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Forestry Corporation of NSW

Native Forest Harvest and Haulage Review and Benchmarking

Final Report

01 February 2021

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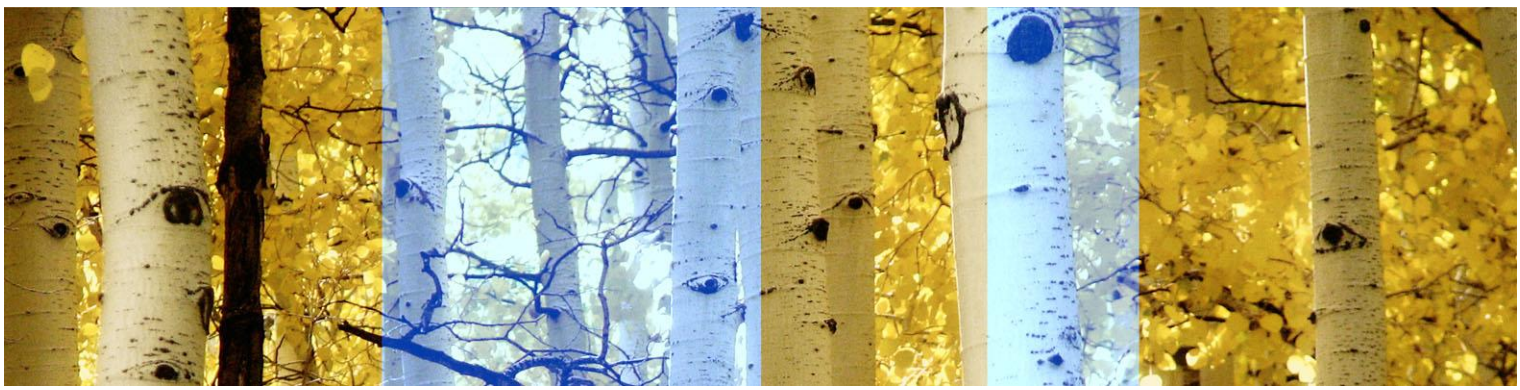
Melbourne



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PREFACE

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EXECUTIVE SUMMARY

Forestry Corporation of New South Wales (FCNSW) is a State-Owned Corporation and the largest producer of logs harvested from commercial native and hardwood plantation forests in NSW. The purpose of this report was to undertake a review and benchmarking of FCNSW's mill door native timber harvest and haul costs for the period 1 July 2016 to 30 June 2019. This review is a legislative requirement under Section 91 (1) of the Forestry Act 2012. In 2017, Indufor undertook the Section 91 review entailing benchmarking and reporting that considered harvest and haulage costs for the first three years of the Corporation (2013/14 to 2015/16).

Indufor were engaged by FCNSW to undertake this independent review. The scope of the review completed for this report was the following:

(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.

The approach, findings and recommendations of this report are outlined as follows.

Benchmarking

The industry benchmarking analysis of FCNSW's native timber harvest and haulage costs was undertaken in two parts:

- Unit cost comparison for the period 2016 – 2019; and
- Analysis of cost drivers through the development of productivity cost models.

The data and information that was collected and applied to the benchmarking analysis comprised the following:

- FCNSW sales data
- FCNSW cost data by activity to determine unit costs for harvest and haulage
- Procurement/tendering information and contracted rate outcomes for both FCNSW and other available jurisdictions.

The findings of the benchmarking analysis were as follows:

- There are significant differences in commercial, regulatory and operating environments between the NSW and other native forest harvesting jurisdictions. Quantifying the direct impact of these characteristics on costs is complex and there is insufficient data to model these impacts effectively.

- *Harvest rates* - Whilst the observed rates in the four identified geographic markets in which FCNSW procures harvesting services appear higher than other jurisdictions, there are market specific factors influencing operating costs that can be attributed to the higher harvest rates in NSW. We note that the harvest rates over the three years covered by this review have increased at a higher rate than the CPI over the relevant period, however at a rate commensurate with increases observed in CPI and fuel, which is a critical driver of harvest costs.

- *Haulage rates* – 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 are within the ranges observed across comparable operations.

Market power assessment

The structure of the market for the provision of harvest and haul services has not substantially changed to those reported upon in the 2013-2016 Benchmarking Study.

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. To consider whether there may be 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 and that the market concentration and pricing outcomes over the three year period covered by the review do not appear to highlight potential market power in local or regional markets.

Efficiency analysis

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

FCNSW delivery charges received from their customers do not appear to cover the combined aspects of third party contracted costs and FCNSW administration costs, over the three year period overall. The level of the recovery shortfall varies by regional and Indufor notes a marginal improvement in the final year of the review period. FCNSW have advised that this situation will be rectified in future years.

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 functions appear to be reasonably competitive and FCNSW are actively managing procurement processes to seek price discovery and ensure contracted parties are operating efficiently
    - Increases have been more than CPI over the review period, however the impact of a 27% increase in the benchmark cost of fuel over the review period is included in this increase.
- FCNSW costs for haulage services are commensurate with other native forest operations.
- FCNSW estimate of administration costs appear to be commensurate with comparable operations.
- Through the application of delivery charges, FCNSW do not appear to be recovering the collective full cost of third party contractor charges and FCNSW administration charges.

Recommendations

Based on our findings above, our recommendations on the options for enhancing the capacity for FCNSW to benchmarking its harvest and haulage costs in the future are the following:

- ***Procurement processes –*** A record of contract negotiations for both harvest and haulage services is now maintained by the Contract and Procurement Manager. This data could be improved by referencing each outcome to a dated negotiation or approval process. Such data would assist FCNSW demonstrate it securing market-based prices.

- ***Inter-jurisdictional data –*** Given the significant inter-jurisdictional operational differences, it is difficult collect comparable harvesting cost data. An option for consideration is for FCNSW to complete regular independent assessments on harvest crews' productivity levels to act as a guide to drivers of harvest cost.
- ***Cost recovery***
    - Cost recovery – FCNSW should continue to ensure that administrative mechanisms are in place to fully recover third party contract and FCNSW administration costs, and that commercial arrangements adequately provide for cost recovery where operating or regulatory conditions substantially change.

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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 2016 to 30 June 2019. This review is a legislative requirement under Section 91 (1) of The Forestry Act 2012.

> ***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

The scope of the review completed for this report incorporated the following aspects. For the period 1 July 2016 to 30 June 2019, for those native timber harvest and haul operations where FCNSW directly engages the contractor and establishes rates for service (mill door sales):

(iv) 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

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

(vi) 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 entailing benchmarking and reporting that considered harvest and haulage costs for the first three years of the Corporation (2013/14 to 2015/16) ('2013-2016 Benchmarking Study'). Key elements of the 2017 Section 91 report were incorporated and updated in preparing this 2020 report.

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 FY2017-19
- Analysis of cost drivers through the development of productivity cost models.

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
- *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.

1.4 Report Structure

The structure of this report is as follows:

- Section 2 provides an overview of the native timber industry in NSW
- 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.

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 and distribution sectors.

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

2.1 Resource

There are 26.5 million (M) hectares (ha) of forest in NSW, of which FCNSW manage 2.2M ha (Table 2-1). 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.

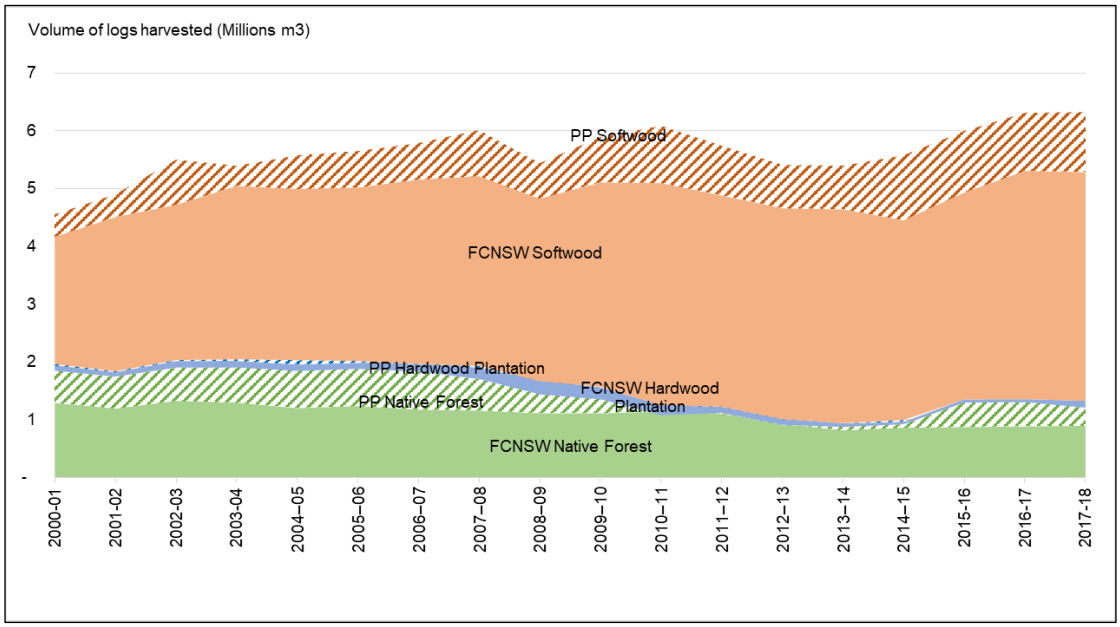
Table 2-1: Forest area

	Area (million ha)		
Description	**Australia**	**NSW**	**FCNSW**
Total land area	770	80	2.2
Total forest area	149	26.5	2.2
Native forest area	147	26.2	1.9
Native forest in formal conservation areas	22	5.1	0.02
Net plantation area	2	0.37	0.24

Source: ABARES, Forestry Corporation Sustainability Report 2018-19

As is evident from Figure 2-1, of the total 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 – 2017/18*

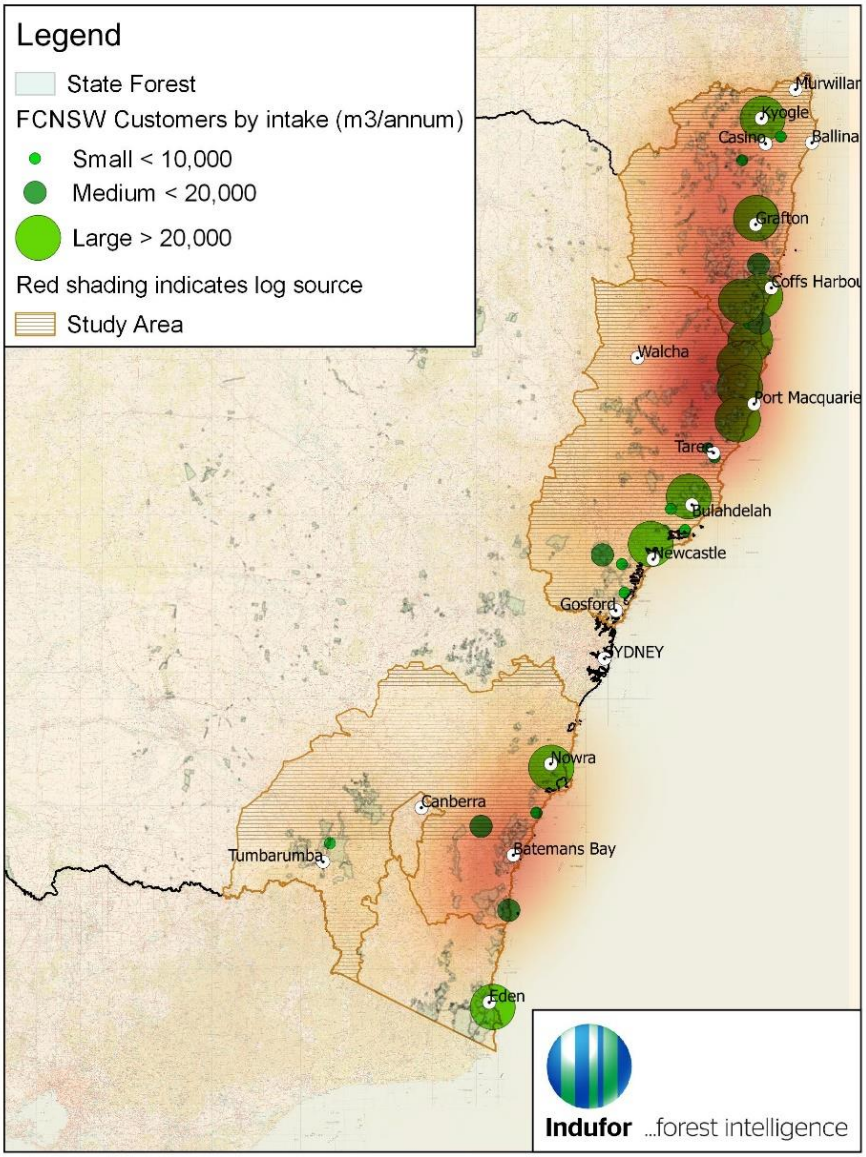


Source: ABARES, FCNSW

*Note – Indufor understands the private native forests volume 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 completed in the coastal forests of NSW. FCNSW manage these log production types and sales in two broad geographic zones based on forest 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 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 2-2: 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

2.3 Timber Production Supply Chain

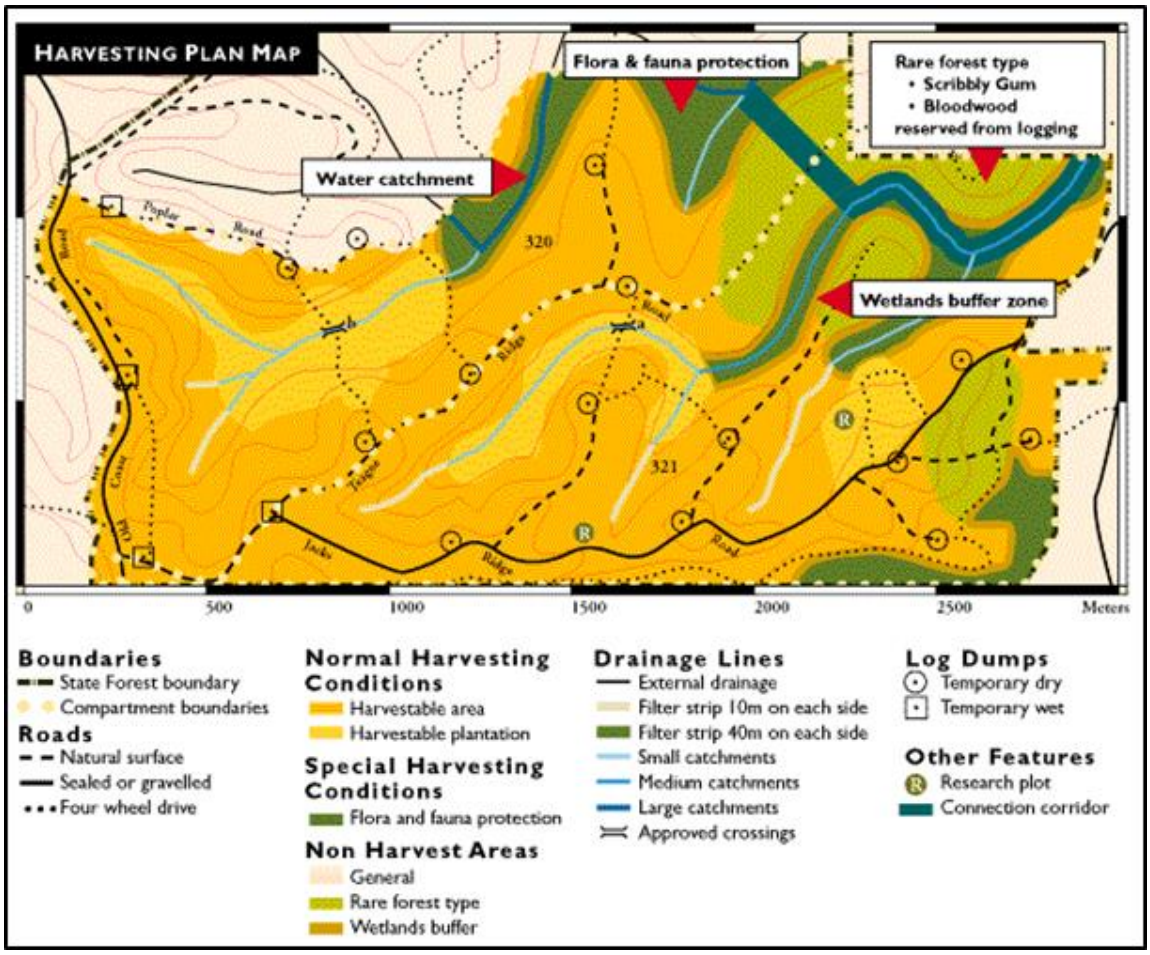
The supply chain for the industry constitutes:

- 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.

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 Figure 2-2, which defines the location of the various harvest and non-harvest areas.

Figure 2-2: 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 2-1: 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 2-2: Manual tree felling

Plate 2-3: Mechanical tree felling

Plate 2-4: Snigging logs (winch)

Plate 2-5: 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 2-3 and following plates). In addition, many NSW timber harvesting operations involves multiple species from the same harvest area, commonly having differing market value.

Figure 2-3: Harvesting process

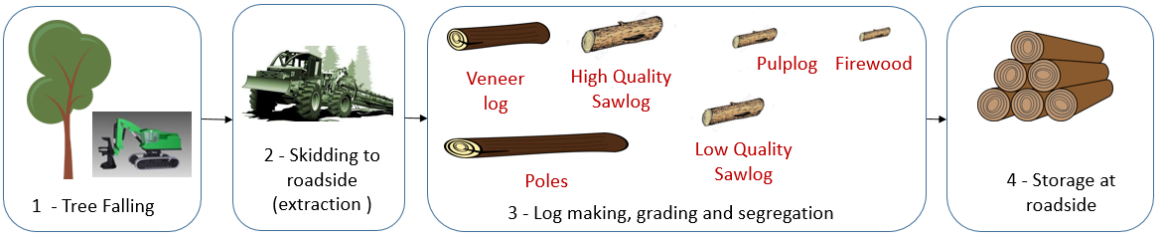


Plate 2-6: Log making with chainsaw

Plate 2-7: 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.

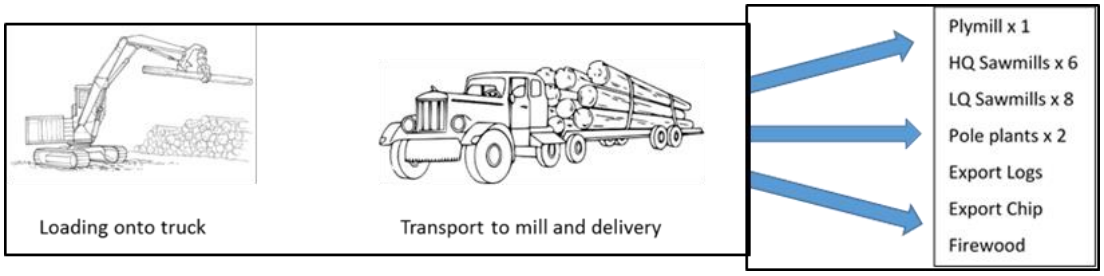
Plate 2-8: Log loading in progress

Plate 2-9: 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 2-4).

Figure 2-4: Log loading and distribution process



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 (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 (see Section 2.4.1 for descriptions of sales arrangements).

