATIONS

6.1 Findings

Our overall findings from the review undertaken for this report are the following:

Benchmarking

- Limited contemporary interjurisdictional data has made benchmarking challenging for this review, however it is apparent that there continue to be significant differences in commercial, regulatory and operating environments between the NSW and other native forest jurisdictions. Quantifying the direct impact of these characteristics on costs is complex and there is insufficient data to model these impacts precisely.

- *Harvest costs* - Whilst the observed costs in the four identified geographic markets in which FCNSW procures harvesting services continue to be higher than other jurisdictions, there are market specific factors influencing operating costs that can be attributed to the higher harvest rates in NSW. We do note that the harvest costs over the three years covered by this review have decreased relative to increases in CPI and fuel, and that the margin between costs in NSW and other jurisdictions has been compressed. We also note harvesting conditions during the review period have been weighted towards higher yielding and more accessible than might be typically encountered, which in turn has assisted in attaining modest harvest cost increases.

- *Haulage costs* – haulage operations are easier to benchmark given haulage operations are more comparable across jurisdictions. Based on the available data our findings are that FCNSW's haulage costs continue to be within the ranges observed across comparable operations. However, higher costs have been incurred by FCNSW customers as a result of increased transport distances over the review period.

Market Power Assessment

The structure of the market for the provision of harvest and haul services has not substantially changed since the 2013-2016 and 2017-2019 Benchmarking Studies (noting that immediately post the current review period the haulage market in Production North has been restructured).

The activity and trend data in relation to the number of operators participating in FCNSW's procurement processes (although limited during this review period) indicate a level of contestability for the provision of harvest and haulage services in the markets identified. To consider whether there may be inappropriate market power within local or regional markets for harvest and haulage services we have considered the following:

- The trends in market concentration for the provision of harvest and haulage services in the identified geographic markets;
- The current market structure and basis on which harvest and haulages services are procured by FCNSW; and
- Pricing for harvest and haulage services over the three-year period considered for this review.

Based on the available data and information in relation to these three areas, it would appear that the market for the provision of harvest and haulage services in the identified geographic markets result from a generally contestable process, although during the review period there was limited market-based processes concluded due to the disruptions from the 2019/20 fires. Most of the tenders

conducted through 2022 have translated to new contracts, finalised through 2022/2023, outside the review period.

We note that a level of market concentration is evident in harvesting services in one market, and haulage services in both markets in Production North. However we also note to date pricing outcomes over the three year period covered by the review do not appear to highlight potential misuse of market power in local or regional markets.

Efficiency Analysis

Indufor and FCNSW have estimated the costs of managing mill door sales, purely on the basis of the attribution of FTE positions. The derived cost appears to be reasonable on a volumetric basis in comparison to industry benchmarks.

Whilst FCNSW delivery charges generally cover third party contracted costs, they do not cover administration costs over the three-year period overall, with some regional differences. FCNSW have advised that this situation is consistently being monitored and reviewed but is not easily addressed under the current supply operating arrangements.

Summary of Findings

Costs for harvesting services are higher than that evident from inter-jurisdictional operations. Rates appear to be reasonable on the basis that:

- Operating conditions are significantly different within and between the jurisdictions, and appear to explain a proportion of the higher costs in NSW
- The market appears to be reasonably competitive (with the exceptions noted above) and FCNSW are actively managing procurement processes to seek price discovery and seeking to ensure contracted parties are operating efficiently
- Unit costs actually decreased over the review period. This has largely been due to operating conditions being favourable in areas that were targeted during wet weather. This is likely to change over the coming years.

FCNSW costs for haulage services are commensurate with other native forest operations.

FCNSW administration costs appear to be commensurate with comparable operations, but have increased significantly on a unit cost basis due to the lower volumes harvested over the review period. Through the application of delivery charges, FCNSW have not recovered the entire cost of contractor and administration charges.

6.2 Recommendations

Based on our findings above, our recommendations for benchmarking and improving the efficiency of FCNSW harvest and haulage operations are the following:

Recommendations	
1. **Efficiency monitoring –** in the absence of updated comparative data for native forests, one option would be more regular independent assessments on harvest crews' productivity levels to ensure FCNSW operations are as efficient as possible. This could include monitoring of machine utilisation (FCNSW now collect temporal and spatial data from harvesting equipment that may be used to a greater extent to monitor productivity), systems of work, capital deployed and labour effectiveness.	Responsibility - FCNSW Timing – to be considered during current review period
2. **Use of strengthened tactical planning information** – This includes sourcing and utilising better data such as timber yields, level of tree retention, terrain, snig distance and slope, as well as roading requirements to allow the tendering of harvesting packages to attract specialised equipment where possible. This ensures contractors are appropriately geared for specific tasks to reduce costs associated with redundant or underutilised equipment. Furthermore, better information about the harvesting prescriptions and types of forest to be harvested over a given period would assist with being able to effectively and proactively forecast any potential changes to costs and revenues. Delivery charges can reflect these costs and ensure cost recovery is improved.	Responsibility - FCNSW Timing – to be considered during current review period
3. **Future benchmarking** – Maintain the current approach (through indexing available data and monitoring trends) but source alternative comparative data, such as from timber plantation operations (as native forest jurisdictional data will become less available and relevant). Because of the differences in operating conditions, particularly between plantation and native forest operations in Australia, unit cost benchmarking should be supplemented by the collection and use of operational performance data to explore the reasonableness for any comparison. This data would be available from the implementation of Recommendation #1.	Responsibility - FCNSW Timing – to be considered during current review period
4. **Cost recovery** – the current accounting methodology sets the delivery charges either through a notional allocation (in the case of Delivered Price contracts) or a contractual allocation (in the case of Delivery Charge Plus Stumpage contracts). FCNSW should continue to ensure that where possible delivery charges are set to fully recover contract and administration costs.	Responsibility - FCNSW Timing - Ongoing

Previous Recommendation	Status / Comment
Alternative approaches – FCNSW consider capturing additional data that may support the development of alternative approaches to benchmarking such as data on inputs and outputs of harvesting and haulage.	To successfully benchmark there is a need for comparative operations elsewhere (which are limited, and likely to be less relevant and current as native forest harvesting is would up in WA and Victoria). FCNSW use costing models based on industry data to ensure rates are reasonable. The datasets used require constant updating, and independent verification. Refer to Recommendation 1.
Cost recovery – FCNSW continue to ensure that mechanisms are in place to fully recover contract and administration costs, and that commercial arrangements adequately provide for cost recovery if operating or regulatory conditions substantially change.	FCNSW could explore a mechanism which allows reconfirming and reconciling delivery charge estimates on say a quarterly or six-monthly basis, as a mode to adjust to actual charges. Since the last review, FCNSW have moved to quarterly adjustments for all contractors and mill door customers (incorporating fuel and CPI). Adjustments based on changed operating conditions are still subject to negotiated outcomes.

