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Natural Resources Commission

Coastal Integrated Forestry Operations Approval Monitoring Program

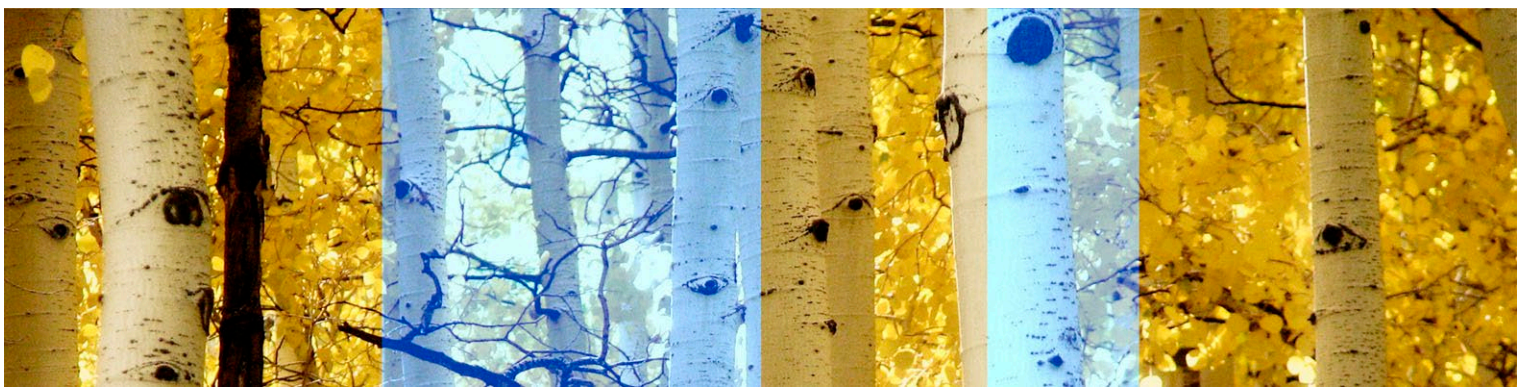
Monitoring wood supply baseline and trends

Final Report

17 June 2022

Melbourne

A21-22109 NRC Wood Supply



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PREFACE

This report was prepared at the request of the Natural Resources Commission (the Client) by Indufor Asia Pacific (Australia) Pty Ltd. The intended user of this report is the Client. No other third party shall have any right to use or rely upon the report for any purpose.

The project involved data analysis and consultation with FCNSW staff during the period February - May 2022; and the views expressed in this report reflect outcomes of the review during this period.

This report may only be used for the purpose for which it was prepared, and its use is restricted to consideration of its entire contents. The conclusions presented are subject to the assumptions and limiting conditions noted within.

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EXECUTIVE SUMMARY

The Natural Resources Commission (NRC) are independently overseeing the design and implementation of the Coastal Integrated Forestry Operations Approval (CIFOA) and are implementing a monitoring program to assess the CIFOA impacts on future wood supply. This report details key drivers of CIFOA wood supply based on historical analysis to guide monitoring of future wood supply.

This represents an historical wood supply baseline as required in the Coastal IFOA monitoring plan – Baselines and trends in wood supply. The second stage of the monitoring plan will develop a forward looking wood supply baseline, incorporating the impact of the 2019/20 wildfires on forest condition, against which future actual wood supply can be monitored.

Report purpose and scope

Indufor Asia Pacific (Australia) Pty Ltd (Indufor) have been engaged by the NRC to evaluate:

1. Historic actual wood supply from NSW coastal native state forests (2003-2019)
2. Drivers of change in wood supply from NSW coastal native forests (2003-2019).

The analysis focusses on drivers of the volume, species and grade of native forest high quality (HQ) logs, supplied from the period 2003 – 2019 (the review period) for the CIFOA region, broken down by North Coast, South Coast, Tumut and Eden subregions.

The analysis considers native forest and plantation supply (recognizing plantation harvesting is not subject to the CIFOA), as well as the suite of log products - HQ (being comprised of large (HQL) and small (HQS)), low quality sawlog (LQ) and pulplog (pulp), as supply chains and the processing industry can be directly or indirectly affected by the utilization of these non-HQ products.

The review period excludes 2020/2021 when wood supply was significantly disrupted due to wildfires and floods.

This study was completed through a desktop analysis of publicly available data relating to NSW native forest supply, and responses from Forestry Corporation of NSW (FCNSW) to data requests from Indufor.