Table 2-3: Overview of FCNSW Native Forest Log Supply Arrangements

Company	Mill Locations	Product	Contract Term[1]	Sale Type	Allocation Total (m^3 or gmt per annum)
Allied Natural Wood Exports	Edrom	Pulplog	2018 - 2033	Stumpage	**290 000**
Allied Natural Wood Exports	Edrom	Sawlog	2020 - 2029	Stumpage	**25 000**
Boral Timber	Koolkhan Herons Ck, Kyogle	High Quality Sawlogs	2004 - 2028	Mill door	**163 000**
	Narooma, Nowra	High Quality Sawlogs	2001 - 2020		
Thora Sawmilling Pty Limited	Thora	High Quality Sawlogs, Low Quality Sawlogs	2004 - 2023	Mill door	**42 627**
Hurfords Hardwood Kempsey Pty Ltd	West Kempsey	High Quality Sawlogs, Low Quality Sawlogs	2004 - 2023	Mill door	**8 123**
Newells Creek Sawmilling Co. Pty Ltd SA Relf & Sons Pty Ltd	Bulahdelah	High Quality Sawlogs, Low Quality Sawlogs	2004 - 2023	Mill door	**19 807**

[1] Contract terms are stated as a guide only – customers may have a series of contracts with differing commencement and end dates

Company	Mill Locations	Product	Contract Term[1]	Sale Type	Allocation Total (m^3 or gmt per annum)
Adams Sawmills Pty Ltd	Bonville	Low Quality Sawlogs	2004 – 2021	Mill door	**21 863**
Hurford's Building Supplies Ltd	Kyogle, Casino, Karuah, Tuncester	High Quality Sawlogs, Low Quality Sawlogs	2004 - 2023	Mill door	**21 753**
Koppers Wood Products Pty Ltd	Junction Hill	Poles and Piles	2004 - 2023	Mill door	**20 260**
Aquafern Pty Limited	Warrell Creek	Low Quality Sawlogs	2005 - 2023	Mill door	**18 000**
Hayden Timbers Pty Ltd	Telegraph Point	Low Quality Sawlogs	2006 - 2023	Mill door	**17 925**
CJ & A Woods Pty Limited	Nambucca	High Quality Sawlogs, Low Quality Sawlogs	2007 - 2023	Mill door	**7 182**
J Notaras & Sons	Grafton	High Quality Sawlogs, Low Quality Sawlogs	2004 - 2023	Mill door	**16 579**
Big Rivers Timbers	Junction Hill	Veneer Logs	2004 - 2023	Mill door	**16 502**
Weathertex Pty Ltd	Heatherbrae	Pulplog	2023	Mill door	**21 000**
Ryan & McNulty Pty Ltd	Benalla	High Quality Sawlogs	2004 - 2030	Mill door	**18 500**
Braidwood Sawmill	Braidwood	High Quality Sawlogs, Low Quality Sawlogs	2020	Mill door	**5 886**
Williams Timber Pty Ltd	Bucca	Poles, Piles, Girders, High Quality Sawlogs, Low Quality Sawlogs	2023	Mill door	**4 550**
Other (63 entities)	Various	Various	Various		**>1000**

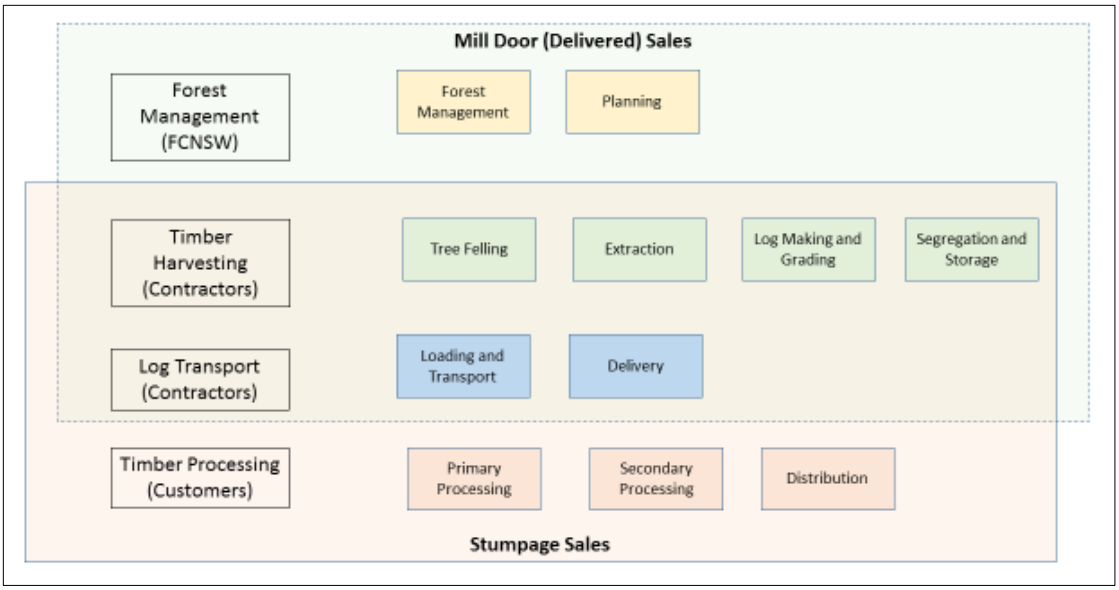
Source: FCNSW

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 in Figure 2-5. 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.

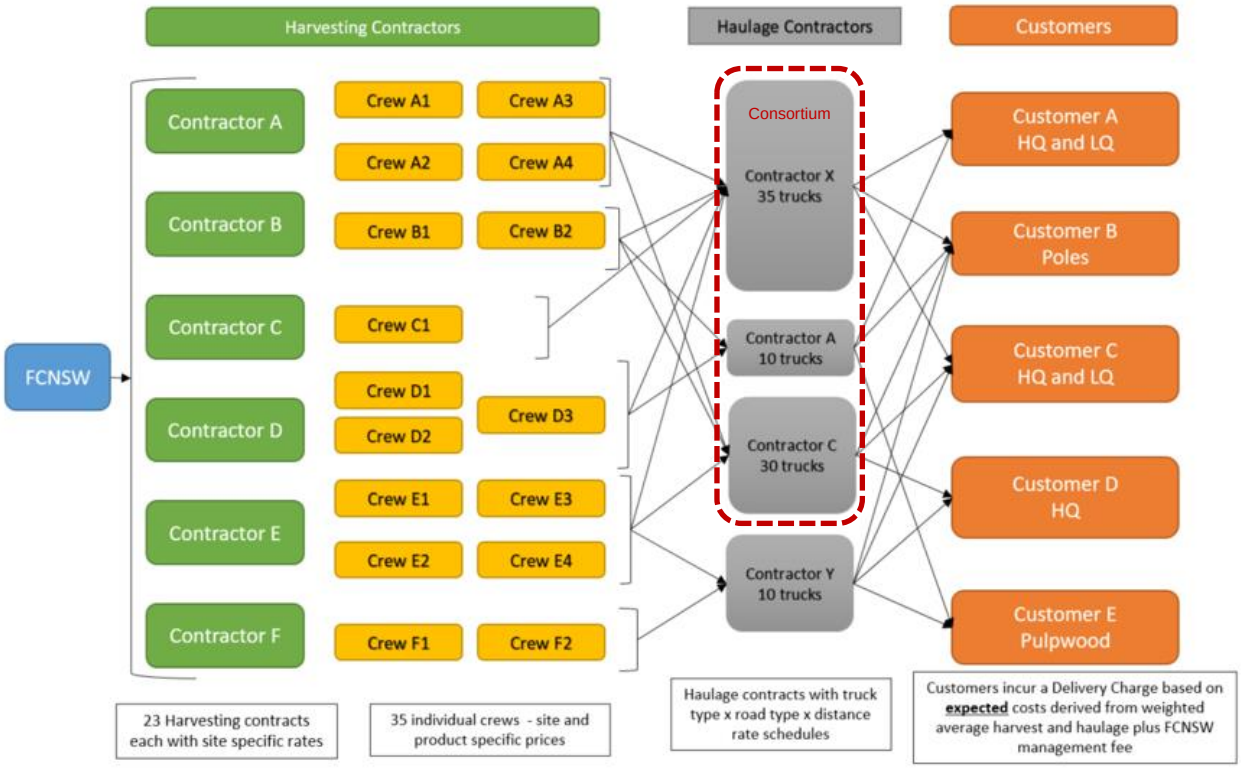
Figure 2-5: Conceptual Diagram of Alternative Sales Arrangements and Control of Supply



In the period FY2017-19, FCNSW sold logs to 130 customers on a mill door basis (combination of Delivered Price and Delivery Charge plus Stumpage contracts), 5 customers on stumpage arrangements, and 21 customers through a combination of mill door and stumpage sales.

FCNSW engaged 31 harvesting contractors and 10 haulage contractors to deliver logs during this period. The delivery charge to the customer is derived from the harvest and haul charges that are estimated from the likely combination of contract prices. Figure 2-6 provides a generalised illustration of the inputs into the delivery charge calculation.

Figure 2-6: 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).

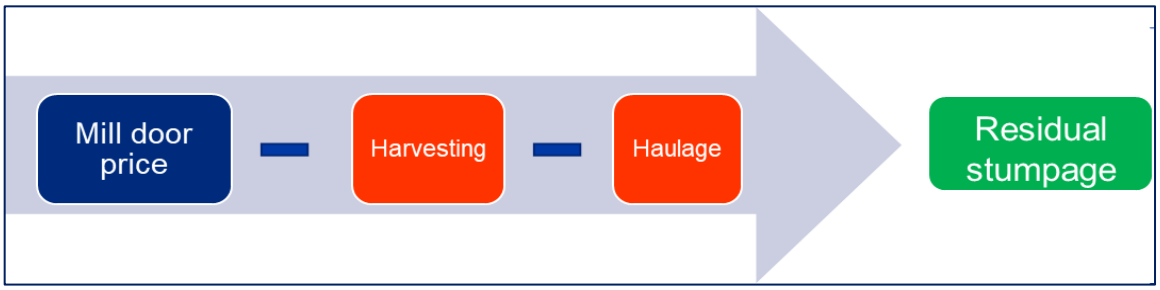
2.4.1 FCNSW – Log Customer Arrangements

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**).

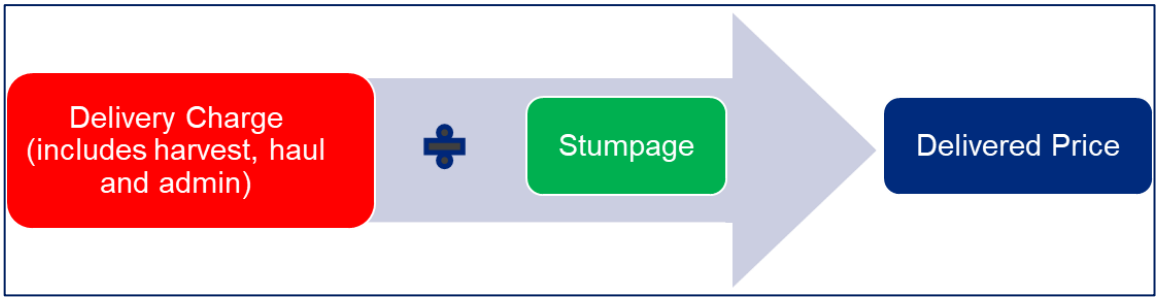
1. **Stumpage** - Provide for the customers to engage harvesting and haulage contractors directly, thereby purchasing logs purely on a 'stumpage' basis (predominant form of sales in the Eden Management Area and Western Region)
2. **Delivered Price** - This typically applies to low quality products, where FCNSW negotiate a mill door price, 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.

Figure 2-7: 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 2-8: 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.

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 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 coupes 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 in Figure 4-4.

While outside the scope of this review, FCNSW went to the open market in 2019 seeking:

- 102,000 tonnes per annum of native forest harvesting capacity (made up of 3 work packages)
- 30,000 tonnes per annum of haulage
- for a period of up to 5 years via a formal Request for Proposals followed by a Direct Negotiation process.

This is considered here to demonstrate the pathway for FCNSW to test the market, whilst noting that this particular process has stalled due to industry interruptions associated with the Black Summer fires of 2019/20.

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 m^3 and 40,000 m^3 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
- Contracts provide for rate adjustments that are generally based on changes in CPI and fuel.

2.5 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.

2.5.1 Industry Competitiveness

The following factors largely determine the long term competitiveness of the timber industry[2]:

- 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)

[2] 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.

- 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 (see Figure 2-1), 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, alsothe 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.

This has an overall impact of reducing the scale of activity, at both the work site level as defined by a coupe, 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 period that include some of the 2018/19 year 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 (see Figure 2-9). Enforcement of the licences is undertaken by the Environment Protection Authority and the Department of Primary Industry – Fisheries.

Figure 2-9: IFOA framework

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.

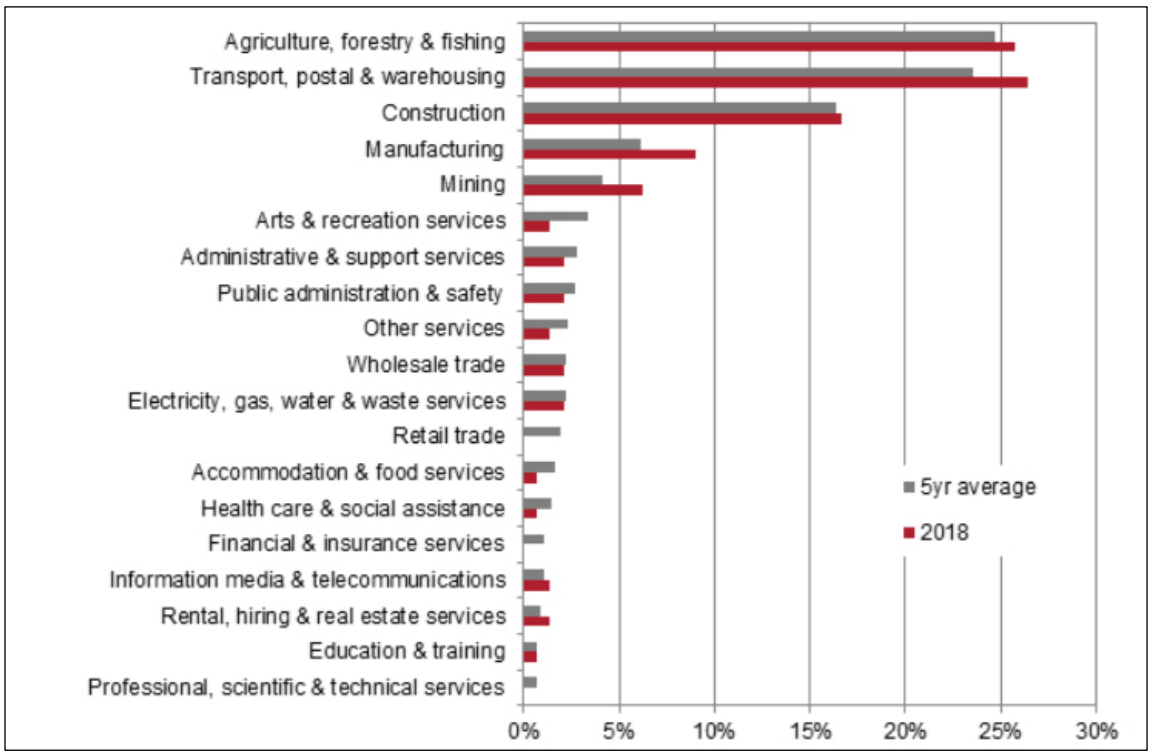
The driver for this change was primarily efficiency through improved technology, providing better access and productivity. In addition, health and safety reform has reinforced this mechanisation change. However, the consequences of this was a greater demand for capital in the form of machinery, requiring 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 (Figure 2-10), 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 2-10: Worker Fatalities: Proportion by industry of employer, 2018 and five year average (2014-2018)



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 as is evident from Figure 2-1. 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 FY2017-19.

3.1 Background

The benchmarking analysis has been undertaken in two parts:

- unit cost comparison for the period FY2017-19; and
- analysis of cost drivers through the development of productivity cost models.

The intent of the unit cost comparison is to provide key benchmarks for comparison with other jurisdictions, to establish a base for future analysis, 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. The degree of customisation can be commonly sourced to on-going exploration of methods utilised by the forest managers and the contractors involved in the harvesting and haulage services, and as a response for on-going cost pressures and desires to enhance operational efficiency.

The intent of these models was to identify the cost factors contributing to overall costs for each jurisdiction, and thus enable a reasonable comparison across differing environments. As will be discussed later, data limitations constrained the use of the models as a means of comparison.

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, the Western Australian Forest Products Commission (FPC) generally conduct open tenders for the majority of the harvest and haul services required, with terms of up to 9 years, aligned with Western Australian Forest Management Plan (FMP) term.

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.

In Victoria, VicForests have tended to go to the market for harvest and haul services every four or five years and offering 3 to 5 years contract term. They are usually open tenders however the most recent was a selected process.

3.3 Unit Cost Comparison

A unit cost comparison of both contract rate schedule 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 (north for north coast, south for south coast (excluding Eden) and 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. Where unit cost data is not available, average rates have been calculated either on a straight or weighted volume basis.

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, Table 3-4 shown below demonstrates the margins applied to each product in FCNSW contracts in order to both 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.

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

Table 3-1: CPI June 2016 - 2019

Period	Index	Annual Change
June 2016	109.3	
June 2017	111.7	2.20%
June 2018	114.0	2.06%
June 2019	115.9	1.67%
Total		*5.92%*
Annual average		*1.97%*

Source: ABS. Note - Sydney (all groups)

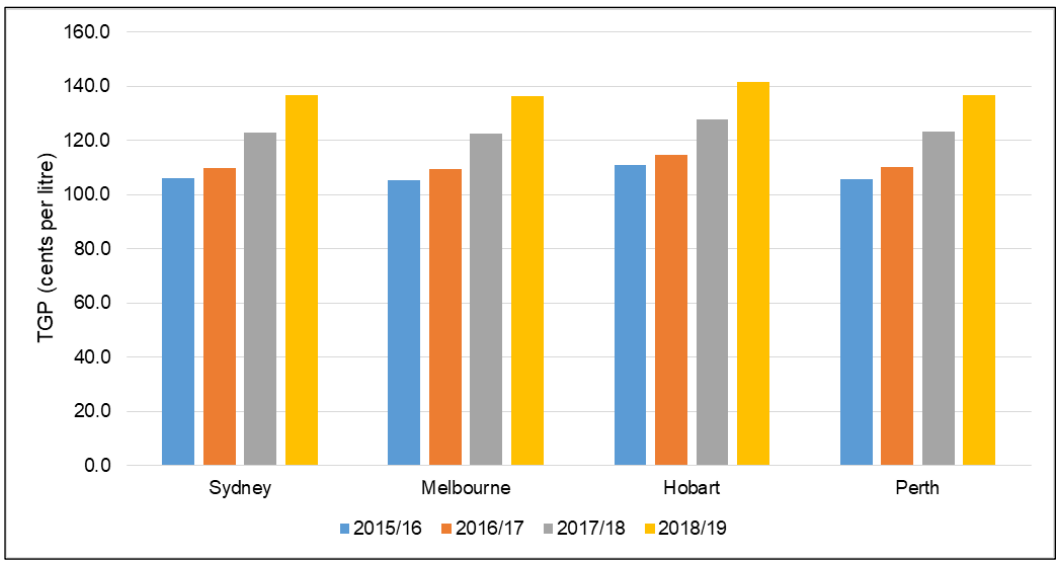
Table 3-2: Average Diesel Terminal Gate Price (Sydney) FY2016 – FY2019

Period	Index (12 month average)	Annual Change
FY2016	105.9	
FY2017	109.8	+3.68%
FY2018	122.9	+11.91%
FY2019	136.8	+11.29%
Total		*+26.88%*
Annual average		*+8.96%*

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

Figure 3-1 shows the difference in diesel prices 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.

Figure 3-1: Average Terminal Gate Price for Diesel FY by City FY2016 - FY2019



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

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, harvest costs on average rose 4.2% per annum.

Table 3-3: Rate of Change – FCNSW Harvest Unit Costs

Harvest ($ per gmt)					
Region	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Change 2016-19**
Production North	39.54	41.59	44.13	45.39	5.85
Annual Change		5.2%	6.1%	2.9%	4.7% (avg)
Total Change					14.8%
Production South	30.15	32.18	32.81	35.23	5.08
Annual Change		6.7%	2.0%	7.4%	5.4% (avg)
Total Change					16.8%
Total	**37.33**	**38.84**	**40.50**	**42.19**	**4.86**
Annual Change		4.1%	4.3%	4.2%	4.2% (avg)
Total Change					**13.0%**

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.

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%

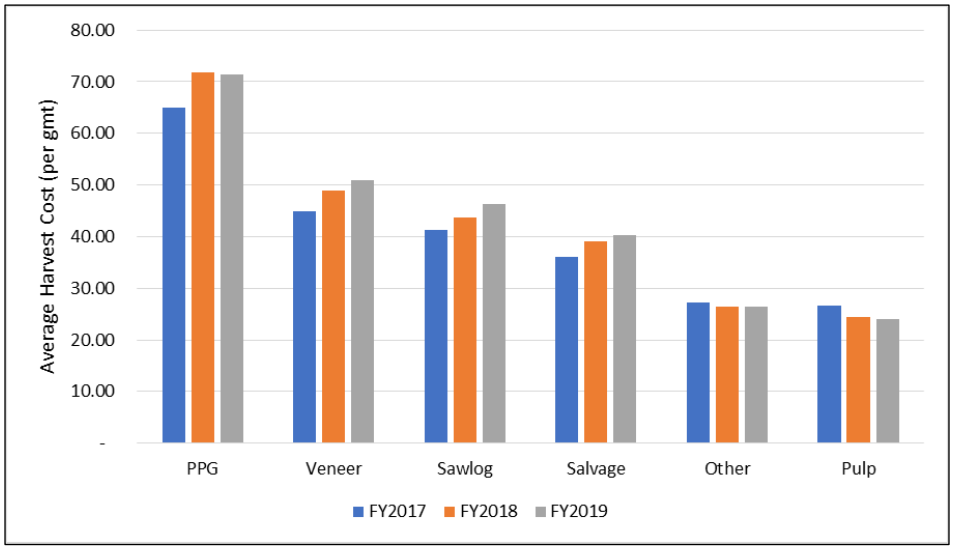
Source: FCNSW

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 significant variation between the products (Figure 3-2). This indicates the absolute increase in rates

has been higher for the PPG group along with the other key products of sawlog and veneer, while harvest for pulp logs and 'other' have declined.