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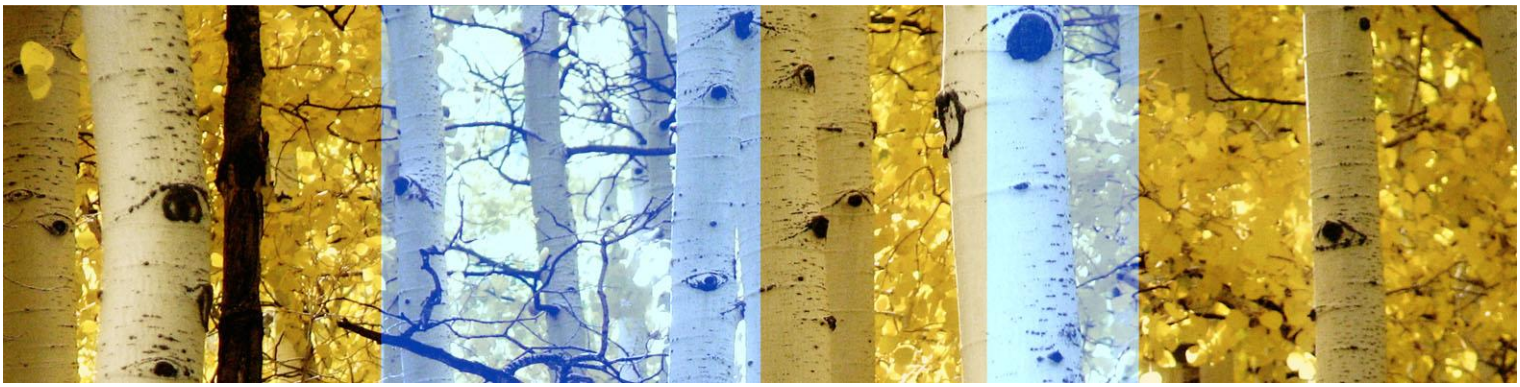


APPENDIX - TIMBER INDUSTRY AND NATIVE FORESTRY IN NSW

A.1 Products

The NSW forest industry supplies a number of finished products to domestic and international markets. The following table highlights the major finished products and related forest type from which the logs are sourced.

Table A1: Timber products

Product Description	Hardwood (Native forest and plantation)	Softwood (Native forest and plantation)
Sawn timber	Heavy construction, flooring, furniture	Framing, industrial, furniture
Plywood	Flooring, construction	Construction, formwork
Composite Products	Cladding	Particleboard, MDF
Pulp and paper	Fine paper (export markets)	Newsprint, packaging
Firewood and biofuel	Domestic, industrial	Industrial

A.2 Timber Production Supply Chain

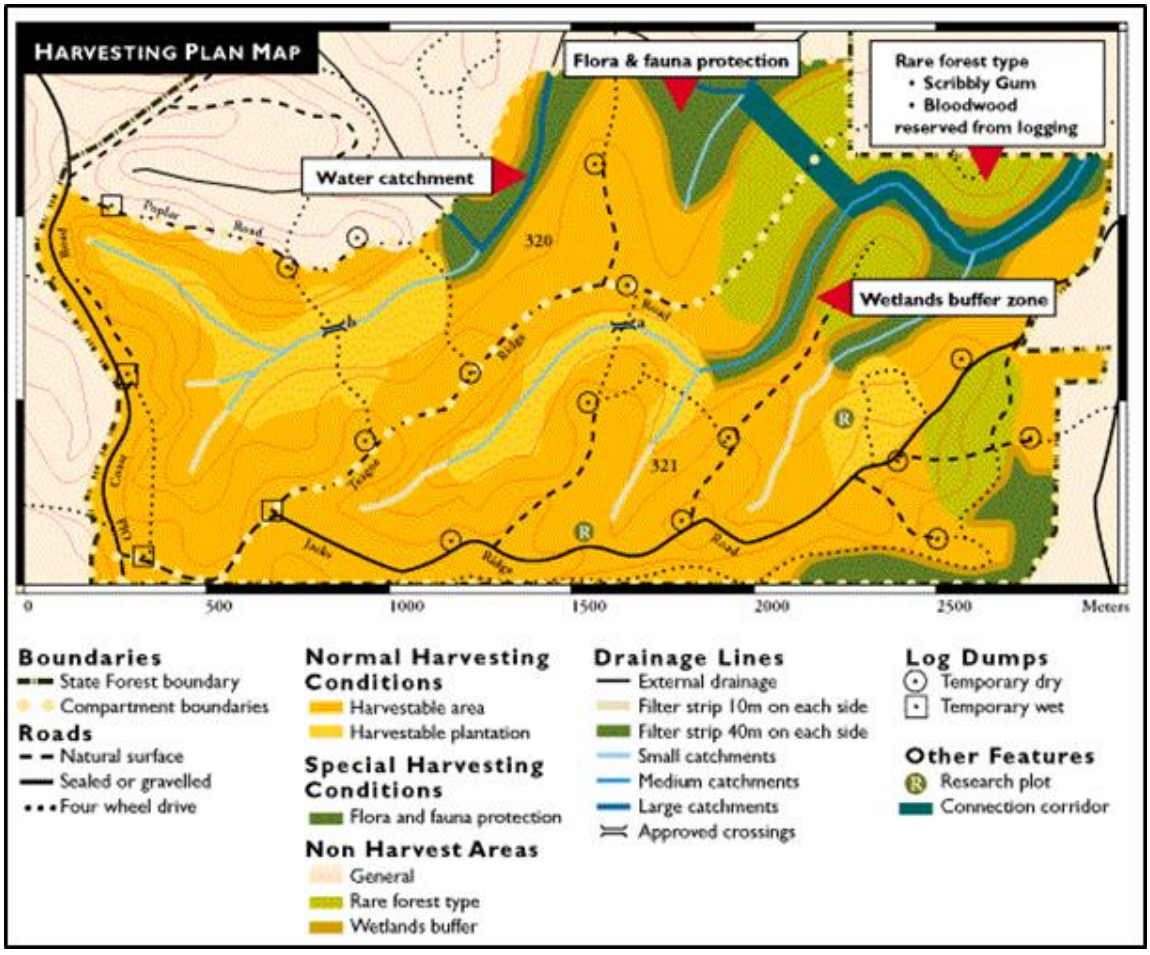
The supply chain for the industry constitutes:

- activities in forest management and growing
- log production operations including road and track construction, harvesting and haulage
- primary processing by sawmills, chipmills, pole producers
- secondary processing by board and paper manufacturers
- downstream processing by truss and frame producers, furniture manufacturers
- timber sales and distribution to wholesalers and retailers.

The following describes the activities broadly undertaken by the forest grower in relation to log production – primarily harvesting and haulage, the key areas subject to this report.

Forest management and growing – includes activities to establish, enhance and protect the forest crop and manage for multiple values including recreation, biodiversity and water production. Roading and harvesting operations are planned to ensure the protection of environmental values and prescribe the type of operations that will optimise the economic and silvicultural outcomes. These planning processes result in the production of a harvest plan, with an example shown in below which defines the location of the various harvest and non-harvest areas.

Figure A1: Example harvesting plan map



Source: FCNSW

Road and track construction - access to the forest is provided via existing road and trail networks. In some cases, new roads may be required to optimise the efficiency of the harvesting and transport operation (see plate below). Minor roads may be the responsibility of harvesting contractors, but in most cases are provided by the forest grower. Snig tracks are constructed as part of the harvesting operation, usually on a temporary basis, and as such are required to meet specific drainage and rehabilitation requirements.

Plate A1: Road construction – track recently widened and drained

Source: FCNSW

Tree felling, extraction, log making and storage – the harvesting operation can be broken down into different phases of tree felling, skidding the logs to roadside and log grading and roadside storage. This is generally performed by a single contract entity using multiple purpose-built machines.