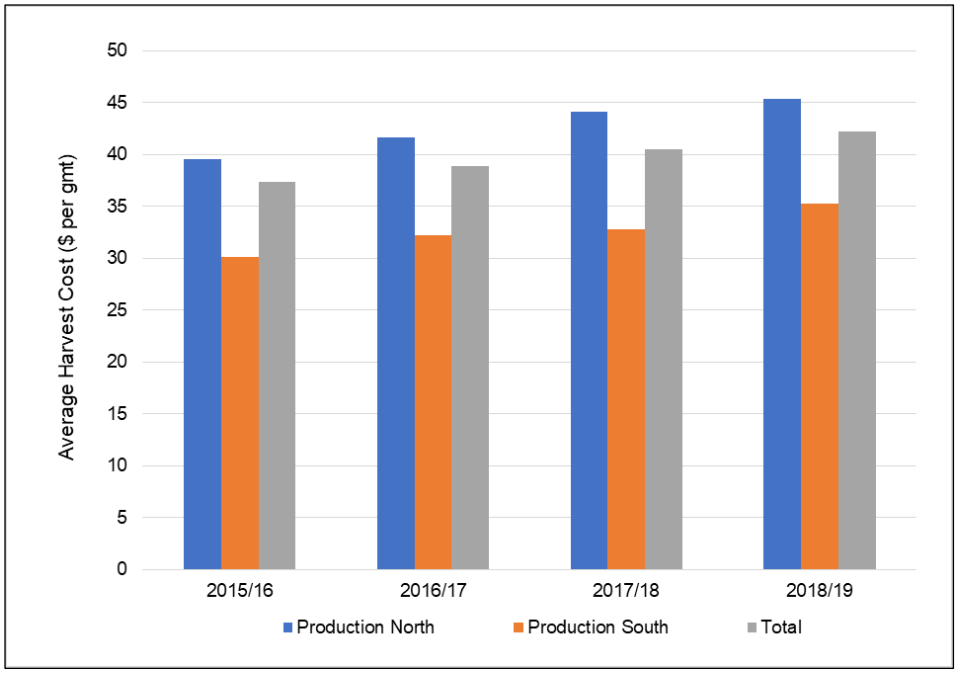
Figure 3-2: Average harvest cost by product group FY2017-2019



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 FY2017-2019

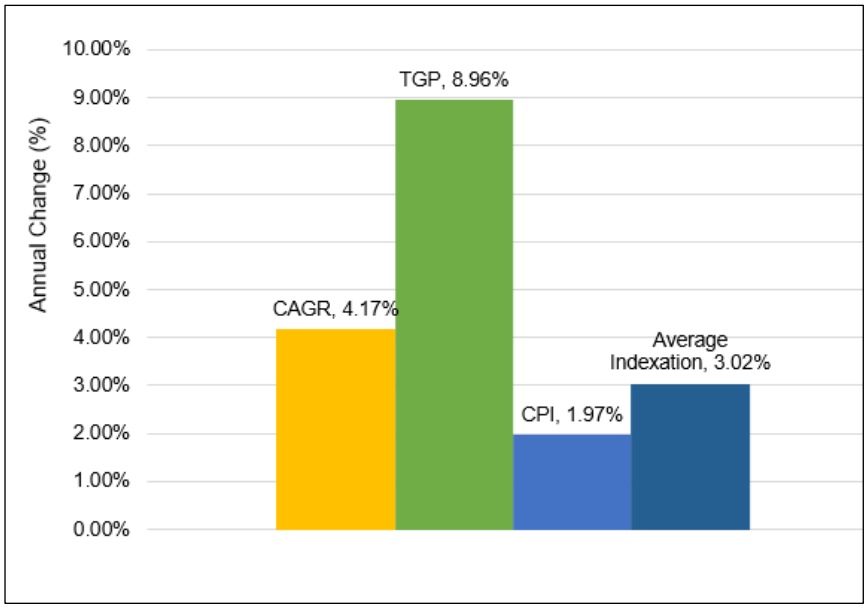


Source: FCNSW

Figure 3-4 below considers the overall movement in harvesting rates, shown in Current Annual Growth Rate (CAGR) of all regions (4.17% average over the 3 years), relative to CPI and fuel (using the TGP[3] as base) over the same period. This supports the view that overall harvesting rates have broadly been kept in line with the impact of changes to CPI and fuel that may have been expected. Within the review period, the indicator price of fuel (see Table 3-2) increased by an average of 9% 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 to how indexation would have affected the rate of change in cost. The actual CAGR of harvest costs (the yellow column) is marginally higher than the derived average index change of 3% in this comparison.

Figure 3-4: Annual harvesting CAGR, TGP (Fuel), CPI and Average Indexation FY2017-19[4]



Source: FCNSW, ABS

Comparison with other jurisdictions

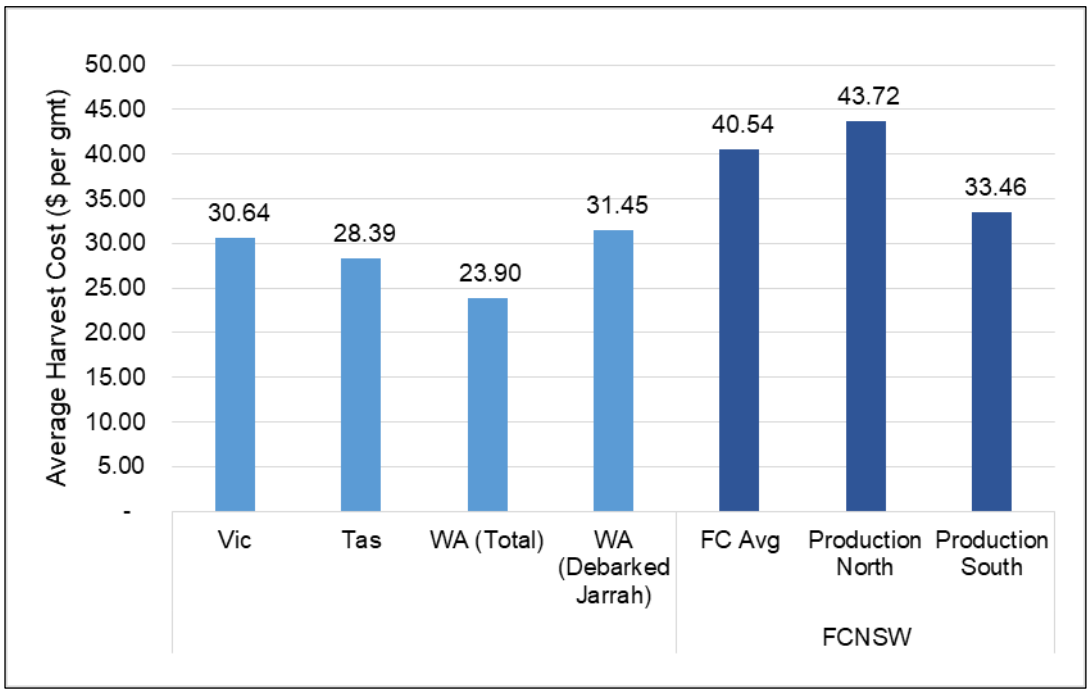
A direct comparison of average harvest rates between native forest operations across Australia is of potential benefit as described in Section 3.5.1. However, care needs to be taken due to the variation in operating conditions and hence factors that affect productivity are significant.

[3] TGP – Terminal Gate Price – Sydney (AIP - http://www.aip.com.au/pricing/tgp/)

[4] 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.

A comparison of the four jurisdictions harvest rates across all operations is provided in Figure 3-5. Note that rates are average unit costs (average rate paid) for the period of FY2016-19. The range is from $23.90 per tonne for Western Australia overall rates to $43.72 per tonne for the NSW north production zone. The underlying drivers for much of this range are described in Section 3.5.1.

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 growth rate of 5.8%, where haulage cost is the weighted average cost for all products delivered in the three year period (Table 3-5).

Table 3-5: Rate of Change – FCNSW Haulage Unit Costs

Haulage ($ per gmt)					
Region	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Change 2016-19**
Production North	23.27	22.95	24.08	26.03	2.76
Annual Change		-1.4%	4.9%	8.1%	3.9% (avg)
Total Change					11.9%
Production South	28.19	32.11	33.17	35.30	7.11
Annual Change		13.9%	3.3%	6.4%	7.9% (avg)
Total Change					25.2%
Total	24.43	25.63	26.99	28.95	4.52
Annual Change		4.9%	5.3%	7.3%	5.8% (avg)
Total Change					18.5%

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. These factors are further considered in Section 3.5.1.

However, when units are converted to $ per tonne km (tkm), for the purposes of removing distance as a variable, the average total rate increase across both regions is 4.3% (Table 3-6).

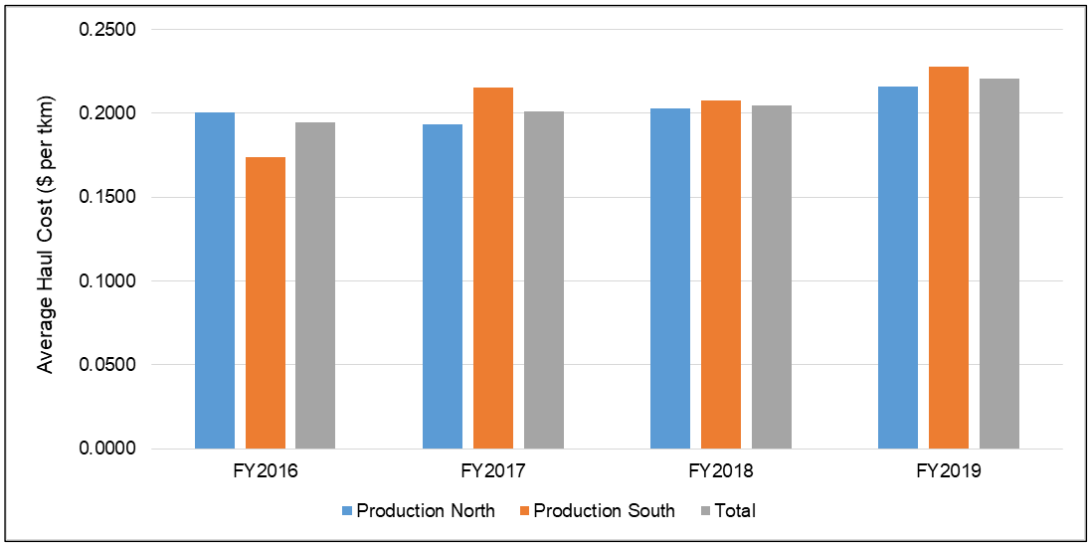
Table 3-6: Rate of Change – FCNSW Haulage Unit Costs (per tonne km)

Haulage ($ per tkm)					
Region	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Change 2016-19**
Production North	0.2006	0.1936	0.2032	0.2161	0.0155
Annual Change		-3.5%	4.9%	6.4%	2.6%
Total Change					7.7%
Production South	0.1739	0.2155	0.2077	0.2276	0.0537
Annual Change		23.9%	-3.6%	9.6%	10.0%
Total Change					30.9%
Total	0.1944	0.2011	0.2049	0.2204	0.0260
Annual Change		3.4%	1.9%	7.5%	4.3%
Total Change					13.4%

Source: FCNSW, ABS

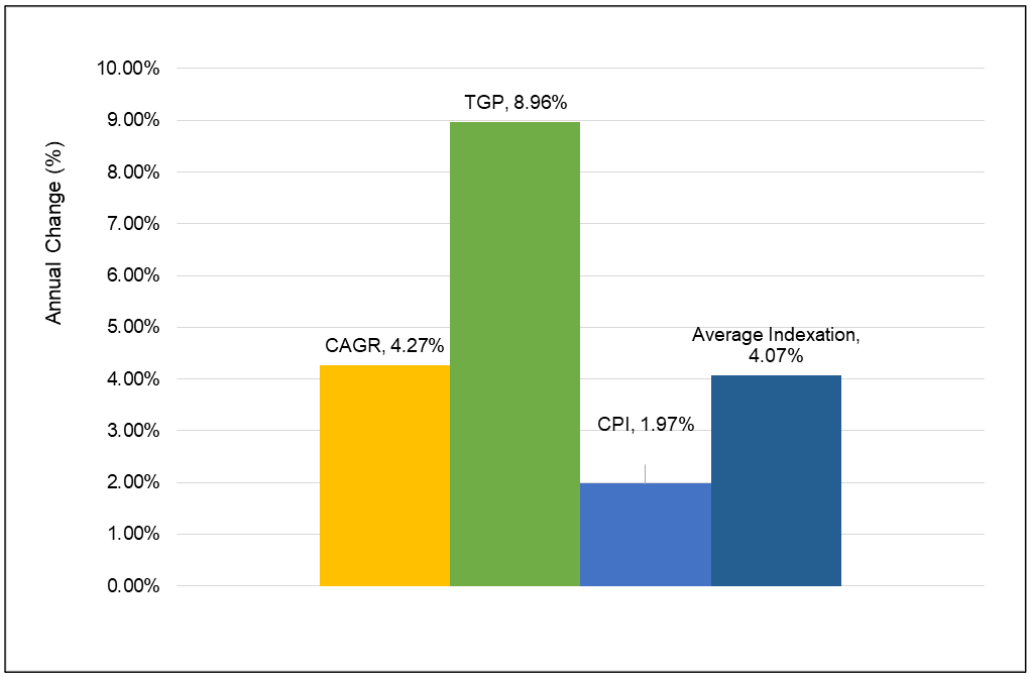
The actual unit cost increases and changes in key cost drivers (CPI and fuel) are charted below in Figure 3-6 and Figure 3-7.

Figure 3-6: Haul Unit Cost by Region FY2017-19



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 contracts. In this instance, the CAGR of haulage costs incurred have exceeded the Average Indexation by ~1.6% across the review period.

Figure 3-7: Annual haulage CAGR, TGP (Fuel), CPI and Average Indexation FY2017-19[5]



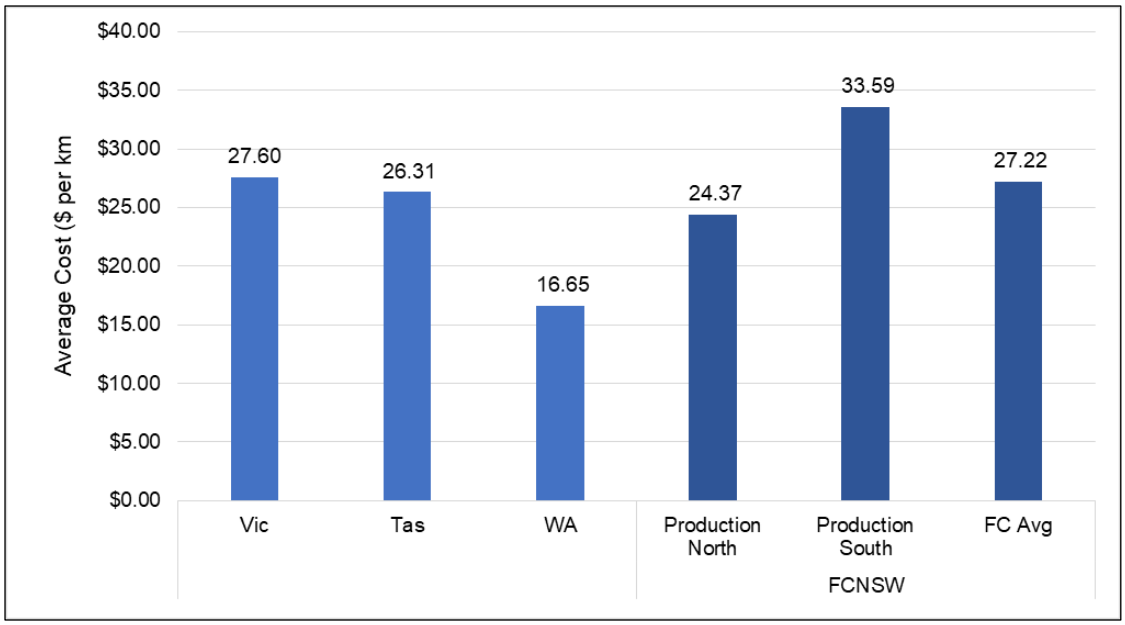
[5] Haulage contracts include price review provisions that adjust base rates to reflect changes in CPI and fuel over the review period. For haulage contracts this index change in generally weighted at approximately 70% CPI to 30% Fuel. This index change is calculated accordingly.

Source: FCNSW

Comparison with other jurisdictions

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 3-8.

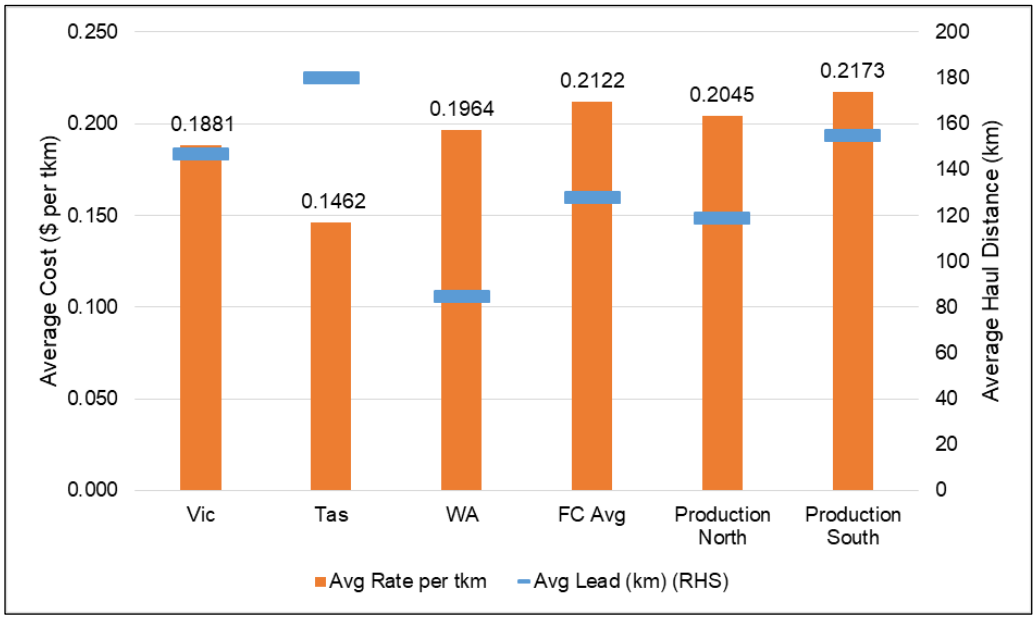
Figure 3-8: Haulage Unit Cost Comparison FCNSW (FY2017–19)



Source: FCNSW, STT, VF. FPC

A more meaningful comparison is often cost per tonne km, removing transport distance as a variable. 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 3-9: Haulage Unit Cost and Haul Distance (RHS) Comparison (FY2017-19)



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 3-10), showing WA and Tasmanian direct comparison. This suggests the FCNSW rates fall within the range for the comparator jurisdictions.

Figure 3-10: Comparison of Average Haulage Rate Schedules

Source: FCNSW, STT, FPC

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 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 actually 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 decrease of 1.9% was less than Consumer Price Index (CPI) [6] of 1.97% for the same period.

Note that the delivery charges and FCNSW costs are further explored in Section 5. Decreasing delivery charges have contributed to FCNSW not recovering third party costs over the period.

[6] CPI – All Groups – Sydney (ABS)

Table 3-7: FCNSW Delivery Charge

Delivery Charge ($ per tonne)					
Region	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Total Change**
Production North	74.54	64.17	67.82	70.03	-4.51
Annual Change		-13.9%	5.7%	3.3%	-1.7% (avg)
Total Change					-6.0%
Production South	68.44	59.62	61.09	64.43	-4.01
Annual Change		-12.9%	2.5%	5.5%	-1.7% (avg)
Total Change					-5.9%
Total	73.12	62.84	65.69	68.30	-4.82
Annual Change		-14.1%	4.5%	4.0%	-1.9%
Total Change					-6.6%

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 2.4.1.

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 the
- Operational level.

3.4.1 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 3-8: 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	

3.4.2 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.

As discussed in Section 2.5, 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 3-9: 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 was not updated for this review on the basis that basic contract structures had not materially changed since that time.

3.4.3 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 Section 3.4.4 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 3-10: 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.

3.4.4 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 3-1: Single tree selection NSW

Plate 3-2: Single tree / gap selection NSW

Plate 3-3: Clearfall system Victoria

Plate 3-4:Steep clearfall Tasmania

Plate 3-5: Western Australian Jarrah harvesting – note logs are 'bark on' and of mixed log quality with little log grade segregation

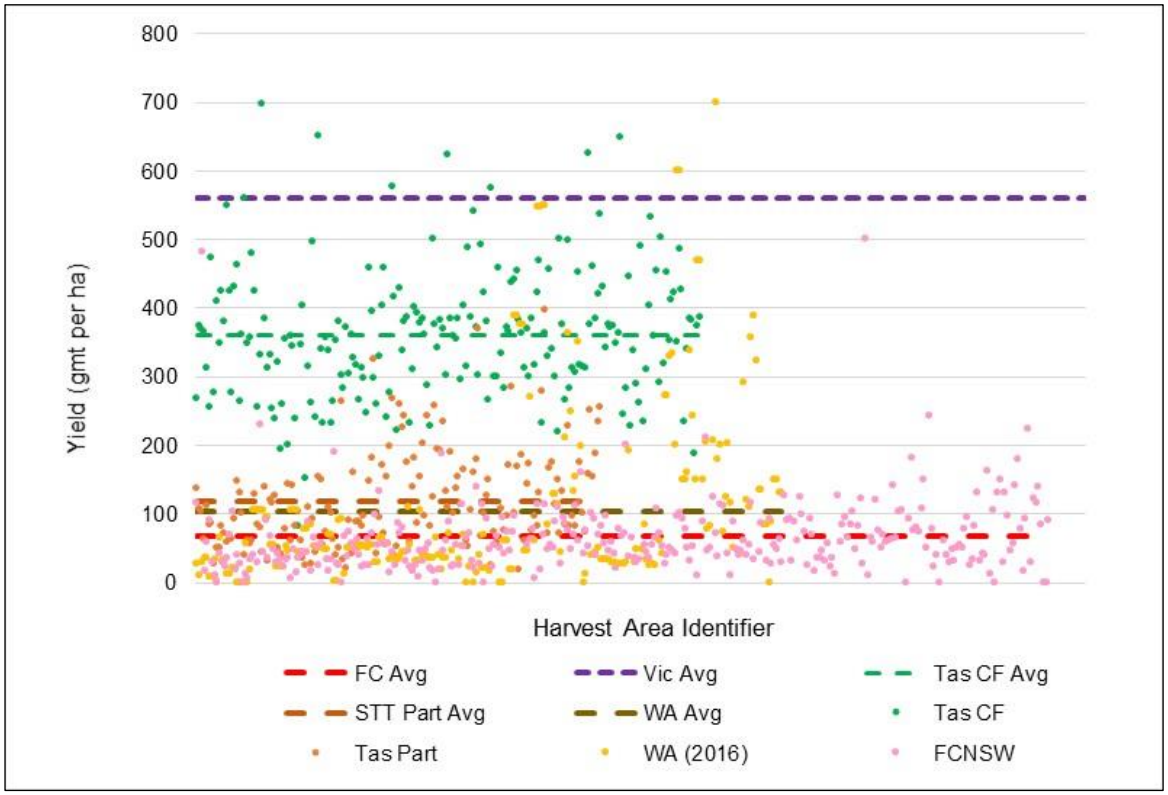
Silvicultural prescriptions are developed in order to meet different objectives. This can mean maximising disturbance to provide for good regeneration from seed, or retaining mid-size trees in order to ensure growing stock is available for subsequent harvesting cycles. Of increasing relevance in NSW 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 3-11 highlights the range in yields across the jurisdictions. For example the STT clearfall operations average twice the yield of the thinning and shelterwood sytems (noted as 'STT Part'), whilst the single tree selction 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 illustates individual coupe yields for the comparator jurisdictions over the 3 year review period, including NSW low yields per ha. In particular it also demonstrates both the spread within each jurisdication but also the significant differences in average yields.

Figure 3-11: Comparison of Yields by Individual Harvest Area by State FY2017-19



Source: FCNSW, FPC, STT, VF

3.4.5 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. An example of the current mandatory equipment list is attached in 0.

The factors influencing haulage costs are listed in Table 3-11.

Table 3-11: 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. As can be seen from Figure 3-10, 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 3-12.

Table 3-12: 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.

3.5 Unit Cost Benchmarking Analysis

3.5.1 Cost Driver Analysis

The following analysis includes data and qualitative information that was collated for the 2013-2016 Benchmarking Study. It sets out to identify the key components of costs that may assist with the comparison to other jurisdictions. These would have remained reasonably static across the review periods so previous data is considered to be relevant to this review.

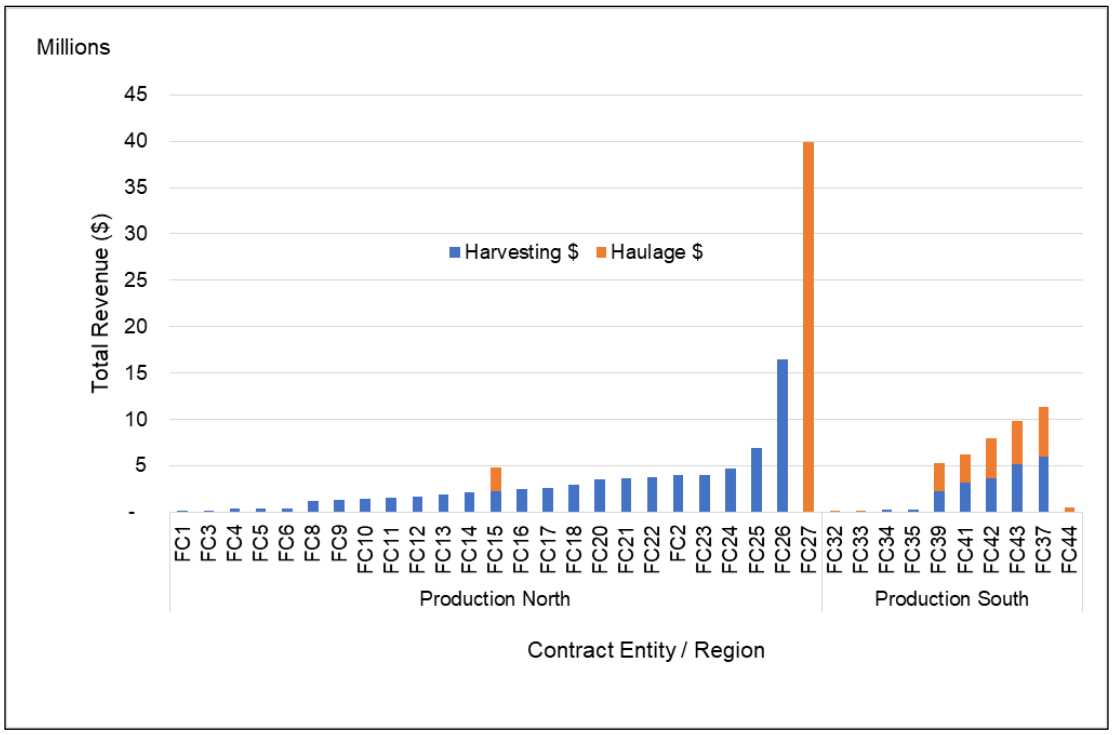
Enterprise - Level 1

To a large extent, harvesting and log haulage companies across native forest operations in Australia are 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 2016/17 – 2018/19, businesses providing harvesting and haulage services to FCNSW generally had total revenues less than $5M, with seven having combined revenues less than $11M, with only one business generating combined revenue of close to $16M. This larger haulage entity is a consortium of several haulage service providers who have contracted through a single enterprise.

Whilst some entities would also provide services for operations on private forests, and for stumpage operations within FCNSW forests, this chart provides a general indication of the range of business sizes within the scope of the study. The underlying reasons for this are discussed in more detail in Section 4.1.4. Also of note is of the 36 contract entities, only 1 provides specialist haulage services, with the larger transport operators within the consort commonly also actively involved in harvesting[7]. Most operators in Production South undertake both harvest and haulage.

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

Figure 3-12: FCNSW Harvest and Haul Contractor Revenue by Contracted Enterprise (all Years FY2017-19)



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. Based on available data, an average of 8% of the reported annualised costs from harvesting crews in NSW was attributed to administration and management, with a range of 5.1% - 10.2%[8]. There was insufficient data from other jurisdictions to contrast enterprises within FCNSW relative to elsewhere.

Harvesting – cost driver analysis - Level 2 (Crew)

The following data was compiled from contributing businesses for the 2013-2016 Benchmarking Study. Industry structures have not changed sufficiently to warrant an update of this data within the context of this review.

This considers costs at the crew level without considering site specific operational factors. A comparison of reported fixed and variable costs is provided in Table 3-13. It is 'standardised' such that the costs represent those that would apply to a single crew. A structure of a crew is described below.

[8] From business data provided for the previous study period 2013/14 to 2015/16

Table 3-13: Annualised Costs from Sample Data for Harvesting Crews (FCNSW, STT)

Crew Type	Typical machine configuration	Typical labour requirement	Reported annualised costs – average and range ($'000)	
			Fixed costs	Operating costs
Manual (Tas only)	skidder, excavator, dozer	3 man crew – hand faller, skidder operator, dumpman	185 (130 - 274)	620 (464 – 829)
Semi mechanised	skidder, 2 x excavator (harvester and loader), dozer	3 man crew – hand faller, skidder operator, dumpman	311 (274 – 360)	646 (567 – 760)
Mechanised	feller buncher, skidder, harvester, excavator (loader)	4 man crew – machine operators	305 (205 - 435)	633 (474 – 922)
Cable	harvester, yarder, 2 x excavator	7 man crew – hand faller, chokerman, plus machine operators	345	1109

Source: FCNSW, Sustainable Timber Tasmania (2016 data)

This analysis provides an indication of the higher fixed costs associated with capital requirements for mechanised crews. The degree to which crews are mechanised will be dependent upon the market in which they operate. Longer term contracts that offer greater certainty will facilitate capital investment. Contract terms vary across the jurisdictions, with NSW and Victoria typically 3 to 5 years, Tasmania 1 to 3 years, and WA up to 9 years.

It could be expected that a higher level of mechanisation would offer higher productivity, expressed as daily or annual production. However, from the data provided, it is apparent that the impact of other drivers play a much more significant role in productivity than the structure of the crew. This is demonstrated by the fact that manual crews in high yielding forests can be more productive on an annual basis than mechanised crews in low yielding areas.

A critical other component relating to the move to mechanised harvesting is improved safety outcomes for the harvesting personnel.

Harvesting – cost driver analysis - Level 3 Operational

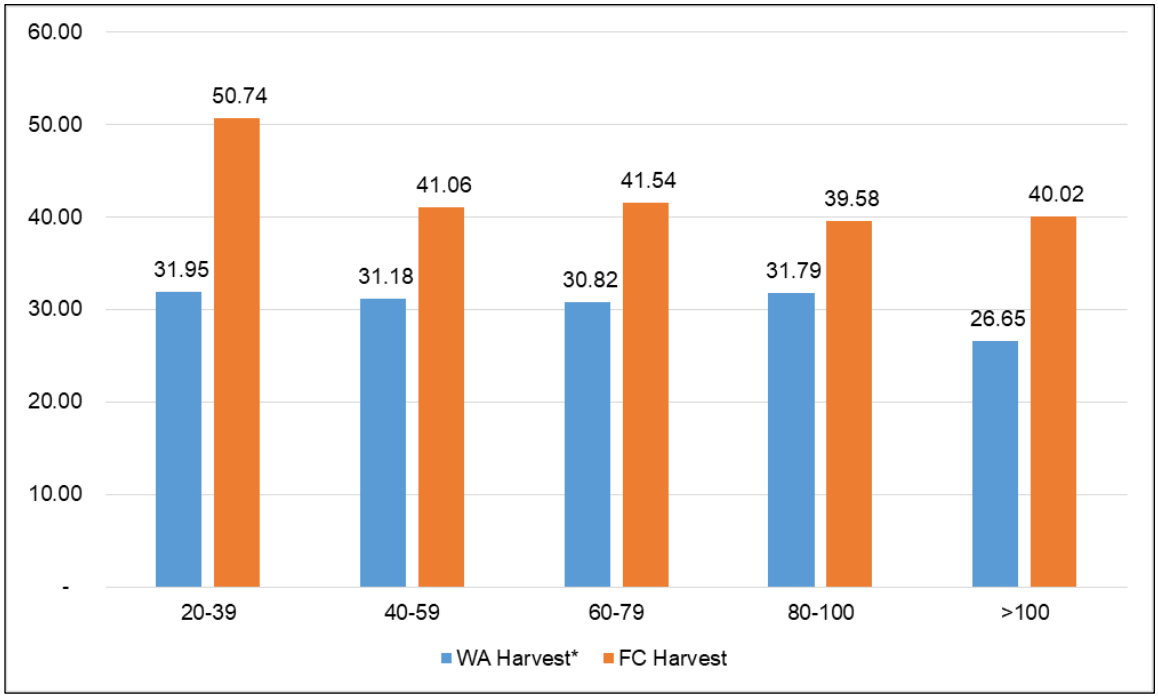
At the operational level, individual factors that impact on the productivity (and hence unit cost) of each phase of the operation are considered. Table 3-14 provides a summary of the comparison in these factors between the jurisdictions.

Figure 3-13 further details a comparison of WA and FCNSW harvest rates, with yield per ha as a key variable. This suggests that within the 40-60 tonne/ha class, FCNSW rates are 32% higher than WA rates, while the FCNSW rates include the production of sawlog and debarking.

The terrain of the WA operation is typically flat relative to those in the eastern states. Slope does have a significant impact on snig distance, travel speed, track drainage requirements, and general machine productivity, as described below.

On the basis of slope, harvestable yield, silvicultural requirements and log making requirements, the NSW harvesting rates appear to be comparable with those observed in WA.

Figure 3-13: Comparison of Average FCNSW and WA Harvest Rates ($/gmt) and Yield/ha



Source: FPC, FCNSW (*WA rates for Jarrah – bark off)

Table 3-14: Operational Costs Factors

Level 3 - Operational Cost Driver Analysis					
Function	Activities		Cost Driver		Comment
	Primary	Secondary	Primary	Secondary	
Road and track construction	Road construction		Distance and standard	Terrain, equipment suitability	In all cases roads are either provided by forest owner or works undertaken outside normal harvesting rate provisions. Snig tracks constructed as required. No data to support further cost analysis, but expected to have minimal impact on unit costs, although rehabilitation standards may vary across jurisdictions.
	Snig track construction		Distance and standard	Terrain, equipment suitability	
Harvesting	Felling	Travelling and tree selection	Total Recoverable Volume per hectare	Distance (stems per ha), decision complexity	Clearfall operations offer significant productivity gains over selective tree harvesting. Protection of retained stems in NSW in particular constrains tree felling efficiency. See Section 3.4.4
		Felling and heading		Trees per day	
				TRV per tree	Tree size and log size critical to harvesting productivity. See below
	Extraction	Grappling	Total Recoverable Volume per hectare	Utilisation level, payload / loads per day	Extraction productivity dependent upon tree size – log / large trees more efficiently snigged, to the point where skidder payload is exceeded. However also depends on proportion of log that is merchantable. No direct data to support utilisation level
		Travelling (loaded)		Distance, terrain, speed	Average snig distance and slope is a key to skidder productivity and key variable in establishing rates in NSW. Uphill v downhill extraction also relevant, but there is insufficient data to compare across jurisdictions
		Travelling (unloaded)		Distance, terrain, speed	As above

Level 3 - Operational Cost Driver Analysis					
Function	Activities		Cost Driver		Comment
	Primary	Secondary	Primary	Secondary	
Harvesting	Processing (Log making)	Trimming	Total Recoverable Volume per hectare	Volume per ha / Tree size / utilisation level	Tree size and log size critical to harvesting productivity. Harvesting (including debarking, trimming) and log handling are generally linearly correlated (with log length). Therefore an increase in log diameter has an exponential (square) impact on productivity. Some data to represent FCNSW operations, however no comparative data. WA operations often only require a 'whole bole' log to be extracted, with no debarking requirement
		Debarking			
		Log making analysis		Defect level, grading complexity	Simple operations (e.g. pulpwood only), or high quality stands with minimal defect will aid productivity through decision making, log servicing and segregation. All operations surveyed had at least 4 log grades with the exception of WA, where rate schedules differentiate between 'whole bole' operations and graded sawlogs with an average $2-93 margin (12%). No other data available to support cost analysis.
		Log making		Utilisation level, piece size, servicing requirements	
		Grading / marking		Grading complexity, marking, tagging requirements	
		Sorting and stacking		Sorting requirements, distance, room at dump	Sorting and stockpiling, in confined spaces increases costs where production bottlenecks are common, and double handling of logs is required. No data available to support cost analysis
	Loading	Sorting	Total Volume loaded per day	Sorting requirements, piece size, loader utilisation	As above
		Loading			Unit cost of loading is dependent upon the degree to which loading resources (equipment / labour) are utilised effectively. If long waiting periods between trucks, cost increase markedly. For large crews balancing equipment can be more easily achieved.

Because of the wide range of operating conditions, the degree to which different factors interact and impact on harvesting productivity are not easily isolated and quantified. FCNSW have used differing approaches to best understand contractor cost arrangements, and in seeking to secure the most competitive price.

Difficulty Class

FCNSW have generally used ground slope and yield per hectare to classify conditions into harvesting 'difficulty classes' which are then used as a basis for suppliers to tender prices (Table 3-15). A Difficulty Class is then assigned to each harvesting area to determine the applicable rate. This example below provides an indication of the current approach used by FCNSW to categorise expected contractor costs.

Table 3-15: Contemporary Difficulty Class Table - FCNSW

			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
			Volume:	**26 - 40m³/ha**
Snig Distance:	<150	A	B	B
	150-300	B	C	C
	301-500	C	C	D
	501-700	C	D	E
			Volume:	**16 - 25m³/ha**
Snig Distance:	<150	B	C	C
	150-300	C	D	D
	301-500	D	D	E
	501-700	D	E	F
			Volume:	**5 - 15m³/ha**
Snig Distance:	<150	C	D	D
	150-300	D	E	E
	301-500	E	E	F
	501-700	E	F	F
Average Log Size	Ave Sold Log Size <0.9 m³/log - increase rate by negotiated margin			
	Ave Sold Log Size >1.5m³/log - decrease rate by negotiated margin			

Source: FCNSW

Daily Production Rate Approach

In 2010, FCNSW developed a process to assist with establishing harvesting rates based on site specific parameters. This considered, yield and average piece size, slope and average snig distance. As a basis, 'snig tables' - longstanding industry benchmarks to estimate crew productivity - were used to estimate crew productivity, which was then further modified based on crew configurations and localised factors such as product mix. FCNSW called for tenders using Crew Day Rates as the basis of submitted prices. The agreed productivity (Daily Production Rate) was then used to calculate unit rates using tendered Crew Day Rates.

A sample of the rates derived from the daily production rate data were provided for the 2013-2016 Benchmarking Study to enable further analysis of the interaction of operating factors on costs. In addition, this data provides evidence of the uncertainty involved in estimating production from parameters that in themselves are not easily quantified. The data was limited to 105 harvest areas subject to negotiation from 2012 – 2016 from the Production North operations. It is still relevant for this discussion, however no additional data was available for the 2020 report due to the manner in which FCNSW conducted price setting during the 2017-2019 period.

Linear regression analysis using Daily Production Rate (DPR) Data

An analysis of the data from the DPR process was used to investigate the relationship between actual harvest cost and snig distance, slope and total yield. These attributes are commonly considered as being the critical drivers of crew productivity and therefore production cost.

Regression results

An analysis of the core attributes was undertaken through the derivation of a multiple linear regression with the following specification:

harvest cost = snig + slope + yield per ha + constant

The results are as follows.