Tree felling was historically completed by hand felling with chainsaws or axes, and now is increasingly being completed by machines (see following Plates). These changes to machine felling have been due to both significant enhancements in the safety performance of the operations as well as potential for increasing efficiency of operation.

Log skidding is done by machine, featuring a range of machine configurations that vary by operation characteristics. The following plate note these variations.

Plate A2: Manual tree felling

Plate A3: Mechanical tree felling

Plate A4: Snigging logs (winch

Plate A5: Skidder with grapple

Source: FCNSW

In the NSW context, trees from a single harvesting operation may be cut into multiple log products, depending on the species, dimensions (diameter and length), defect (branches, rot, gum vein) and available markets. This can include high quality logs for sawmilling and peeling, lower quality logs for milling into industrial grade lumber, logs for exporting both whole and as woodchips, and for domestic firewood (Figure A2 and following plates). In addition, many NSW timber harvesting operations involves multiple species from the same harvest area, commonly having differing market value.

Figure A2: Harvesting process

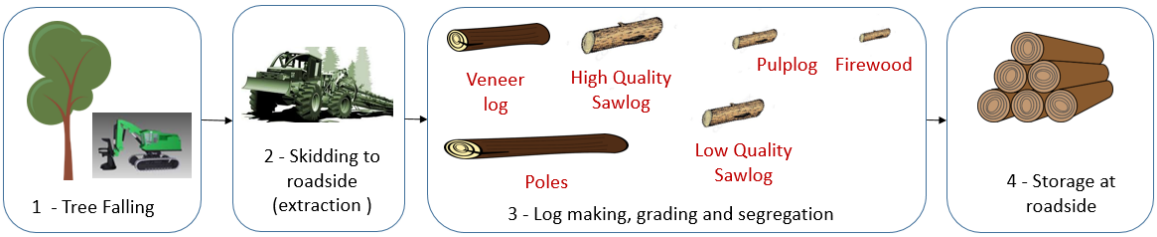


Plate A6: Log making with chainsaw

Plate A7: Log making with harvester

Source: FCNSW

Loading and transport – in native forest operations loading is generally performed by the harvesting contractor. Haulage can be performed by either the harvesting contractor, a separate but related entity, or an independent party.

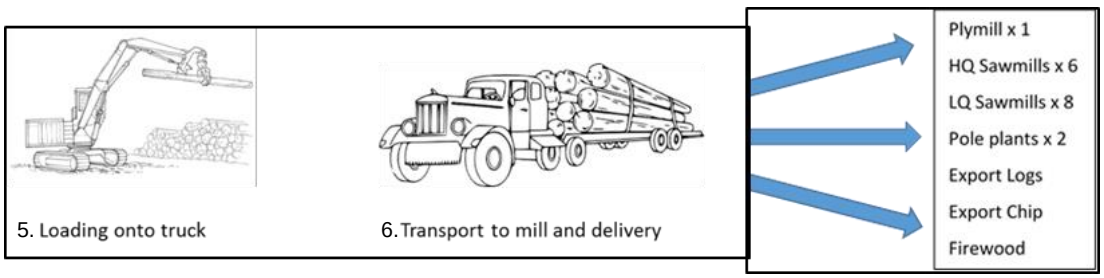
Plate A8: Log loading in progress

Plate A9: Loaded log truck exiting forest

Source: FCNSW

Loading of the operations are arranged to deliver differing log qualities to differing customer requirements, with each truck usually loaded with a single log product.

Figure A3: Log loading and distribution process



A.3 Trends and Dynamics of the Forest Sector

The following section described the dynamics of the forest sector locally and more broadly, and the various trends that have shaped the industry as it is today.

A.3.1 Industry Competitiveness

The following factors largely determine the long term competitiveness of the timber industry[19]:

- Forest ecosystem health – forests must be productive and seek to produce the highest value products possible while providing significant environmental outcomes, which then provides the opportunity for industry to utilise in order to maintain a competitive advantage
- Productivity of harvesting and haulage systems - timber harvesting plays a critical role in broader industry competitiveness due its relationship between stumpage (the value of the crop), and the cost of inputs into the manufacturing sector (i.e. mill door price incurred for receipt of sawlog, pulpwood etc)
- Efficient use of the crop (value recovery) – converting standing volume into the highest possible value combination of products is essential in order to maximise stumpage to the grower and hence provide funds and incentives to reinvest into the regeneration of the forest values
- Effective forest management and policy – provides resource security, both in terms of volume and tenure, and providing the framework whereby the industry has a 'social licence' to operate on a sustainable basis, whilst maximising efficiencies.

A.3.2 Forces Shaping Industry Efficiency and Competitiveness

Productivity drivers in a general sense include research and development, education and training, health, safety and well-being, economies of scale, economic efficiency, labour management, social values, institutional arrangements and the legal framework within which the industry operates. Forest industry specific forces include forest access (infrastructure, topography and soils), labour availability and skills, machinery and equipment, transport systems, tree size and utilisation and skidding or extraction distances.

Timber harvesting systems employed in NSW and elsewhere in Australia reflect the regulatory, topographic, forest and market conditions within specific regions and catchments. There have been numerous forces shaping the way in which the industry operates today, including the social and political influences that have altered the nature of the resource available, the manner in which harvesting may occur, and the expectations in relation to worker and community health and well-being. The following are key overall forces influencing the efficiency of the timber harvesting supply chain.

Resource availability and structure

There has been a general decline in NSW native forest harvesting levels since the 1980's. Land tenure changes (e.g. conversion of State Forest to National Park), revised regulatory frameworks and forest structure, have all contributed to a decline in the available area for harvesting. This trend can be observed nationally and within NSW.

While the total harvest volume has declined significantly, the nature of the available resource has also seen a shift from harvesting predominantly older forests with larger trees, to those with a higher

[19] Ghebremichael, A.; Nanang, D.M. 2004. Inter-regional comparative measures of productivity in the Canadian timber harvesting industry: a multilateral index procedure. Nat. Resource. Can., Can. For. Serv., North. For. Cent., Edmonton, Alberta. Inf. Rep. OR-X-391.

proportion of regrowth stands or those occupying lower productivity sites. This has all led to a general trend towards smaller logs and commonly lower harvested yields on a per hectare basis.

This has an overall impact of reducing the scale of activity, at both the work site level as defined by a compartment, as well as the macro level as defined by overall harvest levels. These scale reductions impact of the efficiency of the harvesting and haulage arrangements.

Environmental regulation

Timber harvesting in NSW on crown land is regulated under the Integrated Forestry Operations Approval Framework (IFOA). This process considers proposed harvesting activities in terms of the impact on soil and water, threatened species, fisheries and cultural heritage. The current structure of the IFOA's for coastal forests has recently been recast with four previous IFOA's (Upper North East, Lower North East, Southern and Eden) brought in under a singled Coastal IFOA. This process included a transition phase encompassing the period subject to this review.

The approvals contain the terms of a licence under the Protection of the Environment Operations Act 1997, the Threatened Species Conservation Act 1995 and the Fisheries Management Act 1994. Enforcement of the licences is undertaken by the Environment Protection Authority and the Department of Primary Industry – Fisheries.