Table 3-16: Regression Outcomes

Regression Statistics	
Multiple R	0.66387573
R Square	0.440730985
Adjusted R Square	0.422088684
Standard Error	8.196565827
Observations	94

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	4764.959313	1588.319771	23.64144838	2.25708E-11
Residual	90	6046.532223	67.18369136		
Total	93	10811.49154			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	35.9208	3.9514	9.0907	0.0000	28.0707	43.7709	28.0707	43.7709
EST Yield per ha	-0.1875	0.0352	-5.3183	0.0000	-0.2575	-0.1174	-0.2575	-0.1174
Avg Snig	0.0219	0.0119	1.8432	0.0686	-0.0017	0.0455	-0.0017	0.0455
Avg Slope (degs)	1.2255	0.2839	4.3170	0.0000	0.6615	1.7895	0.6615	1.7895

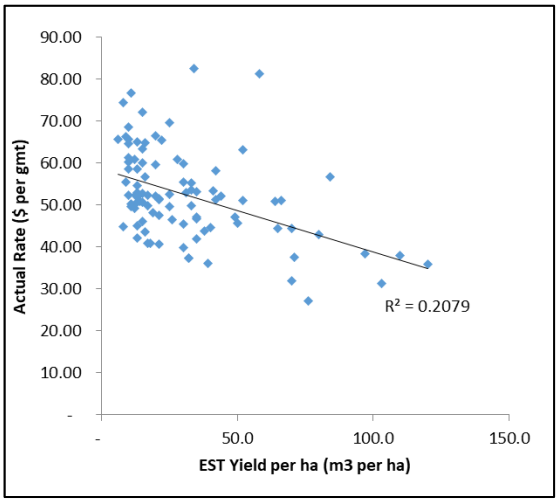
Source: FCNSW

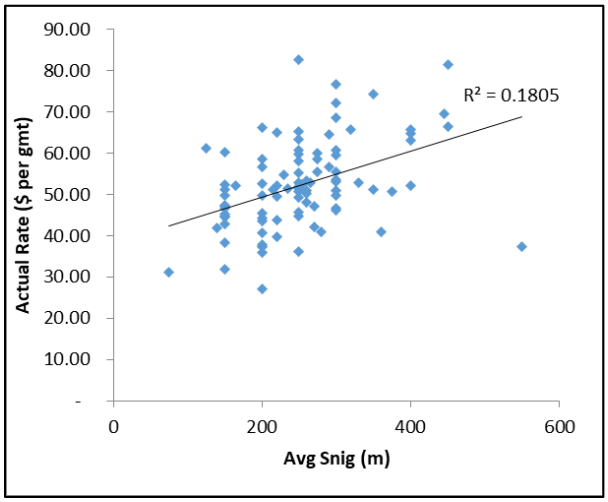
The analysis provided the following result:

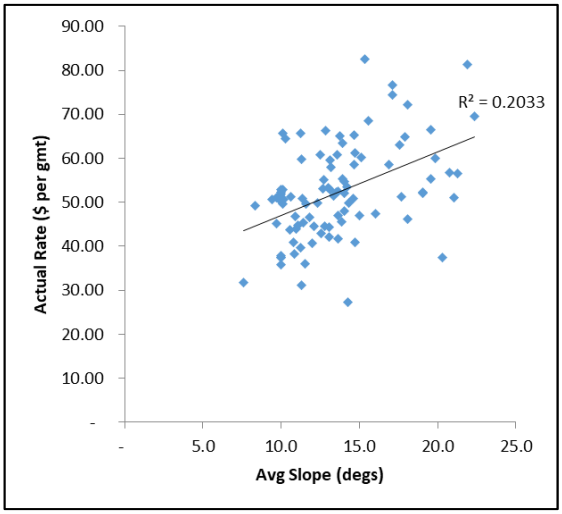
- a modest correlation exists in respect to the combined effect of the modelled attributes (yield/ha, snig distance and slope compared to harvest cost
- a weak correlation is shown with a negative relationship exists between the harvest rate and the yield per hectare (i.e. cost goes down as yield increases)
- similarly, a weak correlation is shown with a positive relationship exists between harvest rate and average snig distance
- a weak correlation existed in respect to a positive relationship exists between harvest rate and average slope.

The following charts demonstrate the relatively weak correlation with the spread of data points around the regression line for harvest costs (y axis) as a function of the individual cost attributes of yield per ha, snig distance and slope.

Figure 3-14: Line Fit Plots for Yield Snig Distance and Slope







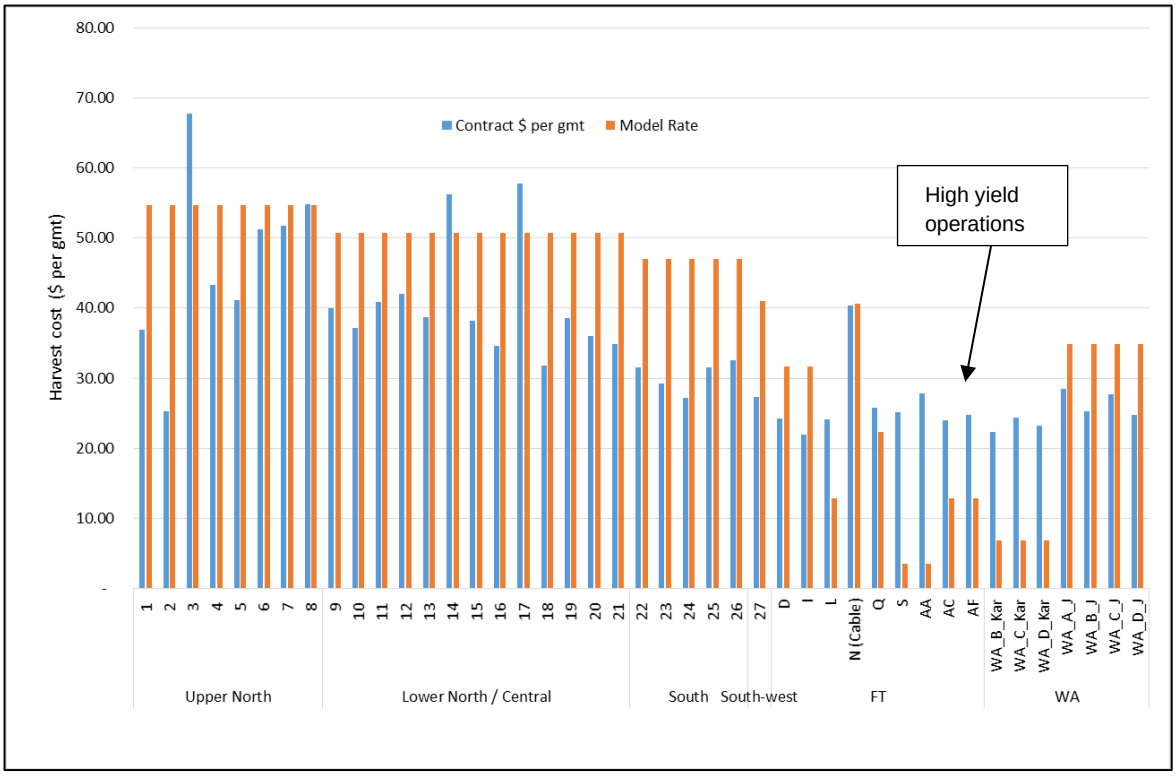
Based on the analysis, a following regression equation was derived:

Harvest Rate = 35.921 - 0.187 x (yield) +.022 x (snig distance) +1.226 x (slope)

(Adjusted R Square of 0.422 – less than 50% of the variation can be attributed to these factors)

As a test to these cost drivers contribution to harvest cost, this equation was applied to the parameters associated with the FCNSW crews average harvest rate for 2015/16, using the average yield for the upper north and lower north / central regions, and a standardised snig distance. In addition, this model was applied to the operating environment assumed to reasonably represent other jurisdictions. However, for high yielding stands in Tasmania and WA, it would appear that the model underestimates the total cost, indicating that the relationship between yield and cost is not linear. In any case the regression has been undertaken using a population that had a maximum yield of 120m^3 per ha, and an average of 31m^3 per ha, so it is unsurprising that modelling costs for high yielding stands is relatively coarse.

Figure 3-15: Comparison of Harvest Rate Modelled using Regression Equation and Average Actual Rate



Note: 2016 data

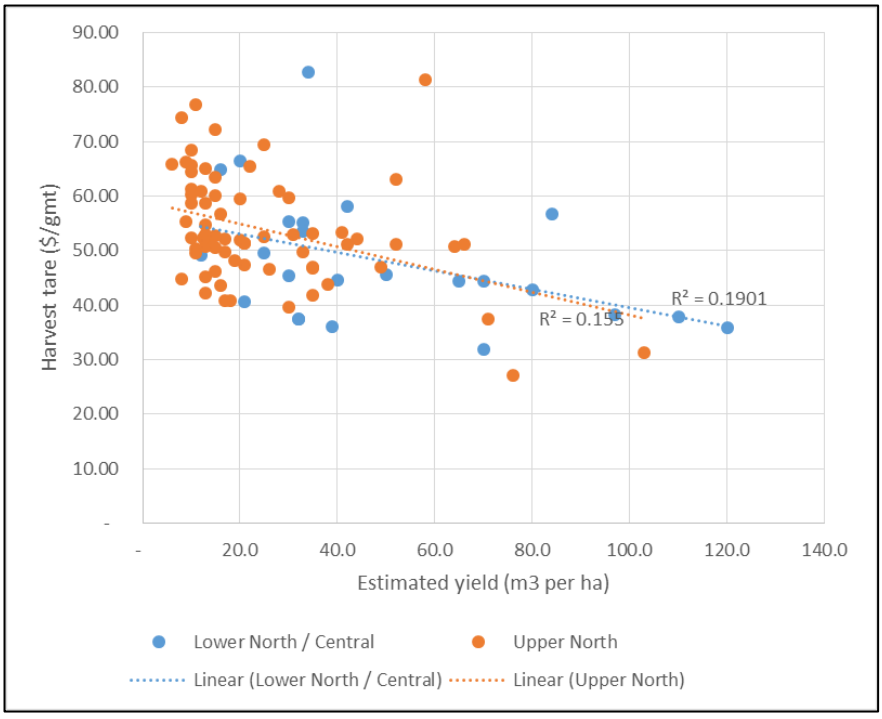
Based on these results, 42% of the variation in harvest is explained by the three variables, suggesting that the current specification of the model is a partial explanation for the harvest costs, and that there are a number of additional significant factors that contribute to harvest rate that are

not accounted for in these attributes. It appears that other aspects are influencing the agreed costs of harvest. The analysis of the variability between predicted and realized yield is an example of the uncertainty. It would seem a large source of volatility is that the risk and uncertainty to the process results in significant variation in how enterprises quantify and manage this risk. Additionally, the scale elements of individual enterprises have the potential to impact on market depth and potential to derive full market competition, which reinforces the impact of high volatility in estimation of production costs.

Data limitations for this analysis include:

- Data was available only for FCNSW North Coast / Central operations for the period in which the rate setting process was followed (2012 – 2016). The following chart demonstrates the spread of yields and costs across the two areas.
- Data was available only for a sample of harvesting conditions within the region.

Figure 3-16: Harvest Cost and Estimated Yield by Area (Upper North v Lower North/Central)

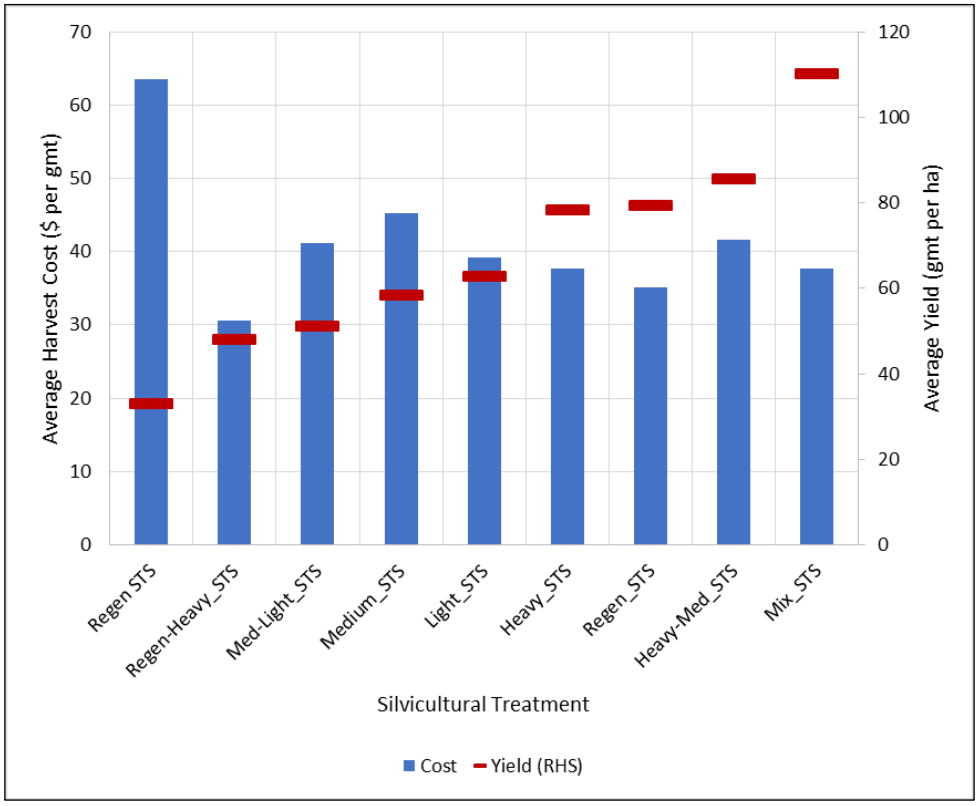


Source: FCNSW

In summary, harvesting costs are related to number of factors, however the level of variation and uncertainty in predicting the variables constraints the potential to develop a definitive relationship between harvest cost and slope, yield and snig distance. From the data provided for FCNSW, Tasmanian, WA operations, and Victorian rates, 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.

Further analysis was undertaken on new yield data and the relationship with harvesting costs for FCNSW operations during the review period (FY2017-19). Figure 3-17 illustrates the impact of silviculture on yield and the average cost of harvesting within each category. Apart from Regen STS, harvesting costs are within a $30 to $45 range regardless of yield suggesting a limited direct relationship in this instance.

Figure 3-17: Average FCNSW Harvest Cost and Yield by Silviculture Type (FY2017-19)

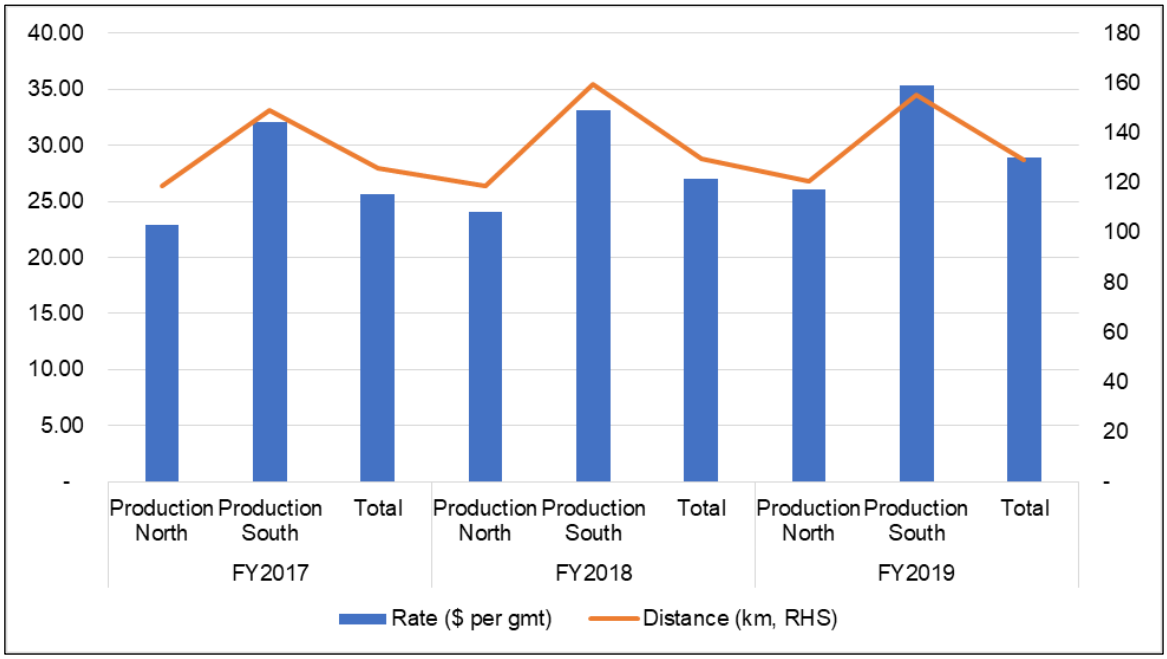


Source: FCNSW

Haulage – cost driver analysis

A comparison of operating conditions that impact on haulage cost drivers are summarised in Table 3-17 below. Transport distance is the most significant influence on the unit costs variation observed in FCNSW haulage charges (Figure 3-18).

Figure 3-18: Average Lead Distance and Haulage Charges FY2017 - 2019

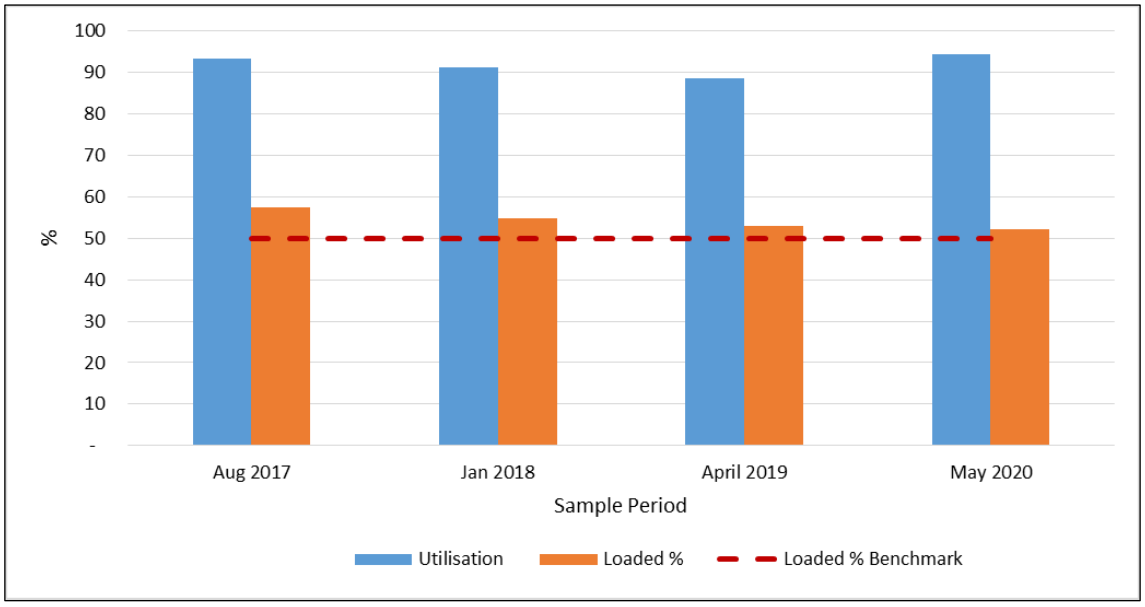


Source: FCNSW

The key efficiency metrics for transport operations includes loaded kilometres as a percentage of total kilometres, and utilisation, that is, the hours a truck is used (and thereby generating revenue) as a proportion of hours available.

A sample of fleet performance statistics is provided below in Figure 3-19 for the main transport operation in Production North Region. The data indicates that loaded running exceeds the industry benchmark of 50% (assumes simple hub and spoke haulage tasks), whilst truck utilisation at around 90% is very high. Both of these indicators suggest that the truck fleet is being utilised efficiently under this arrangement.

Figure 3-19: Fleet Performance - Production North



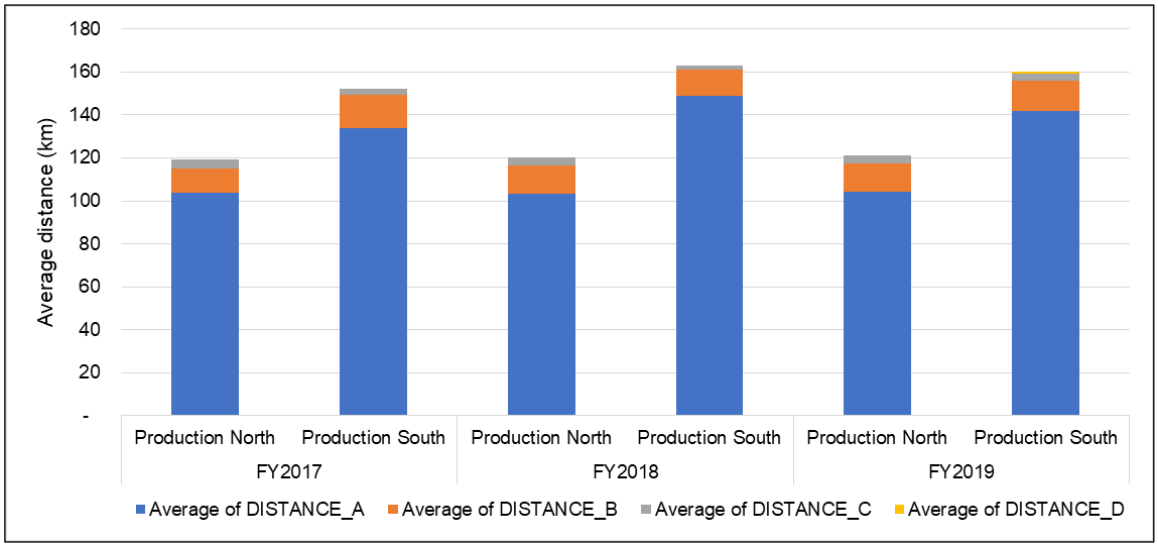
Source: FCNSW

In summary, limited data is available to compare the haulage cost drivers for operations in other jurisdictions to FCNSW operations. However, it is apparent, that from various efficiency measures, there has been a significant improvement in the performance of the fleet in the Production North region as a result of the centralised despatch model. Risks associated with concentrating the market for haulage service providers will need to be managed through monitoring fleet statistics and ensuring efficiency gains flow through the supply chain.

The road standard impacts on travel speed thereby productivity and haulage costs. However limited data from other jurisdictions has not enabled a direct comparison to FCNSW charges. The NSW road classes are tabled in Table 3-12.

A comparison of transport distance by average road class for the period for FCNSW operations is demonstrated in Figure 3-20. The 'non-Class A' road distances are relatively consistent, which reflects a common approach to the original forest road network design across the FCNSW estate.

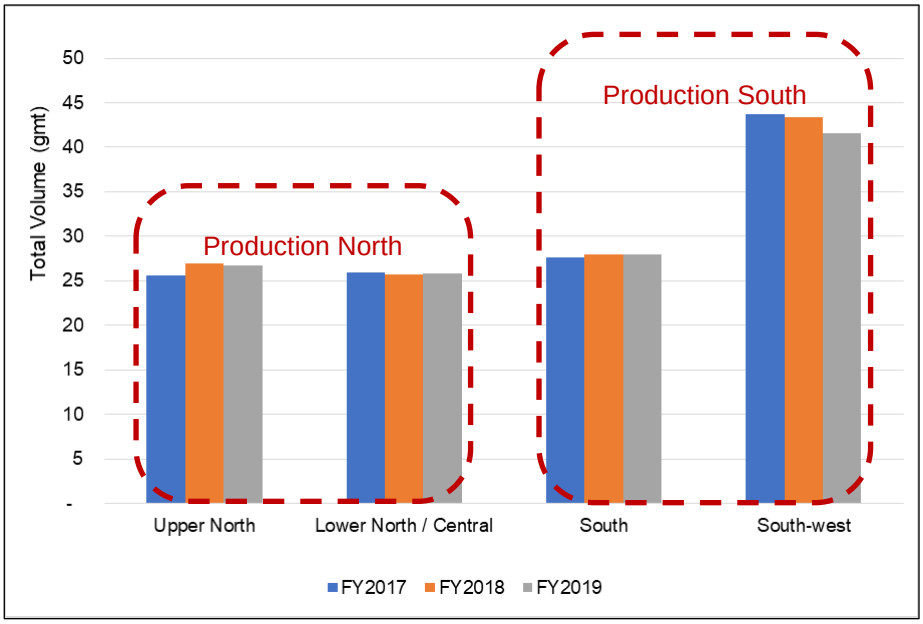
Figure 3-20: Average Transport Distance by Road Class FY2017-19



Source: FCNSW

The other key productivity driver for haulage operations is payload. Figure 3-21 details the average payload over the study period for the four markets.

Figure 3-21: Average Truck Payload by Market FY2017-19



Source: FCNSW

Whilst the coastal areas all trend around 26 tonnes, the South-West operations were significantly higher due to the almost exclusive use of higher productivity vehicles, generally B-double (9-axle) configurations. This is reflected below in Figure 3-22. The proportion of log volume transported in Production North is predominantly by 6 and 7 axle trucks, whilst 9 axle trucks are more prevalent in Production South. No truck configuration data was available for the comparator organisations.

Figure 3-22: Proportion of Log Volume by Truck Configuration by Region (FY2017-19)

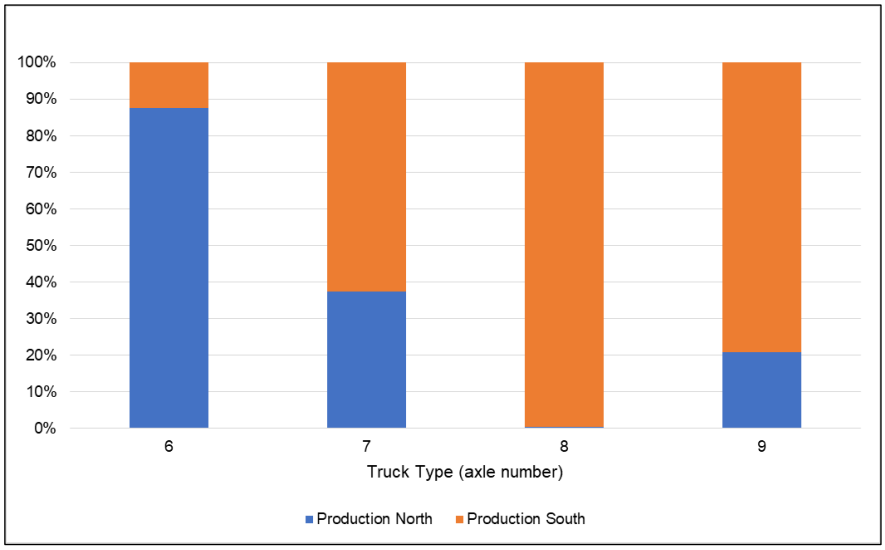


Table 3-17 provides a summary of the cost drivers introduced in Table 3-11, and the potential to compare costs across jurisdictions where data is available to do so.

Table 3-17: Haulage Cost Driver Analysis

	Level 3 - Operational Cost Drivers (Haulage)				
Function	Activities		Cost Driver		Comment
Haulage	Empty	Travelling empty	Volume x Distance per day	Payload	Most native forest operations in NSW, Vic and Tas limited to mainly single trailer (25t – 30t payload). WA employ semi and road trains (50t+). Rate schedule comparison includes truck configuration.
	Loading	Loading		Loaded running	Loading /unloading congestion can limit truck productivity. No data available to identify and compare operations.
					Industry standard 'hub and spoke' operations tend to result in 50% loaded running depending upon where depots are located. Where schedules can be coordinated to provide cross loading opportunities, significant efficiencies are gained. Appears to be improving in north coast operations as a result of centralised despatch
	Loaded	Travelling loaded		Hours per day available	Available hours is a function of legal restriction based on driver fatigue management. No data is available to compare jurisdictions.
		Unloading		Hours per day utilised (planned and unplanned NPT)	Where a combination of depot location, loading site and customer location, and in order for the driver to return home each day only part days are utilised. In addition, unplanned delays such as excessive loading times, wet weather or breakdowns result in trucks being underutilised. Exacerbated when average lead distances are in excess of 100kms. No data to compare jurisdictions.

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

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 Meaning of Harvest and Haulage Services (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:

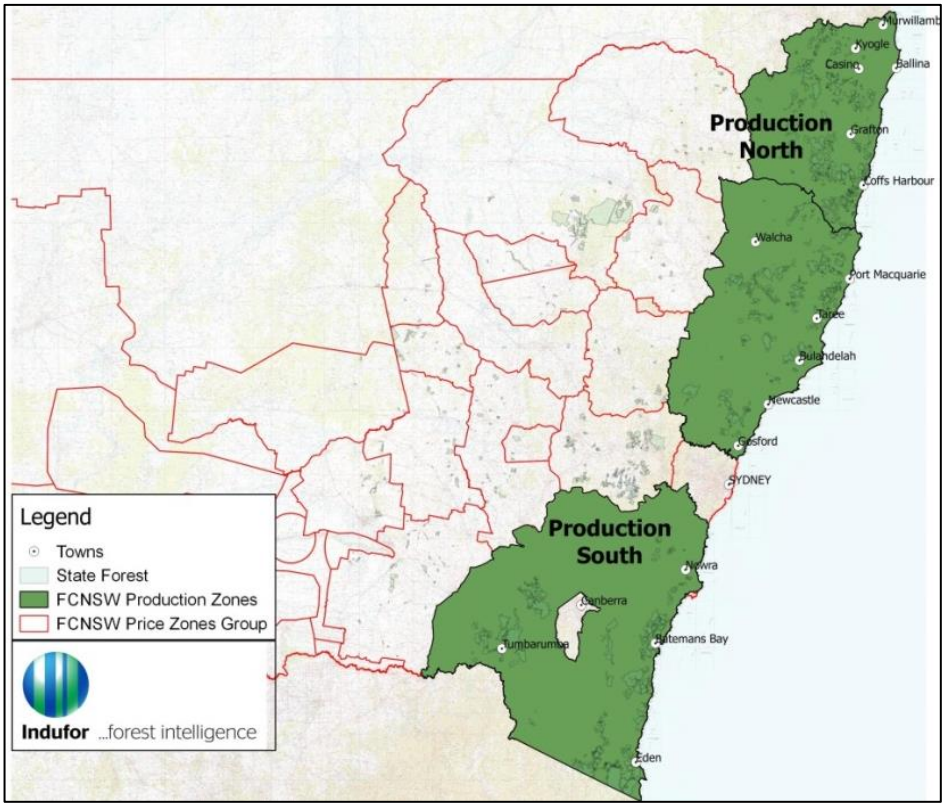
"Haulage Operations" means transportation of Log Products from Harvesting Unit to a Product Destination.

4.1.2 Geographic Market Boundaries (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 in Figure 4-1 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 480,000 m^3 per annum
- Production South – annual production of 200,000 m^3 on a mill door basis plus 260,000 m^3 stumpage.

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

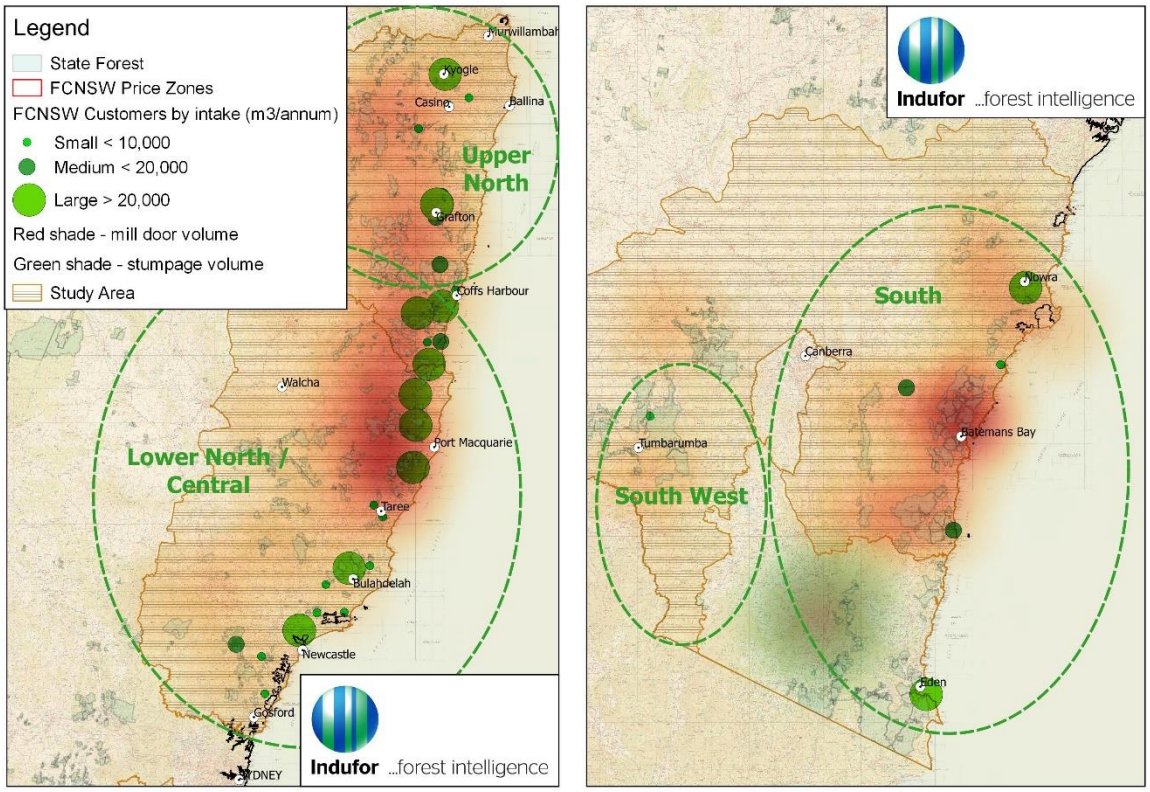


Source: FCNSW

As illustrated in Figure 4-2 below, 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' 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 Operating and Commercial Arrangements

As discussed in Section 2.4, the majority of native timber supplied by FCNSW is sold on a 'mill door' basis where the price paid by the customer includes the growing, harvesting and transport costs to the mill gate. FCNSW separately contracts for harvest and haulage service with the costs of these services being incorporated as a pass through cost under the terms of the FCNSW customer supply agreements.

FCNSW procures harvest and haulage services through a tender process based on projected demand based long term and short term supply agreements and industry analysis of demand. FCNSW's standard agreements for harvest and haulage are generally for a term of five years with provisions for contract extensions. Shorter term contracts are also used where necessary to meet temporary or unforeseen demand or shortfall in capacity.

As outlined in Section 4.1 above, FCNSW procures harvest and haulage services on the basis of parcels or packages within the four geographic areas (Upper North, Lower North/Central, South and South West).

4.1.4 Barriers to Entry

Harvest services

The harvest services market is characterised by predominantly a number of smaller geographically based operators. As illustrated in Figure 3-12 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 market.

Haulage Services

As illustrated in Figure 3-12 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.

4.1.5 Market Participants and Market Share

Based on the information provided by FCNSW for the period 2016/17 to 2018/19 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.

Table 4-1: Market Share Analysis for Harvest and Haulage Services (All years FY2017-19)

Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)	Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)
Upper North - Harvest					**Upper North - Haul**				
Harv 11	2 127	8%	41	6%	Harv 15	-	0%	2	0%
Harv 13	1 269	4%	31	5%	Harv 20	269	2%	7	1%
Harv 14	442	2%	6	1%	Haul 2	15 178	98%	635	99%
Harv 15	-	0%	15	2%	Nil	-	0%	1	0%
Harv 16	80	0%	2	0%					
Harv 17	16 313	58%	383	59%					

Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)	Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)
Harv 18	373	1%	6	1%					
Harv 2	2 613	9%	60	9%					
Harv 20	-	0%	7	1%					
Harv 27	2 112	7%	37	6%					
Harv 36	1 203	4%	18	3%					
Harv 38	1 494	5%	32	5%					
Harv 40	199	1%	6	1%					
Nil	-	0%	-	0%					
Total	28 225	100%	645	100%		15 447	100%	645	1
Lower North / Central Harvest					**Lower North / Central Haul**				
Harv 1	133	0%	3	0%	Harv 15	-	0%	2	0.3%
Harv 10	2 476	8%	55	7%	Haul 2	19 577	100%	776	99.7%
Harv 18	7 720	24%	170	22%	Nil	-	0%	0	0.0%
Harv 22	3 600	11%	86	11%					
Harv 27	237	1%	4	1%					
Harv 29	3 850	12%	109	14%					
Harv 32	2 350	7%	59	8%					
Harv 33	1 926	6%	38	5%					
Harv 37	429	1%	12	2%					
Harv 40	3 779	12%	95	12%					
Harv 6	4 717	14%	109	14%					
Harv 8	1 588	5%	37	5%					
Nil	-	0%	0	0%					
Total	32 804	100%	779	100%		19 577	100%	779	1
South Harvest					**South Haul**				
Harv 23	307	2%	11	2%	Harv 24	3 093	19%	66	0
Harv 24	2 211	13%	67	14%	Harv 25	4 654	29%	143	0
Harv 25	5 205	31%	143	29%	Harv 28	3	0%	0	0
Harv 28	9	0%	0	0%	Harv 3	5 053	31%	169	0
Harv 3	5 786	34%	169	35%	Harv 39	6	0%	-	0
Harv 35	291	2%	6	1%	Harv 9	3 018	18%	91	0
Harv 39	14	0%	0	0%	Haul 1	487	3%	12	0
Harv 9	3 242	19%	91	19%		-	0%	6	0
Nil	-	0%	0	0%					
Total	17 064	100%	488	100%		16 313	100%	488	1

Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)	Alias	Rev ($ 000)	Rev (%)	Weight ('000 gmt)	Weight (%)
South-west Harvest					**South-west Haul**				
Harv 12	-	0%	-	0%	Harv 3	321	7%	7	0
Harv 3	220	6%	7	5%	Harv 34	4 367	93%	130	1
Harv 34	3 637	94%	130	91%					
Nil	-	0%	7	5%					
Total	3 856	100%	144	100%		4 687	100%	144	1

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 FY2017-2019

Number Contractors	Upper North	Lower North/Central	South	South West
Harvest	13	12	8	3
Haulage	4	3	1	2
Vertically integrated	4*	3*	7	2

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

A summary of the number of contractors including operators entering and exiting the market in the period 2005 to 2019 is outlined in Table 4-3 below.

Table 4-3: Harvest and Haul Contractor Participation Trends FY2005-2019

Number Contractors	Upper North	Lower North/Central	South	South West
Harvest - Total	19	25	14	4
Haulage - Total	9	9	14	4
Harvest - Entering	3	6	3	1
Harvest - Exiting	3	13	10	2
Haulage - Entering	6	5	11	2
Haulage - Exiting	6	7	9	2

Source: FCNSW

This illustrates that there is evidence of competition for the market for both harvest and haulage services across the four geographic markets for the period 2005 to 2019. This is further illustrated in Table 4-4.

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 15 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 considered 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 14 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. The market share trends are detailed in Table 4-4 below, using volume as the basis for comparison.

Harvest contractor market share trends

Based on data provided by FCNSW, the market share trends for 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) market share.