Source: EPA NSW

The impact on harvesting activities is generally seen in terms of the quantity and type of trees that must be retained and protected within the harvest area, the manner in which tracks and trails must be drained and protected, and the resultant duration of return harvesting in any one area.

Mechanisation

Timber harvesting has increasingly seen a transition away from motor-manual tasks such as tree felling with chainsaws to mechanised operations that include:

- Tree harvesters / fellers
- Grapple skidders that efficiently move multiple tree lengths from within the forest to the landing
- Processors or loaders that debark, cross-cut and sort logs at landing.

The driver for this change was primarily efficiency through improved technology, providing better access and productivity. In addition, health and safety reform has reinforced this mechanisation change. However, the consequences of this was a greater demand for capital in the form of machinery, requiring more sophisticated business structures, longer term contracts and increasing the exposure of the entities involved to fluctuating cashflow arising from changing demand,

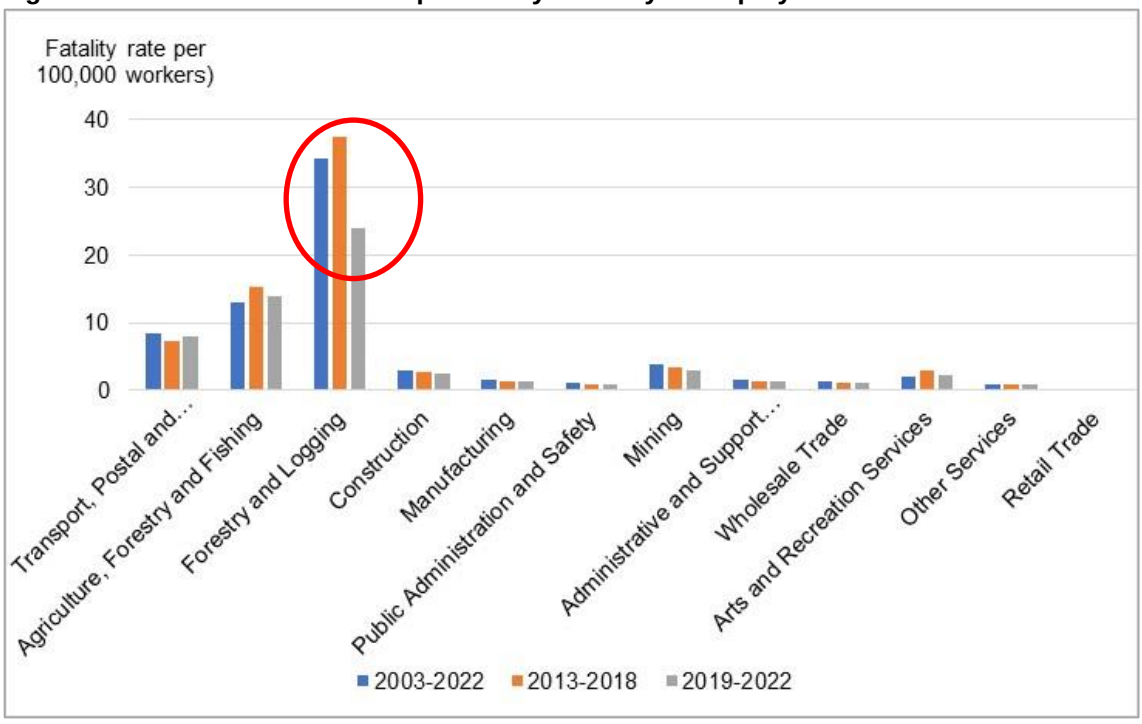
resource availability, and production capacity. This demand for capital is further noted as being for relatively highly customised machinery in respect to harvesting equipment.

Health and well-being

The timber industry has long been identified as a relatively high risk work environment (refer to), and forms part of the agriculture, forestry and fishing sector that records the highest proportion of workplace fatalities in Australia.

In the NSW context, a series of fatalities within the industry in the early 2000's was the catalyst for a significant shift in the proportion of operations away from utilising hand fallers. Positive health and well-being outcomes associated with mechanisation have also been a force in the retention of existing and recruitment of new employees in the industry.

Figure A4: Worker Fatalities: Proportion by industry of employer



Source: Safe Work Australia / statistics

The operating environment for timber harvesting workers has been significantly changed over the last 20 years with greater mechanisation, particularly in relation to tree felling, with reductions in chainsaw operations in favour of specialised equipment such as feller bunchers. Improving safety outcomes in the workplace can come at a higher upfront cost in addition to that associated with higher capital requirements, including higher training standards, administration and management overheads, personal protective equipment (PPE) and fewer available productive work hours.

Transition to 'mill-door sales'

Over the last 20 years, many Australian forest growers have tended to manage the supply chain within the forest, rather than allocating stands to timber customers who may have contracted their own harvesting and transport, and paid the grower a stumpage fee.

The key drivers for this centred on:

- A better alignment of health and safety objectives
- More control of environmental and silviculture outcomes

- To assist with the transition to mechanised operations
- Better control of value adding / recovery operations within the forest through more sophisticated log grading procedures, market segmentation and product allocation
- Improved capacity to optimise the supply chain through making effective trade-off decisions in terms of forest infrastructure, recovered yield, harvesting costs and transport systems.

Markets

There has been a general decline in timber sales from native forests. Perhaps more significantly in terms of impacting on operating costs is the change year on year in demand for specific products and overall fibre. As native forests in NSW produce a range of products from high value poles and veneer logs, through to low quality sawlogs and pulpwood, and a wide variety of species and related timber quality, any loss or decline of a particular market can significantly impact on the unit production cost of the other products. This is particularly the case where access to pulpwood markets has been unavailable or constrained. The productive capacity of harvesting crews would be curtailed if only a small proportion of each tree, or trees within a stand contain merchantable material.

Corporate behaviour

Across Australia, native forest harvesting is now dominated by the supply arising from public native forests. This results in both the harvesting and haulage contractors, and processing customers having a high dependency on this supply for their businesses. Similarly, across Australia, most public native forest management agencies while being government entities have had an increasing focus and scrutiny on their commercial arrangements.

Most Australian public native forest management agencies are now in a corporatised form, resulting in increased transparency in their reporting arrangements, governance functions and financial performance. This trend was largely initiated in the mid-1990's and then became increasingly commonplace through the 2000s. This reflected public policy frameworks, given the functions of the management agencies included them being an arm of government with an overtly commercial interaction. In some circumstances, this resulted in the commercial arm being fully separated from the arms of government involved in the stewardship and protection activities of public land management (i.e. as observed in Victoria and Western Australia) or where a corporate entity is formed with clear governance and financial frameworks but retaining the stewardship and commercial activities within the one organisation (i.e. NSW and Tasmania).

This corporate platform of clear commercial performance has resulted in the forest management agencies looking to establish both log pricing arrangements reflective of the capacity to pay in the market place, as well as efficient cost management so as to enhance the resource rent and capture of this rent to the owners of the resource, which is the representative of the respective State Government. Within this arrangement, the forest management agencies assess the potential risks and uncertainty to their financing, and seek to manage this as effectively as is reasonable given their governance arrangements and overall mandate.