Table 4-4: Harvest Contractor Market Share Trends* FY2005-FY2019

Market / Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Upper North															
Contract 801	38%	38%	42%	41%	39%	41%	46%	50%	50%	58%	59%	59%	59%	62%	65%
Contract 802	0%	7%	17%	17%	17%	18%	17%	19%	15%	13%	14%	13%	0%	0%	0%
Contract 803	16%	12%	0%	0%	3%	4%	6%	5%	9%	8%	9%	10%	10%	12%	7%
Contract 804	2%	2%	9%	8%	7%	9%	8%	6%	2%	0%	0%	0%	0%	0%	0%

Market / Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Contract 805	0%	18%	16%	9%	8%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 806	2%	5%	7%	12%	11%	3%	0%	2%	2%	0%	0%	0%	0%	1%	8%
Contract 807	0%	0%	0%	2%	5%	6%	8%	9%	6%	0%	0%	0%	0%	0%	0%
Contract 808	0%	0%	0%	0%	0%	17%	15%	1%	0%	0%	0%	0%	0%	0%	0%
Contract 809	0%	0%	0%	0%	0%	0%	0%	2%	5%	7%	6%	7%	5%	7%	6%
Contract 810	0%	0%	0%	0%	0%	0%	0%	4%	6%	5%	6%	5%	6%	6%	8%
Contract 811	25%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 812	12%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 813	0%	0%	4%	7%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 814	5%	5%	4%	4%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 815	0%	0%	0%	0%	0%	0%	0%	0%	1%	4%	6%	6%	6%	6%	4%
Contract 816	0%	0%	0%	0%	0%	0%	0%	2%	4%	4%	0%	0%	0%	0%	0%
Contract 817	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	5%	0%
Contract 818	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Contract 819	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Contract 820	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%
Lower North / Central															
Contract 822	20%	20%	16%	19%	22%	21%	24%	22%	24%	24%	22%	21%	24%	23%	26%
Contract 823	19%	18%	21%	23%	22%	24%	23%	23%	22%	10%	16%	15%	18%	20%	21%
Contract 824	9%	9%	10%	13%	17%	20%	20%	19%	14%	17%	17%	15%	16%	20%	23%
Contract 825	4%	6%	7%	10%	11%	9%	9%	9%	8%	10%	11%	12%	19%	17%	15%
Contract 826	9%	9%	8%	6%	7%	7%	8%	8%	8%	7%	0%	0%	0%	0%	0%
Contract 827	5%	5%	5%	7%	5%	5%	4%	3%	4%	4%	4%	5%	2%	0%	0%
Contract 828	0%	0%	0%	0%	0%	0%	0%	4%	6%	11%	11%	11%	0%	0%	0%
Contract 829	5%	6%	5%	5%	6%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 830	2%	3%	4%	3%	2%	3%	3%	4%	1%	0%	0%	0%	0%	0%	0%
Contract 831	0%	0%	0%	0%	0%	0%	2%	3%	4%	5%	6%	8%	13%	12%	6%
Contract 832	0%	3%	14%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 833	0%	0%	0%	0%	0%	0%	0%	0%	3%	8%	9%	8%	0%	0%	0%
Contract 834	4%	4%	2%	2%	2%	1%	1%	1%	2%	1%	1%	1%	2%	2%	2%
Contract 835	6%	6%	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 836	0%	0%	0%	1%	2%	2%	2%	2%	3%	3%	3%	3%	7%	6%	7%
Contract 837	2%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%	0%	0%	0%	0%
Contract 838	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 839	4%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 841	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	11%	9%
Contract 842	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Contract 843	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	4%	8%
Contract 844	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	5%	7%
Contract 840	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South															
Contract 849	0%	0%	0%	0%	0%	1%	19%	23%	22%	26%	26%	30%	33%	28%	27%
Contract 850	36%	39%	33%	26%	17%	17%	15%	16%	13%	16%	9%	0%	0%	0%	0%
Contract 851	0%	0%	0%	13%	19%	18%	19%	17%	20%	17%	11%	13%	7%	0%	0%
Contract 852	0%	0%	0%	13%	21%	23%	14%	11%	10%	13%	13%	18%	20%	19%	17%
Contract 853	29%	22%	21%	22%	16%	12%	10%	8%	8%	7%	3%	0%	0%	0%	0%

Market / Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Contract 854	0%	0%	0%	0%	0%	0%	0%	10%	15%	21%	22%	25%	29%	38%	37%
Contract 855	0%	0%	0%	4%	11%	13%	11%	11%	10%	0%	0%	0%	0%	0%	0%
Contract 856	0%	0%	1%	13%	16%	15%	11%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 857	0%	0%	0%	0%	0%	0%	0%	4%	3%	0%	15%	14%	0%	0%	0%
Contract 858	18%	26%	31%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 859	16%	12%	14%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 860	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Contract 861	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 862	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 863	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	15%	15%
South West															
Contract 867	49%	55%	60%	56%	46%	27%	11%	20%	29%	100%	100%	100%	100%	100%	86%
Contract 868	51%	45%	40%	44%	54%	73%	89%	0%	0%	0%	0%	0%	0%	0%	0%
Contract 869	0%	0%	0%	0%	0%	0%	0%	80%	71%	0%	0%	0%	0%	0%	0%
Contract 870	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	14%

Source: FCNSW

*Note that this long term trend data differs slightly for the 3 years (2017-2019) in comparison to Table 4-1. This has resulted from merging two datasets, and by removing very small participants from this long term analysis.

Where the markets are closely related, as is the case for Upper North and Lower North / Central, contractors operating across both markets are not evident from this table.

Based on the data provided by FCNSW above, it does appear that the market share captured by contractors providing harvest services have moved over time indicating a degree of competition operating within the service markets.

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 close to 70% of the contract harvest 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 been vertically integrated at times into harvesting and haulage
- The firm has 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 the firm has a proven track record of meeting production targets and other non-price criteria.

The average unit cost for each contractor has been analysed in terms of the market share held by the firm. For the Upper North, the three largest contractors' unit costs are between 3% and 33%

under the median cost for that market. For the Lower North the same three largest contractors unit rates are between 3% over and 2% under the median, whilst for the South, the three largest contractors unit rates are between 14% over to 1% under. This suggests that that the larger firms generally tend to have a cost competitive advantage, rather than leveraging their market share to obtain above market rates.

Haulage contractor market share trends

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

Table 4-5: Haulage Contractor Market Share Trends FY2005-FY2019

Market / Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Upper North															
Contract 879					2%	2%	3%	3%	4%	5%	7%	2%			
Contract 880	46%	33%	30%	33%	29%	29%	28%	24%	22%	21%	19%	9%			
Contract 881	46%	49%	44%	41%	43%	45%	44%	48%	52%	54%	54%	22%			
Contract 882															
Contract 883		12%	20%	22%	22%	22%	24%	26%	22%	21%	20%	7%			
Contract 884												59%	100%	100%	97%
Contract 885	4%														
Contract 886	5%	6%	6%	4%	1%										
Contract 887				1%	3%	2%									
Lower North / Central															
Contract 889	6%	3%													
Contract 890	53%	51%	48%	46%	45%	45%	44%	43%	47%	41%	43%	21%			
Contract 891	3%	4%													
Contract 892						1%	2%	2%	2%						
Contract 893			0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Contract 894				2%	4%	3%	3%	2%							
Contract 895	25%	18%	14%	7%											
Contract 896	13%	24%	38%	45%	51%	51%	50%	52%	50%	59%	57%	31%			
Contract 897												48%	100%	100%	100%
South															
Contract 899			0%	5%	4%	5%	1%								
Contract 900								5%	7%						
Contract 901												1%	5%	20%	18%
Contract 902													4%		1%
Contract 903												18%	21%	17%	19%
Contract 904	87%	89%	90%	54%	30%	28%	41%	36%	45%	51%	47%	16%			
Contract 905		4%	3%	8%	11%	7%	3%	1%	0%	0%					
Contract 906				0%	4%	4%	4%	3%	1%						
Contract 907												3%	12%	16%	16%
Contract 908				3%	6%	18%	20%	19%	21%	18%	12%	13%	6%		
Contract 909													2%	0%	
Contract 910												18%	31%	28%	28%

Market / Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Contract 911		0%	0%	6%	8%										
Contract 912				11%	21%	23%	16%	16%	11%	14%	17%	19%	20%	19%	18%
Contract 913												0%			
Contract 914	13%	7%	6%	14%	17%	15%	14%	14%	14%	17%	24%	10%			
Contract 915							1%	5%							
Contract 916												0%			
South-west															
Contract 918															19%
Contract 919							20%	89%	70%						
Contract 920	51%	47%	41%	44%	54%	77%	72%								
Contract 921	49%	53%	59%	56%	46%	23%	9%	11%	30%	100%	100%	100%	100%	100%	81%

Source: FCNSW

Comment on market share trends for haulage contractors

Based on the data provided by FCNSW above, 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.

In the Upper North and Lower North market, one observable outcome is emergence of the consortium in 2016 who had 100% of the haulage services market in Upper North in 2016/2017, after being awarded all the northern haulage work. We understand from FCNSW that this is a consortium of incumbent haulage contractors. It 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 have indicated that savings have been made that would be shared between FCNSW and the customers. In terms of reducing competition, FCNSW maintain that the consortium has retained the independence of the individual firms and thereby there is the potential to recreate market tension if they choose to do so. Furthermore, the consortium arrangement has included the provision of improved supply chain data that will help increase the understanding of fleet dynamics and reduce the uncertainties inherent in native forest transport, potentially improving the opportunities for new players to successfully enter the market. Indufor would observe that these are reasonable assumptions however a high level of due diligence is required to ensure that the presence of the consortium does not result in reduced competition in the long term.

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 purchaser of harvest and haulage service
- The potential for countervailing power from FCNSW's timber customers.

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.

An example of this evolution is the process that stemmed from a review of harvest and haulage services procurement in 2010. To that point, open tendering had been based on calling for bids for parcels of work based on harvesting areas and associated 'difficulty classes'. Prices were based on a green metric tonne (or in some cases m^3), and the contractor was responsible for understanding and predicting productivity levels and product mix, in order to ensure the pricing was sustainable.

Because of the extremely wide variation in operating conditions and hence productivity, FCNSW undertook to help manage the risk of 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 top establish rates for individual areas.

After further review in 2015, FCNSW returned to open tenders for unit pricing. However, as the market response was poor, particularly on the South Coast, direct negotiation with existing firms was seen as the best means to achieve reasonable outcomes.

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?

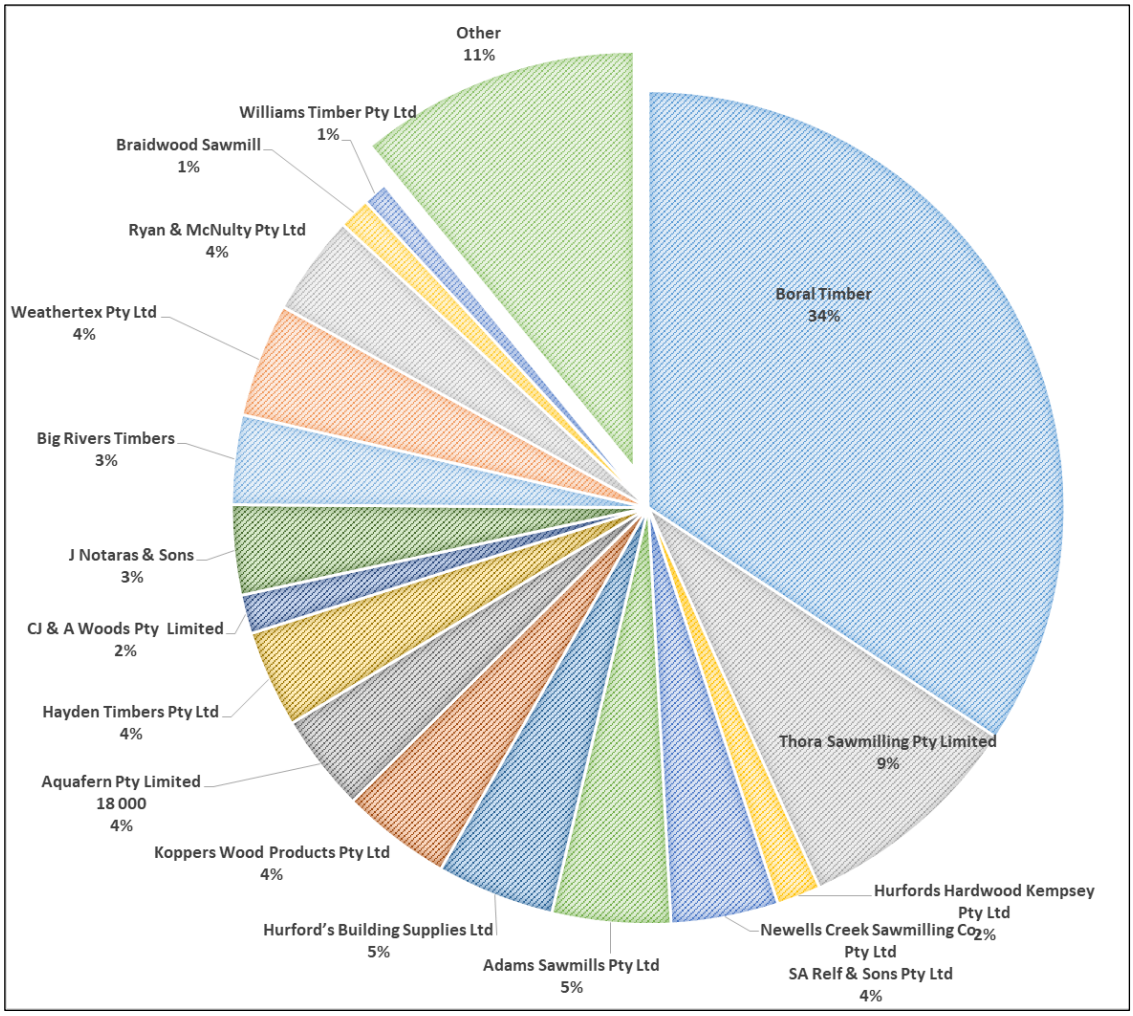
- Does the supplier costs remain competitive?

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, 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. On this basis, 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 4-3 below, FCNSW's native timber customers include a number of larger businesses, with Boral receiving over 34% of logs by volume from FCNSW forests (excluding stumpage operations). 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.

Figure 4-3: FCNSW Customer Allocation (Top 20, FY2019, excludes stumpage sales)



Source: FCNSW

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 addition, over 50% of the log volume sold by FCNSW annually is under a mill door price arrangement (refer to section 2.4.1) - 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 derive a residual stumpage based on the mill door price, less contract costs. Therefore, there is a strong 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 within 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	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Change 2016-19**
Upper North	40.50	41.38	45.50	49.63	
Annual Change		*2.2%*	*9.9%*	*9.1%*	*22.5%*
Lower North / Central	38.62	41.78	43.02	42.31	
Annual Change		*8.2%*	*3.0%*	*-1.6%*	*9.6%*
South	30.72	33.67	34.24	36.88	
Annual Change		*9.6%*	*1.7%*	*7.7%*	*20.1%*
South-west	27.32	26.75	27.77	29.47	
Annual Change		*-2.1%*	*3.8%*	*6.1%*	*7.9%*

Source: FCNSW

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 ($ per gmt)					
Region	2015/16	2016/17	2017/18	2018/19	Change 2016-19
Upper North	21.22	21.71	22.99	25.25	
Annual Change		*2.3%*	*5.9%*	*9.8%*	*19.0%*
Lower North / Central	24.41	24.05	24.95	26.60	
Annual Change		*-1.5%*	*3.8%*	*6.6%*	*9.0%*
South	29.74	31.97	32.83	35.36	
Annual Change		*7.5%*	*2.7%*	*7.7%*	*18.9%*
South-west	26.43	32.64	34.36	35.11	
Annual Change		*23.5%*	*5.3%*	*2.2%*	*32.9%*

Source: FCNSW

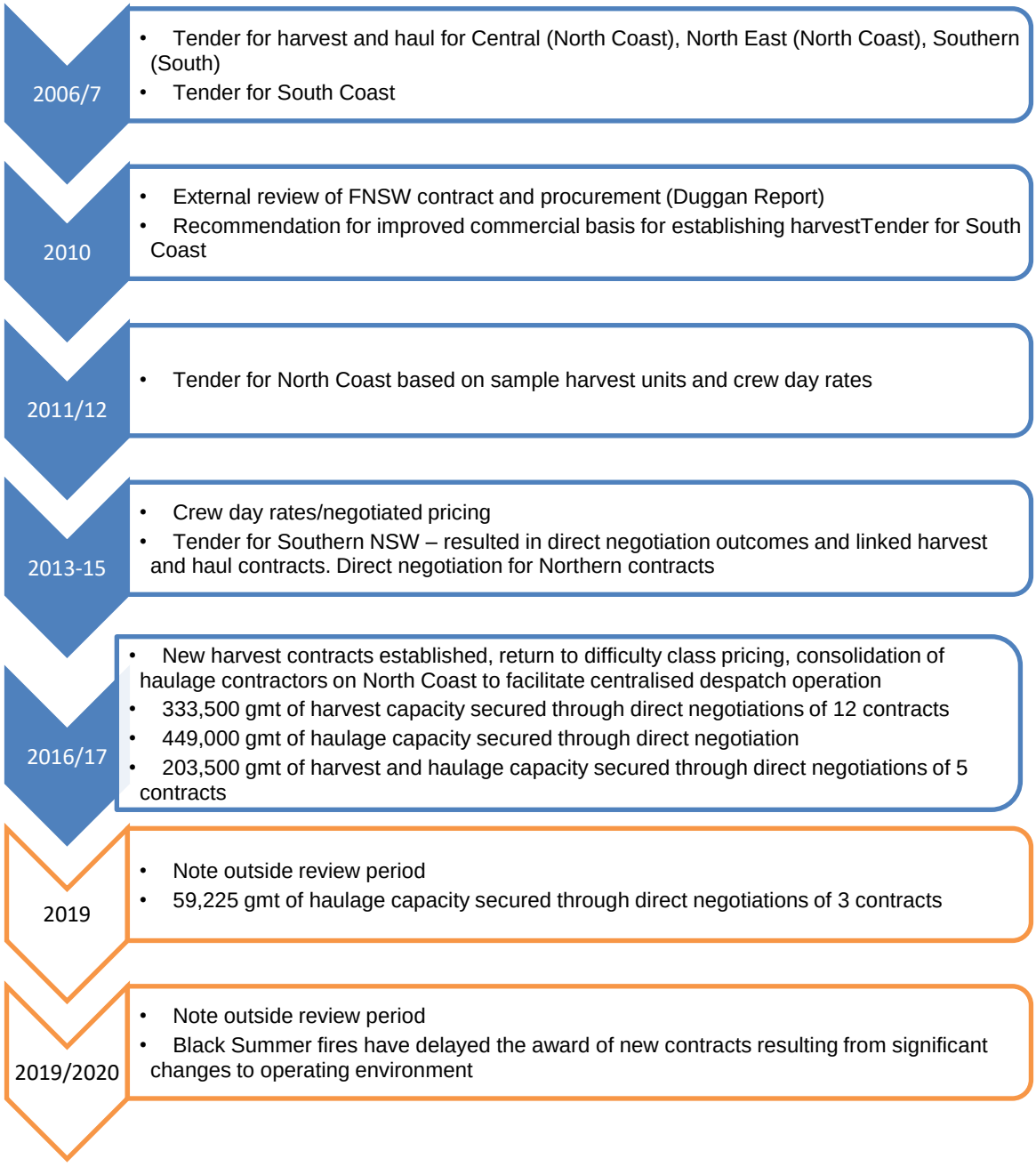
No data was available, nor was it within scope of the study, to compare longer term trends and therefore the impact of market power over a longer period of time.

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 FY2017-19 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 (Figure 4-4).

Figure 4-4: Timeline and Details of FCNSW Market Approaches



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. This is exemplified by the consolidation of haulage activities on the North Coast that has delivered both direct cost savings and evidential improvements in fleet efficiency (see Section 3.5).

4.6 Conclusions

The assessment of market power for this review points to similar conclusions as were drawn for the 2013-2016 Benchmarking Study. 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 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 result from a contestable process and that the market concentration and pricing outcomes over the three years covered by the review do not appear to highlight potential market power in local or regional markets.

FCNSW have however noted that the industry is potentially undergoing significant instability resulting from regulatory changes and the impacts of the Black Summer bushfires. 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 2.4.1, 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 m^3 based on FTE allocations for FCNSW to manage and administer harvest and haulage services (estimated to be \$3-73 per m^3 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 are currently applied at the rate of \$3-82.

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.

Operating margin – delivery charge revenue less 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 positions in the structure such as the Sales and Distribution Managers that would not be required under stumpage sales, and 19 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 50% 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

Item	%	Number	$
Dedicated Managers	100%	3	
Dedicated Supervisors	100%	3	
Dedicated Coordinators	100%	8	
50% Harvesting Managers	50%	3	
50% Harvesting Supervisors	50%	6	
50% Harvesting Coordinators	50%	10	
Capital related items (depreciation and interest)	None advised		
Total		33	3 098 343

Source: FCNSW – FY2018 (mid-point) Estimate (based on 2.5% annual indexation)

With an average annual volume in the order of 831,000m^3, the average estimated administration cost would equate to approximately \$3-73 per m^3. 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[9].

5.3 Revenue

As discussed in Section 2.4.1, 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,

[9] Refer to VicForests Annual Report 2018/2019 p.24 and Forestry Tasmania Annual Report 2018/19 p.97

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 are currently reported by FCNSW as being $3.82/gmt. Average delivery charges and changes over the review period are detailed below.

Table 5-2: Average Delivery Charges 2016 – 2019

Delivery Charge ($ per tonne)					
Region	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Total Change**
Production North	74.54	64.17	67.82	70.03	-4.51
Annual Change		-13.9%	5.7%	3.3%	-1.7% (avg)
Total Change					-6.0%
Production South	68.44	59.62	61.09	64.43	-4.01
Annual Change		-12.9%	2.5%	5.5%	-1.7% (avg)
Total Change					-5.9%
Total	73.12	62.84	65.69	68.30	-4.82
Annual Change		-14.1%	4.5%	4.0%	-1.9%
Total Change					-6.6%

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 decrease of 1.9% is evident from the aggregated data.

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 5-3. As discussed, the delivery charges may include the administration fee that recognises FCNSW costs noted in Section 5.2. However, FCNSW accounts do not identify where the administration fee is applied.