An upshot of this increasing corporatisation of the behaviour of the forest management agencies is that the agencies dealings in the marketplace sought to reflect commercial arrangements as would be expected by private parties. This level of reflectance is influenced by the legacy arrangements and operating environment (i.e. planning or regulatory frameworks) in which the forest management agencies operate, as well as the mandates provided to them by their shareholders. Nevertheless, it is a complex operating environment. Governments typically expect a commercial return from the agencies, as well as desired social and political outcomes, while also continuing to effect the operations of the entity through changing regulatory frameworks that reflect changing community expectations.

A.3.3 Commercial Arrangements

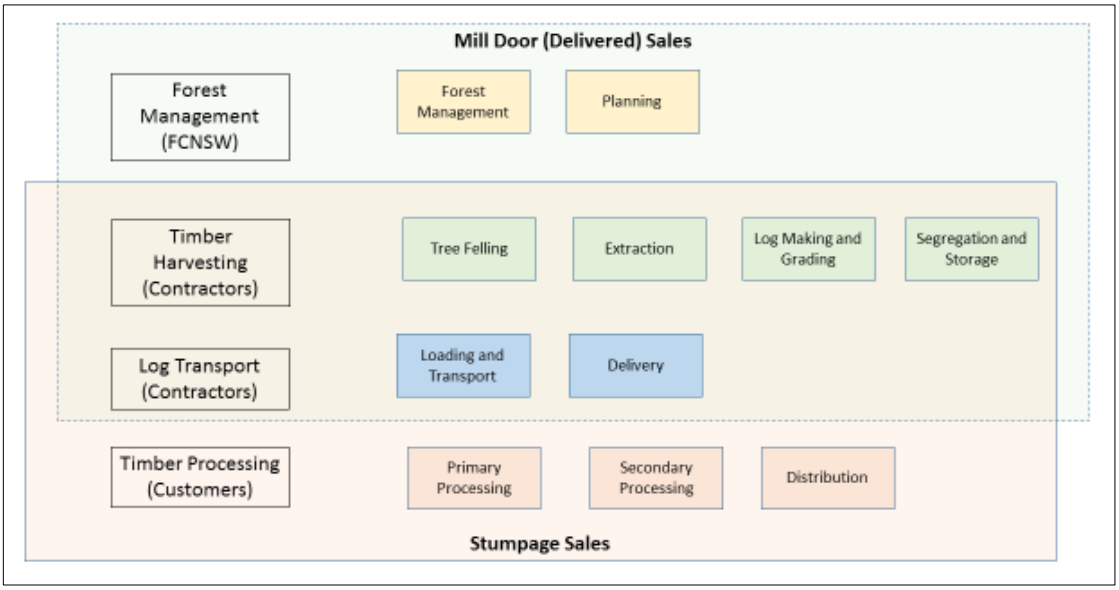
The primary commercial relationship underpinning log supply are contracts between FCNSW and log customers that may range in term from casual – short term through to 20 year Wood Supply Agreements (WSA). The key current native forest supply contracts in place are tabled in Section 2.4, along with the key products being sold, the contract terms and the basis of the sale.

The majority of the timber supplied by FCNSW, and of revenue to FCNSW, from native forest is sold on a 'mill door' or 'delivered' basis – that is, the price customers pay for the logs includes the cost of forest management and growing as described in the form of a stumpage, plus the actual harvesting and transport costs for delivering the logs to the mill gate of the customer (termed the delivery charge) along with a FCNSW harvesting administration charge. With a mill door sale, the overall cost to the customer is termed delivered cost, incorporating the costs of stumpage, actual harvest and haulage charges, and FCNSW administration charge.

In some cases, most notably in the Eden Forest Management Area, and Western Region, FCNSW commercial arrangements provide for the customers to engage harvesting and haulage contractors directly, thereby FCNSW sells the logs purely on a 'stumpage' basis, and property rights and risk transfers at that point.

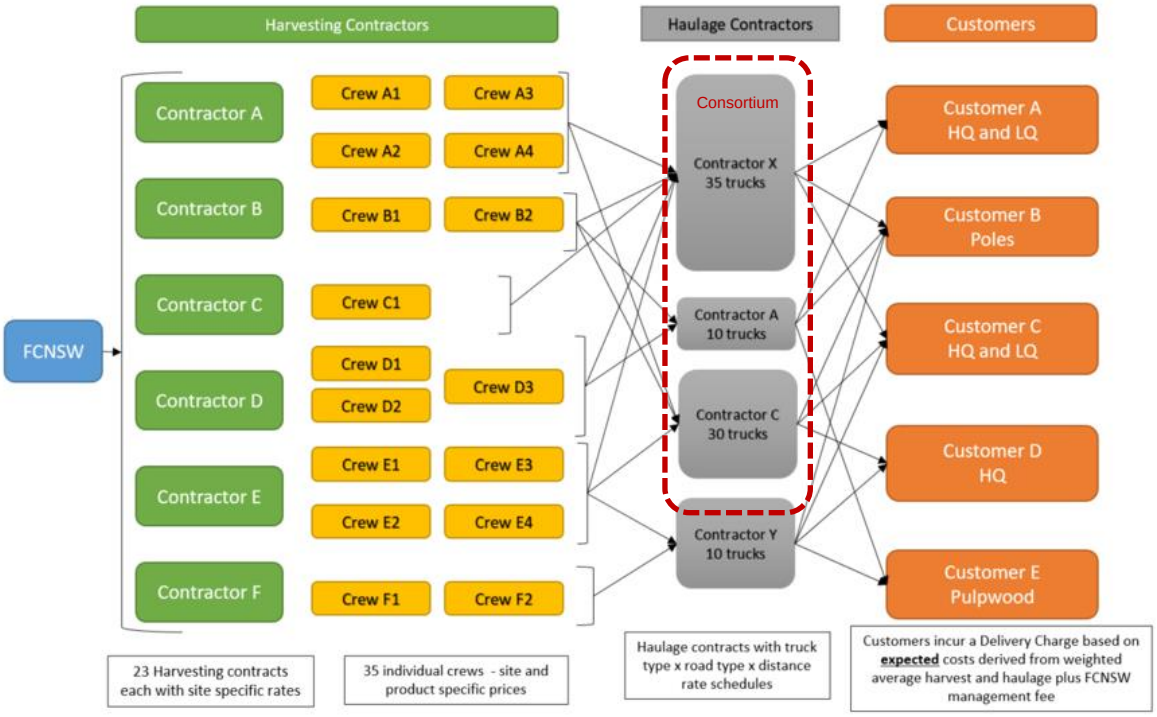
The entities involved in the supply chain and the potential commercial relationships are described below. Under mill door sales, FCNSW control the supply chain to the point of delivery of the log to the customer's mill, whereas under stumpage sales, the customer assumes control of the harvesting and haulage.

Figure A5: Conceptual Diagram of Alternative Sales Arrangements and Control of Supply



The diagram below provides a generalised illustration of the inputs into the delivery charge calculation.

Figure A6: Conceptual Log Harvesting and Delivery Model*



* Schematic represents a North Coast model, including the haulage consortium. The South Coast has linked harvest-haul contractors (i.e. the same party complete harvesting and haulage).

A.3.4. FCNSW – Log Customer Arrangements

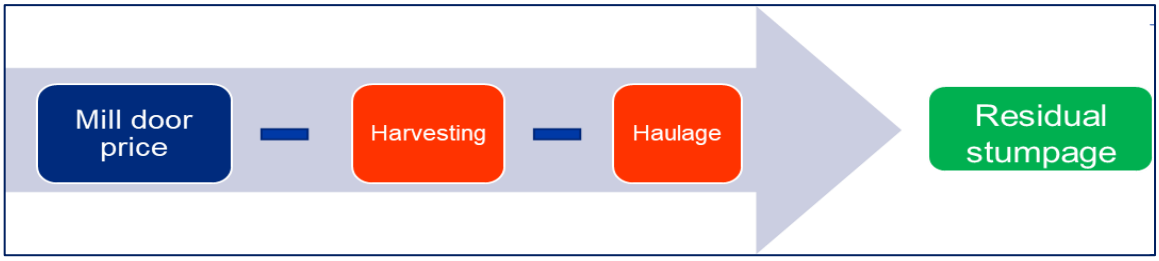
FCNSW log sales arrangements include supply agreements for long term wood supply agreements, and supply contracts encompassing parcel sales on a casual and short term basis. Long term agreements have arisen from tendered or negotiated outcomes. Shorter term agreements, particularly for low quality products can also be established following tenders and other forms of market exploration.

Commercial arrangements include three types of sales contracts, **Stumpage** and two types of Mill Door contracts (**Delivered Price** and **Delivery Charge + Stumpage**).

1. **Stumpage** - Provide for the customers to engage harvesting and haulage contractors directly, thereby purchasing logs purely on a ‘stumpage’ basis (predominant form of sales in the Eden Management Area and Western Region)

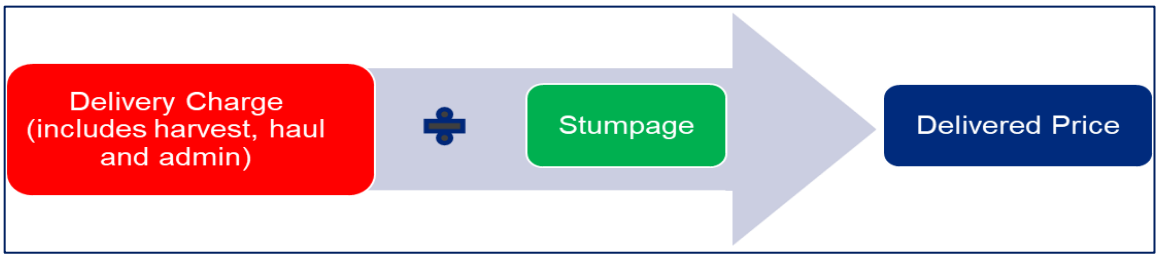
2. **Delivered Price** - This typically applies to low quality products, where FCNSW negotiate a mill door price. **Stumpage** movements and **delivery cost** adjustments are generally combined. FCNSW absorb the risk of costs either being higher or lower than anticipated, and derive a residual stumpage based on the mill door price, less contract costs as demonstrated below. Note that from an accounting perspective, FCNSW apply a notional Delivery Charge under Delivered Price contracts to cover harvest and haulage costs. The notional allocation of the Delivery Charge and Stumpage components has no influence on the Delivered Price.

Figure A7: Delivered Price Contracts



3. **Delivery Charge plus Stumpage** - The third type of contract provides for prices for the two components to be established independently – stumpages resulting from pre-defined adjustment mechanisms that include market based indices, and delivery charges that are a function of estimated contracted costs for harvesting and haulage. In this contract type, the customers wear the risk on increased or decreased costs where, for example, transport distances change from one period to the next.

Figure A8: Delivery Charge plus Stumpage Sale Arrangements



In both cases, contract arrangements provide for annual adjustments based on base cost movements and structural adjustments where significant changes occur such as new contracting tender processes are conducted or major changes to log market dynamics.

A.3.5 FCNSW – Harvest Contractor Arrangements

Given the obligations assumed by FCNSW in respect to the quantum and grade of logs to be delivered to differing customers, FCNSW engages harvesting and haulage contractors as part of the delivery arrangement. Within this delivery arrangement, FCNSW is responsible for the planning of the harvesting compartments and making these available to the harvesting contractors. FCNSW is also responsible for the overall performance of the harvesting and haulage contractors in respect to environmental as well as health and safety performance. As part of their contractual arrangements with the harvesting and haulage contractors, FCNSW requires the contractors to attain a range of minimum performance standards.

FCNSW undertakes tenders and seeks to match harvest and haulage capacity with projected demand based on the existing and proposed long and short terms wood supply agreements and industry analysis. Typically, the contracts arise from open tenders with harvesting and haulage contractors that are generally up to five years in length, and may include extension provisions. Shorter term contracts are employed to satisfy a temporary or unforeseen shortfall in capacity. Current harvesting rates generally result from the long term harvest and haulage services procurement processes conducted by FCNSW, which are tabled below.

Harvest and haulage agreements with FCNSW are typical of the broader Australian native forest industry in that they commonly have a number of key commercial terms:

- Contracts arising from open tenders are commonly up to 5 years in duration to facilitate financing of equipment

- Shorter term agreements may be employed where there is a specific capacity shortfall or uncertainty surrounds supply requirements
- Typical quantities for native forest harvesting are between 15,000 m3 and 40,000 m3 per annum
- Rates are usually based on a matrix that accounts for the type of product and the difficulty class related to completing the operations, or an agreed target production rate. An example of a Difficulty Class Matrix is provided below.

Table A2: North Coast Difficulty Class Matrix

			Volume:	**over 40m³/ha**
Slope of Net Harvest Area:		'Moderate'	'Steep'	'Very Steep'
		0% - 29% is over 20°	30% - 60% is over 20°	61% - 100% is over 20°
Snig Distance:	<150	A	A	A
	150-300	A	B	B
	301-500	B	B	C
	501-700	B	C	D

- Contracts provide for rate adjustments that are generally based on changes in CPI and fuel.

A.4. Economics of Harvesting and Haulage

To facilitate meaningful benchmarking, Indufor has sought to complete an analysis that provides an evaluation of the key cost drivers within the timber harvesting and haulage industry. We have attempted to analyse and contrast costs at three levels, being the:

- Enterprise/business level;
- Harvesting crew or truck level; and the
- Operational level.

A.4.1 Enterprise Level Cost Drivers

Whilst understanding the actual operating environment is critically important, so too is an evaluation of the other influencing factors such as the structure and profile of the businesses involved and the nature of the relationships between supplier and customer.

High level business cost drivers are tabled below. The study used this as a basis for comparing and contrasting enterprises within NSW and comparator regions.

Table A3: Level 1 – Enterprise Cost Drivers

Level 1 - Enterprise Level Cost Drivers		
Item	Measure	Consideration
Fixed capital (other than crew level)	$	Plant and equipment, infrastructure, business size
Working capital	$	Business size, payment terms, cashflow
Management and supervision	$ per year	Number of staff / crews, geographic spread, complexity
Administration	$ per year	Complexity
Total revenue	$ per year	

A.4.2 Crew Level Cost Drivers – Harvesting

At a crew or truck level, costs are attributed to capital, labour, repairs and fuel. The factors that will influence unit costs are table below.

There has been a transition to mechanised operations within native forests across Australia Equipment includes specialised plant for felling, snigging and processing logs. Minimum standards include specific machine guarding requirements and fire suppression systems. Financing costs will vary depending upon equipment needs, contract terms and business risk. Typical capital costs for a standard 3 machine harvesting crew are in the order of $1.2M to $2M. Data provided for this study indicates that estimates of total financing costs in the range of $0.6M - $1M per harvesting crew.