When FCNSW revenue (revenue and grants) is compared with the contract and estimated administrations costs incurred by FCNSW over the same period, the average operating margin over the period is estimated to be $(3.96) per m^3. This includes government grants received as part of an industry adjustment on the South Coast arising from forest policy decisions. Despite the grants, overall FCNSW failed to cover third party and administration costs during the review period. Indufor are advised that this is largely due to changes to operating conditions following the determination of Delivery Charges such that costs incurred have been higher than anticipated. FCNSW report expecting that this situation is likely to be reversed in subsequent years, such that any revenue shortfall should be recovered.

Table 5-3: Operating Margin by Region FY2017-19

FY Year	Region	Costs and Revenue ($'000)				Margin ($'000)	% Margin	Margin ($ per gmt)
		Contract	Costs* (Admin)	Rev	Grants			
2017	Production North	-29 761	-1 722	29 632	-	-1 852	-6.5%	-4.01
	Production South	-12 306	-714	11 412	383	-1 224	-10.7%	-6.40
	Total	-42 067	-2 436	41 044	383	-3 076	-7.6%	-4.71
2018	Production North	-31 483	-1 731	31 478	-	-1 737	-6.1%	-3.74
	Production South	-14 214	-804	13 162	814	-1 042	-7.9%	-4.84
	Total	-45 697	-2 535	44 639	814	-2 779	-6.6%	-4.09
2019	Production North	-34 383	-1 819	34 156	-	-2 046	-6.1%	-4.20
	Production South	-15 396	-814	14 065	1 979	-166	-1.2%	-0.76
	Total	-49 780	-2 633	48 221	1 979	-2 213	-4.9%	-3.13
Total		-137 544	-7 605	133 905	3 177	-8 068	-6.0%	-3.96

Source: FCNSW (* note that admin costs have been calculated at the derived rate of $3.73 per gmt)

In summary from the data available, the full complement of third party contract and administration costs are not being recovered 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 the log stumpage component.

FCNSW have advised that delivery charges have been the subject of a detailed review in 2017, and that changes to operating plans have resulted in delivery costs exceeding those predicted at the time delivery charges were negotiated with customers. It is expected that this will be rectified in future years, and that in the current year (FY2021) a sufficient margin is being achieved on deliveries to cover contract and administration charges.

5.5 Opportunities for improved efficiency

There are a number of key challenges facing the industry in NSW. These include a changing social and political landscape that has a profound impact on the ability to efficiently extract timber resources from native forests. This has been compounded by the Black Summer bushfires that have imposed an altered regulatory regime in addition to any impacts on the timber resource itself.

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

- Modified harvesting prescriptions with higher tree retention and lower yields
- Tighter supply constraints that necessitate, sub-optimal transport arrangements leading to longer transport distances and higher costs
- More broadly, uncertainty in the industry following the Black Summer Fires that will decrease interest / competitiveness by suppliers for harvest and haul services

Indufor would observe that overall, FCNSW approach to market for services achieves a good balance between leveraging existing expertise and capital and exposing the market to new entrants to ensure some competitive tension is maintained. This evidence of this is that most rates have been held below the expected impact of both CPI and fuel over the review period.

Whilst there appears to be limited opportunities to increase the efficiency of the existing operations, strategies to mitigate the impact of the future cost pressures are required. Identifying and monitoring the specific changes to the operating environment, triggered by the external forces listed above will assist with developing strategic options. Being able to effectively and proactively quantify any changes to costs and revenues will be key to seeking regulatory relief or financial assistance or recognition through customer pricing.

6. FINDINGS AND RECOMMENDATIONS

6.1 Findings

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

Benchmarking

- There are 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 effectively.

- *Harvest rates* -. Whilst the observed rates in the four identified geographic markets in which FCNSW procures harvesting services appear 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 rates over the three years covered by this review have increased at a higher rate than the CPI over the relevant period, however at a rate commensurate with increases in CPI and fuel.

- *Haulage rates* – 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 are within the ranges observed across comparable operations.

Market Power Assessment

The structure of the market for the provision of harvest and haul services has not substantially changed since the 2013-2016 Benchmarking Study. Therefore, comments pertaining to the Market Power are largely unchanged.

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. To consider whether there may be 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 contestable process and that the market concentration and pricing outcomes over the three year period covered by the review do not appear to highlight potential market power in local or regional markets.

Efficiency Analysis

Indufor and FCNSW have estimated the marginal 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.

FCNSW delivery charges do not appear to cover third party contracted costs, or the administration costs, over the three year period overall, with some regional differences and an improvement in the final year of the review period. FCNSW have advised that this situation will be rectified in future years.

Summary of findings

1. 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 and FCNSW are actively managing procurement processes to seek price discovery and ensure contracted parties are operating efficiently
    - Increases are more than CPI over the review period, however the impact of a 27% increase in the benchmark cost of fuel over the review period has been contained.
2. FCNSW costs for haulage services are commensurate with other native forest operations.
3. FCNSW administration costs appear to be commensurate with comparable operations.
4. Through the application of delivery charges, FCNSW do not appear to be recovering the collective entire cost of contractor and administration charges.

6.2 Recommendations

Based on our findings above, our recommendations on the options for enhancing the capacity for FCNSW to benchmarking its harvest and haulage costs are the following:

Previous Recommendation	Status / Comment
Procurement processes – FCNSW consider the development of a systematic and consistent approach to the collection and reporting of data and information in relation to its procurement of harvest and haulage services including: tender details, tender specification, bidder participation and contracts awarded (including rates). This could involve a summary table from tendered or negotiated outcomes that could directly inform an analysis of the functioning of the market.	A record of contract negotiations for both harvest and haulage services is now maintained by the Contract and Procurement Manager. The utility of this datacould be improved by referencing each outcome to a dated negotiation or approval process.
Cost data – FCNSW work towards the development of standardised cost data set for its harvest and haul operations by: contract, product, market, price and volume as suggested in Appendix C;	This data has been retrieved through the data request process relatively efficiently but is not maintained as a standalone reporting dataset. No further action is warranted.
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). A way to answer this to conduct internal benchmarking of one contract against another during negotiations, and this underpins the approval process. FCNSW also use a costing model based on industry owning and operating costs to ensure rates are reasonable
Inter-jurisdictional data – FCNSW further examine the feasibility and value of collecting additional data from other jurisdictions to provide the basis for the development of other benchmarking techniques such as productivity indexes in the future; and	While it is difficult to collect data from inter jurisdictional parties when there is little relevance to what FCNSW do, one option for consideration is more regular independent assessments on harvest crews' productivity levels to ensure FCNSW has optimal operations
Cost recovery – FCNSW give consideration to ensuring the financial monitoring and reporting	Currently, FCNSW reports and monitors H&H Margin as a part of the management

Previous Recommendation	Status / Comment
systems appropriately capture costs and revenues associated with managing mill door sales to ensure that future comparisons with cost recovery and the administration burden of alternative sales arrangements can be made.	accounting processes. Margin management is constrained by the underlying methodology to calculate delivery charges.
Additional Recommendation	**Status / Comment**
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.

7. BIBLIOGRAPHY

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

Example Mandatory Equipment Requirements Equipment	Mandatory Equipment Specification
Harvesting equipment	Protective guards and structures on heavy mobile plant – ROPS, FOPS and OPG (see attached circular CEC 201403 Protective Structures on Heavy Plant) Mechanical harvesters and processors (as a minimum) must be fitted with an appropriate fire suppression system that meets Australian Standards AS5062.
Prime Mover	Truck mounted UHF two way radio. UHF hand held radio. Central tyre inflation (CTI) on the drive wheels or another system that the contractor can demonstrate provides comparable benefits to the satisfaction of FCNSW. A cabin rear guard system manufactured to a standard to protect truck occupants in the event of load shift. On-board scales with a remote readout to allow load measurement to an accuracy of +/- 100 kg while the Driver is outside the truck in the safe zone. Global Positioning System (GPS) as specified in clause 14.2 Smart Phone if requested by FCNSW Firefighting equipment as per the Forest Practices Code
Trailer(s)	On-board scales with a remote readout to allow load measurement to an accuracy of +/- 100 kg while the Driver is outside the truck in the safe zone. Airbag suspension or another system that the contractor can demonstrate provides comparable benefits to the satisfaction of FCNSW. Automatic load tensioning system on all bays Remote release straps such that the loads can be unsecured by remaining on the Driver's side of the Vehicle. 1800 LOGHAUL signage indicating the Vehicle's designated fleet number and of the following dimensions.(859X258mm) Electronic Braking System that incorporates rollover protection and is capable of recording brake pressure, time, faults, and EBS triggers.* Light Emitting Diodes (LED) lights on brake, tail and indicator, and clearance lights. A design aimed at improving Vehicle stability.
Vehicle combination (prime mover and trailer)	All components of the combination (i.e. trailer(s) and prime mover) must individually exceed a Static Roll-over Threshold (SRT) of 0.35g at all times.
Office/Home Base	Personal computer with internet connection and an email address.

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APPENDIX A. FCNSW ORGANISATIONAL STRUCTURE

Figure A-1: Production North Organisational Structure

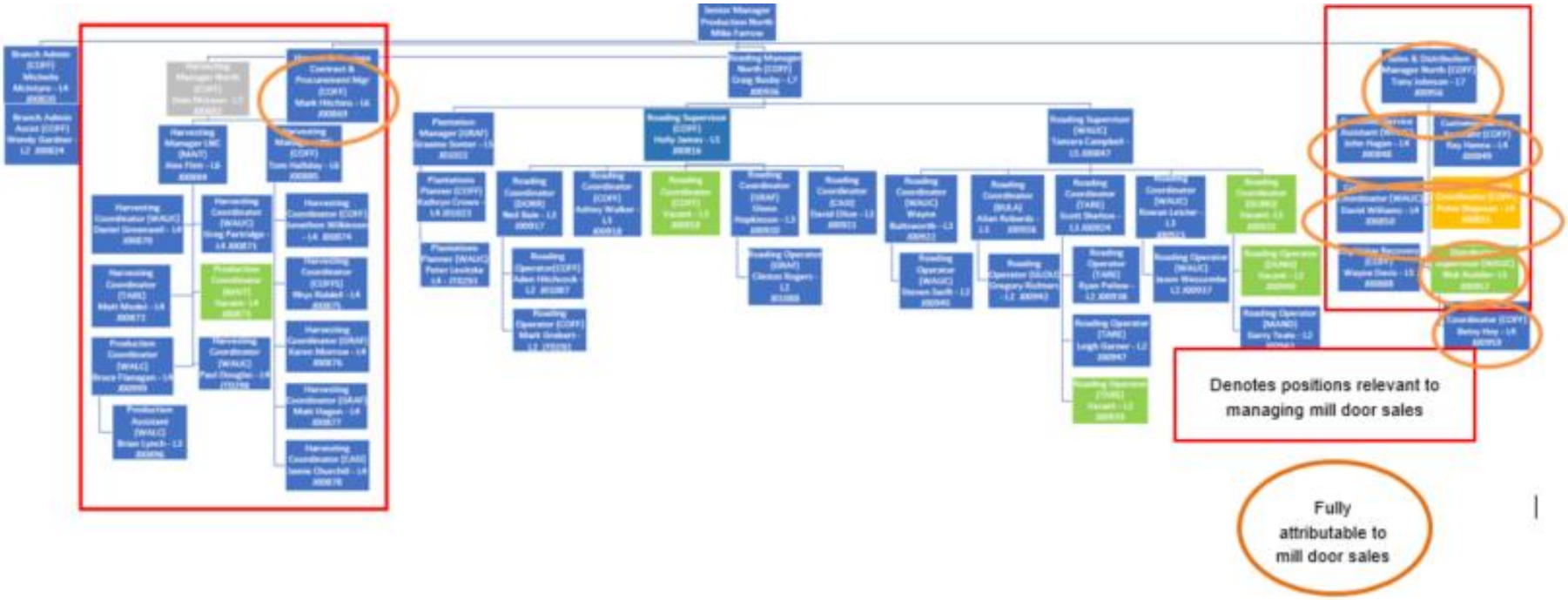
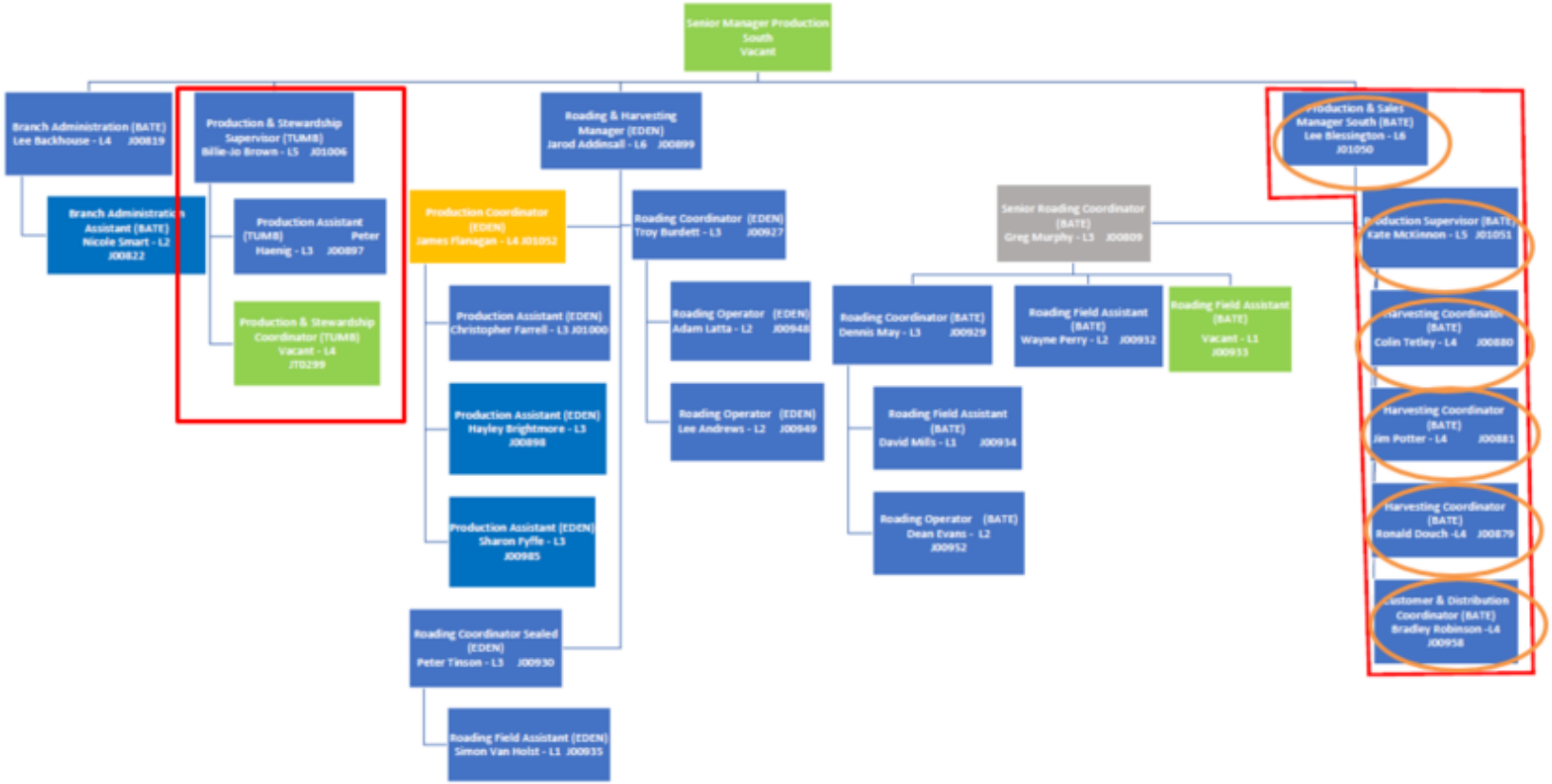


Figure A-2: Production South Organisational Structure



APPENDIX B. PROPOSED DATA REQUIREMENTS

Source	Data required	Used to calculate and compare
Load data from sales system	Date	Unit cost comparison 2013 – 2016, 2016 – 2019 Changes in operating conditions Changes in market share / operation
	Tonnes and m3	
	Product and Customer	
	Contractor and crew (if available)	
	Transport distance by road class	
	Actual $ for Harvest, haul, delivery, other (payment), other (revenue)	
	Harvest Plan ID	
	Region, Price zone	
	Difficulty class	
	Truck type	
	Yield per ha x harvest plan ID	
	Average slope harvested (data from DTM preferred)	
	Snig distance data (if available)	
	Rate schedules for harvest and haul	
	Fleet performance – average lead, loaded km, utilisation	
Other jurisdictions	Average harvest cost by contractor x volume harvested	Rate changes over time and impact of operating parameters on costs
	Average haul rate by contractor x volume x distance, haul rate schedules	
	Harvest costs by yield, slope and other operating parameters if available	
Tender reports, negotiated outcomes, briefing notes,	Specifications, candidate market, participants, rate outcomes	Activity in market and degree with which it is operating effectively

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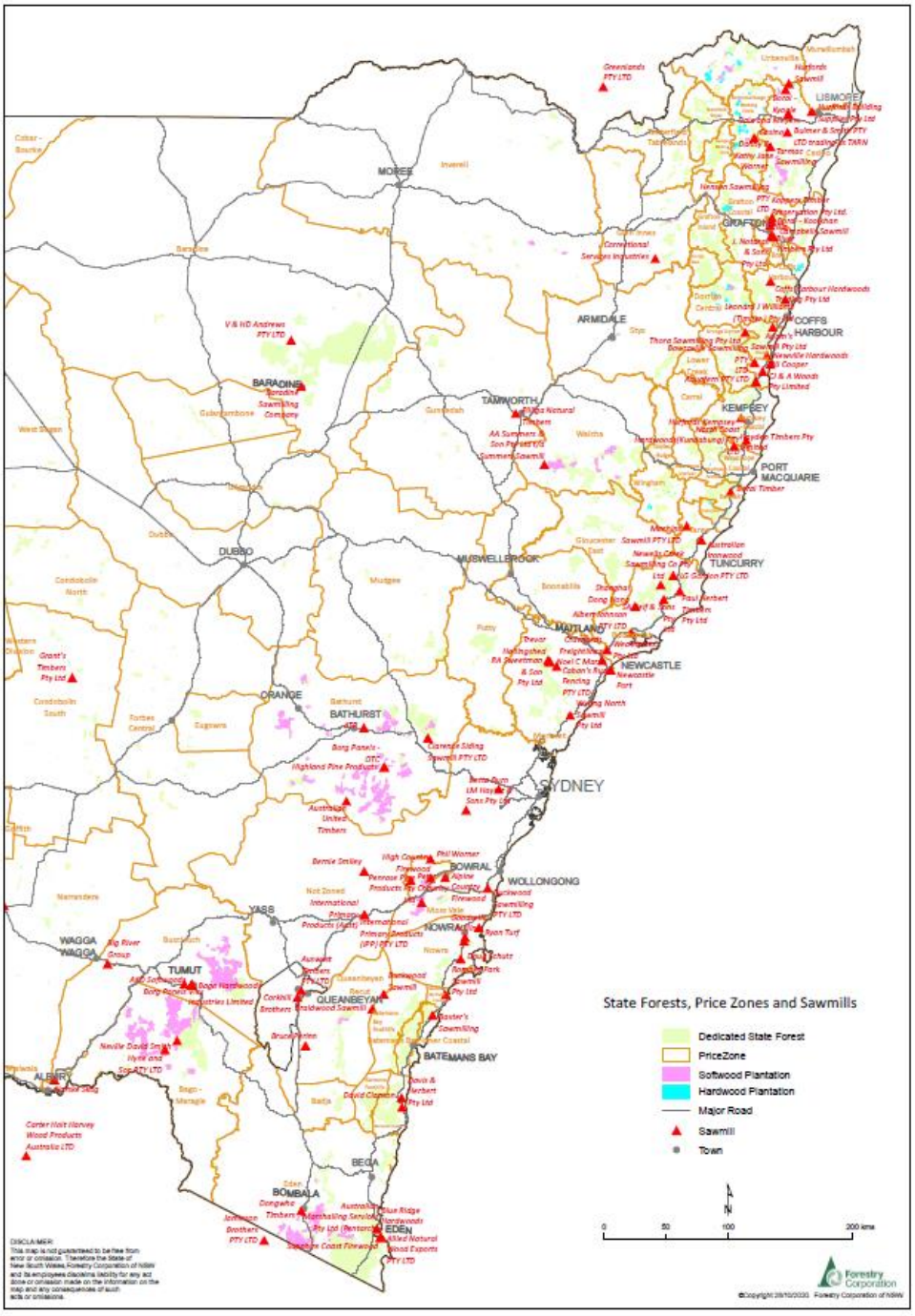
APPENDIX C. FCNSW SALES OVERVIEW



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