Table A4: Level 2 – Crew/Truck Cost Drivers

Level 2 - Crew / Truck Level Cost Drivers		
Item	Measure	Consideration
Fixed capital	$	Machine requirements / specifications / contract terms (depreciation schedules)
Labour	$ per year	Level of mechanisation / labour market
Repairs and Maintenance	$ per year	Age of equipment, serviceability
Fuel	$ per year	
Work days per year	Days per year	Relocation, Wet Weather (Seasonal/ad hoc), planning delays, protests
Work hours per day	Hours per day	Travel
Annual production	tonnes	
Average price per tonne	$ per tonne	

This type of data was collated for the 2013-2016 Benchmarking Study. It has not been updated for subsequent reviews on the basis that basic contract structures had not materially changed since that time.

A.4.3 Operational Cost Drivers – Harvesting

Site and market specific considerations heavily influence the underlying economics of felling, extraction, processing and loading. For example, average daily production (m^3 per day) can vary significantly between different locations as a result of access, topography, forest condition, forest treatment (see the Appendix for discussion on silviculture) and in particular the market availability

for residues such as pulpwood. The following table describes the operational factors that have the greatest impact on productivity and thereby costs.

Table A5: Operational Factors Influencing Harvest Costs

Level 3 - Operational Cost Drivers (Harvesting)					
Function	Activities		Cost Driver		
	Primary	Secondary	Primary	Secondary	Non-productive time (NPT)
Harvesting	Falling	Travelling	Total Recoverable Volume per day	Distance (stems per ha)	Operator availability
		Falling and Heading		Trees per day	
				TRV per tree	
	Extraction	Grappling	Total Recoverable Volume per day	Utilisation level, payload / loads per day	Waiting for stock, operator availability
		Travelling (loaded)		Utilisation level, distance, terrain, speed	
		Travelling (unloaded)		Distance, terrain, speed	
	Processing (Log Making)	Trimming		Tree size / utilisation level	Waiting for stock
		Debarking			
		Log Making Analysis		Defect level, grading complexity	
		Log Making		Utilisation level, piece size, servicing requirements	
		Grading / marking		Grading complexity, marking, tagging requirements	
		Sorting and stacking		Sorting requirements, distance, room at dump	
	Loading	Sorting	Total Volume loaded per day	Sorting requirements, piece size	Waiting for stock
		Loading			Waiting for truck

Harvesting includes the following activities:

Felling - resources required for felling trees can be a single chainsaw operator (‘hand faller’), or a specialised machine. Productivity for either hand or mechanical felling is dependent upon the distance required to travel between trees to be felled, forest conditions (terrain, understorey), the complexity of felling (particularly the need to protect retained trees or drainage features from damage), and the amount of total recoverable volume (TRV) of each tree.

Extraction of logs to a roadside landing is generally undertaken in eastern native forests in Australia with skidders. These will use a winch rope or grapple to drag (or ‘snig’) trees from the point of felling to the landing. Productivity is directly related to log size, the average snigging

distance required, and travel speed, which in turn is a function of ground conditions, terrain and slope in particular.

Processing - most hardwood logs in Australia are required to be debarked. This is followed by 'crosscutting' to generate logs from the main stem that are appropriate size and quality to meet a particular market segment, and are suitable for transport. Processing may be undertaken by chainsaw operators or specialised equipment. Capital costs will vary accordingly. Productivity is related to the complexity of grading, and the level of defect in the trees that require servicing. All of these factors may also impact the TRV of each tree.

For felling, extraction and processing, TRV per ha is the key driver of productivity. Low yielding sites, due to either or both few commercial trees or a limited number of smaller trees, require more trees to be felled, further distances for logs to be snigged, and will tend to consist of smaller trees therefore increasing the number of pieces required to be handled by each phase.

Loading is undertaken with wheeled or tracked loaders. The time taken to load a truck is related to the average log size, and the waiting time between trucks.

The productivity of each phase or activity is also related to non-productive time. This can be significant where there are bottlenecks in the production process, such as excessive snigging distance, that constrains either the felling process by not being able to remove sufficient felled material to ensure felling can continue unimpeded, or the processing and loading process by not enabling a continuous flow of resource to the landing. Operations that maximise productivity through effective synchronisation of production phases tend to be the most efficient and cost competitive. Non-productive time resulting from wet weather, relocation, operator travel time, and machine breakdown can also have profound impacts on productivity and thereby costs.

A.4.4 Impact of Silviculture

Silviculture is the practice of establishing or regenerating forests, and managing the forest through thinning, pruning, and harvesting to meet specific objectives. In comparing harvesting rates, the silvicultural regimes employed can have a significant impact on the removed yield, and also on the costs associated with managing retained standing trees.

Compared to harvesting systems elsewhere in Australia, NSW generally has a much higher level of retained number of stems that do impose a cost in terms of identifying, protecting and managing them during the harvest operation (see below).

Plate A10: Single tree selection NSW

Plate A11: Single tree / gap selection NSW

Plate A12: Clearfall system Victoria

Plate A13: Steep clearfall Tasmania

Plate A14: Western Australian Jarrah harvesting – note logs are 'bark on' and of mixed log quality with little log grade segregation

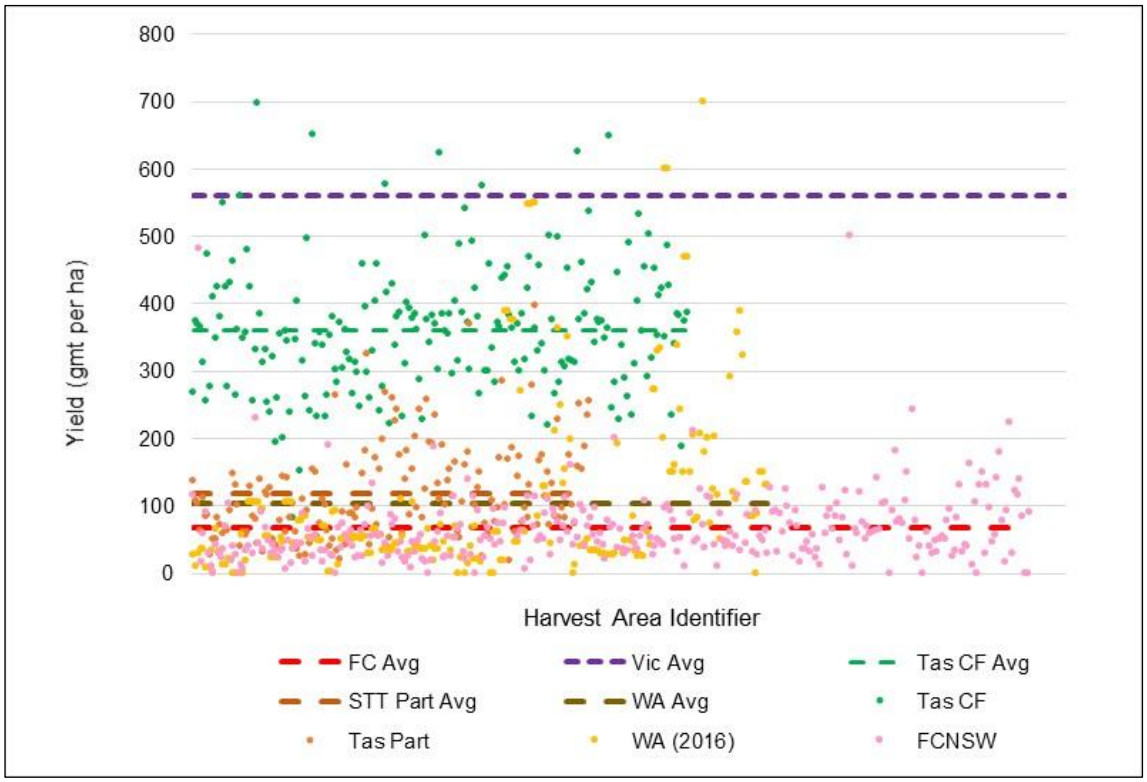
Silvicultural prescriptions are developed in order to meet different objectives. This can mean maximising disturbance to provide for good regeneration from seed, or retaining mid-size trees in order to ensure growing stock is available for subsequent harvesting cycles. Of increasing relevance in NSW is the retention of trees to meet threatened species prescriptions, and the provision of habitat across the harvested areas.

Once a tree or patch of trees is identified as needing protection, felling and extraction of other trees must be undertaken in such a fashion as to have no impact on the retained tree or patch. This can add to the cost of building snig tracks, directional felling, and moving equipment. Whilst retained tree management is common elsewhere, other jurisdictions subject to this study tend to have a higher proportion of clearfall or large gap operations, which are in essence simpler to undertake in that tree selection is more easily completed, and protection areas more easily defined and retained.

As a result of different forest types and silvicultural systems, Figure A9 highlights the range in yields across the jurisdictions. For example the STT clearfall operations average twice the yield of the thinning and shelterwood systems (noted as 'STT Part'), whilst the single tree selection systems generally adopted by FCNSW result in yields generally less than 60 gmt per ha. The Victorian yield is represented by a single average (VF Avg), rather than details at the harvest area level. It is important to note reflect the majority of VF operations are clearfall, as well as the very high productivity of the Ash-type forests within the state.

This chart illustrates individual compartment yields for the comparator jurisdictions over the previous 3 year review period, including NSW low yields per ha. In particular it also demonstrates both the spread within each jurisdiction but also the significant differences in average yields.

Figure A9: Comparison of Yields by Individual Harvest Area by State FY2017-19



Source: FCNSW, FPC, STT, VF

A.4.5 Truck Level Cost Drivers – Haulage

Haulage includes the following activities:

- Scheduling and despatch of trucks
- Travelling unloaded to the forest
- Loading of logs (actual loading usually performed by harvesting contractors)
- Strapping down of logs

- Transport to mill
- Unstrapping / unloading (unloading usually performed by mill).

The following factors influence the total cost and unit costs within each jurisdiction.

Equipment – prime movers and log trailers. There has been an increasing demand for specialist equipment to improve health and safety outcomes for log transport. This includes trucks with appropriate guarding, measurement scales, and GPS capability, and trailers with measurement scales, road-friendly suspension, auto-load tensioning systems, electronic braking systems and a design to meet vehicle stability requirements.

The factors influencing haulage costs are listed in below.

Table A6: Operational Factors influencing Haulage Costs

Level 3 - Operational Cost Drivers (Haulage)					
Function	Activities		Cost Driver		
	Primary	Secondary	Primary	Secondary	Non-productive time
Haulage	Empty	Travelling empty	Volume x Distance per day	Payload	Waiting for loader
	Loading	Loading		Loaded running	Congestion at dump
		Strapping down		Total kms per day	Congestion at mill
	Loaded	Travelling loaded		Hours per day available	Driver hours - fatigue
		Unloading		Hours per day utilised (planned and unplanned NPT)	Whole load requirements (complete trips)

The key operational cost driver is the quantity transported daily. This is a function of distance, road condition, terrain, loading and unloading time, and payload. These factors are discussed below. Haulage operations, unlike harvesting, are not influenced as strongly by site specific factors, although road standard into the harvest site can vary with low yielding forest rarely justifying the expense of significant roadworks. Generally though, key drivers are more easily predicted, the operating environment more homogenous, and comparing costs across jurisdictions is somewhat easier.

The related influence on haulage costs is distance travelled from the forest to the mill or delivery site. There is a linear relationship between rates and distance.

The other key parameters are road standards which have an impact on travel speed as well as truck repairs and maintenance, and payload which can vary significantly ranging from standard semi-trailer configurations (27 tonnes) to road trains in excess of 80 tonnes.

A description of the different road standards within FCNSW and VicForests operations is tabled in Table A7: Road Class Description Comparison.

Table A7: Road Class Description Comparison

	Definition / Description	
Class	**FCNSW**	**VicForests**
A	Sealed roads where none of the conditions of Class B apply.	Any section of a road with a surface of bitumen, concrete, metal, gravel or material similar to gravel on which there is sufficient width of formation for two vehicles to pass without difficulty, and on which speed is not unduly reduced by grades, curves or conditions of surface or urban and residential areas.
B	Unsealed roads: Which are formed and drained by means other than rollover drains and where none of the conditions of Class C apply. Sealed roads: Which loaded truck travel speed, fuel economy and wear and tear is assessed by Forests NSW as being no better than an equivalent unsealed B class surface due to one or more of: narrow single lane width, bitumen surface deterioration, sustained steep grade (>500m, >8 degrees) or poor horizontal alignment.	(i) Any section of road with a surface of bitumen, concrete, metal, gravel, sand or material on which there is sufficient width of formation for two vehicles to pass only with difficulty or speed (compared with "A" Class roads) is reduced by grades, curves or urban and residential areas and to which none of the conditions applicable to "C" Class roads apply. (ii) Any section of an earth road on which there is sufficient width of formation for two vehicles to pass without difficulty and on which speed is not unduly reduced by grades, curves or condition of surface
C	Unsealed roads: Which compared to Class B roads, loaded truck travel speed is reduced and truck wear and tear increased due to: Adverse surface conditions, rollover drains, rock, rutting or corrugations. Adverse road grades exceeding 5 degrees for more than 500 metres.	(i) Any section of road where there is insufficient width of formation for two vehicles to pass or speed (as compared to Class "A" road) is considerably reduced by grade, curves or conditions of surface, e.g. corrugations and rutting. (ii) Any section of road where the road surface is likely to cause excessive tyre wear.
D		(i) Unformed bush track or roughly formed bulldozer trail. (ii) Any section of an earth road on which there is insufficient width for two vehicles to pass and speed is severely restricted by grades, curves or condition of surface.

Source: FCNSW, VF

Truck utilisation is dependent upon the non-productive time. This includes waiting to be loaded or unloaded, but can also include time where the truck is not utilised due to wet weather, or to constraints on drivers such as fatigue management restriction. Where operations are structured such that a truck may take 7 hours to complete a load from the time it leaves the depot to the time it returns, if a shorter trip is unavailable to 'fill in' the day, the truck will remain under-utilised even though it may be available for a 12 hour window for that day.

Efficiency gains can be made through effective scheduling whereby backloading or crossloading occurs (loaded running). This fundamentally means that the distance a truck is loaded exceeds the unloaded distance, so that assuming all other things are equal, the truck is spending a higher proportion of the day moving logs and generating revenue to cover both fixed and operating costs.