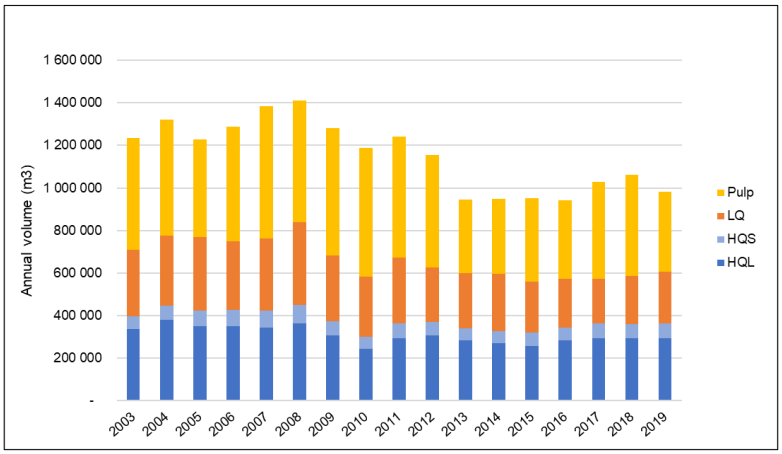
Historic wood supply 2003 – 2019

FCNSW provided comprehensive log sales data for the review period spanning seventeen calendar years from 2003 - 2019. The data has been aggregated by Indufor to enable overall trends to be considered as well as regional and local specific factors.

Total supply across the CIFOA areas declined over the period, with key reductions relating to LQ and pulp logs.

ES Figure 1 Total volume of all log products arising from CIFOA regions (2003-2019)

The largest decrease in volume over the review period has been associated with pulplogs and LQ logs (approx. 40%) while HQ sawlog decreased by around 15% over the 2003-2019 period



Source: FCNSW

There are substantial differences in trends for HQ and other log grades between subregions. For the North Coast, HQ and LQ declined by around 20%, while on the South Coast and Eden HQ levels were

maintained whilst there were significant declines for other products. All product volumes in Tumut varied considerably. Details are provided in the body of the report.

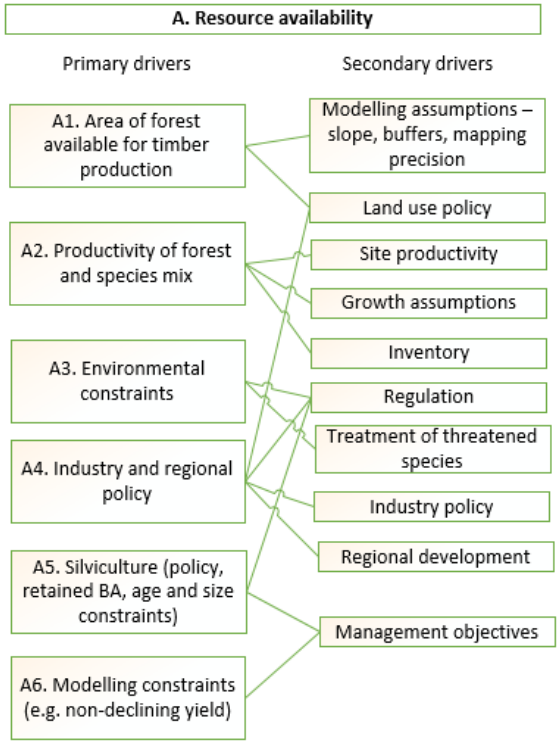
Indicative drivers of historical wood supply

Wood supply can be influenced by various policy, regulatory, logistical, operational and physical frameworks, and operating environments that impact and influence supply, and demand drivers (contracts and markets). Given the complexity of the potential suite of drivers influencing historical supply, three broad categories of primary drivers are considered: **resource availability**, **market forces** and **supply chain** characteristics. The primary drivers can influence each other and are also influenced by a range of secondary factors.

Category A. Resource availability

Resource availability was assessed based on FCNSW's strategic wood supply plan which is regularly updated using the FRAMES model to incorporate new data, additional constraints and goals, and differing assumptions. Primary and secondary drivers of resource availability are shown in ES Figure 2.

ES Figure 2 Resource availability – primary and secondary drivers



Resource availability - summary

Net harvest area and growing stock are two key quantitative parameters in resource modelling. Net harvest area has changed only modestly over the review period.

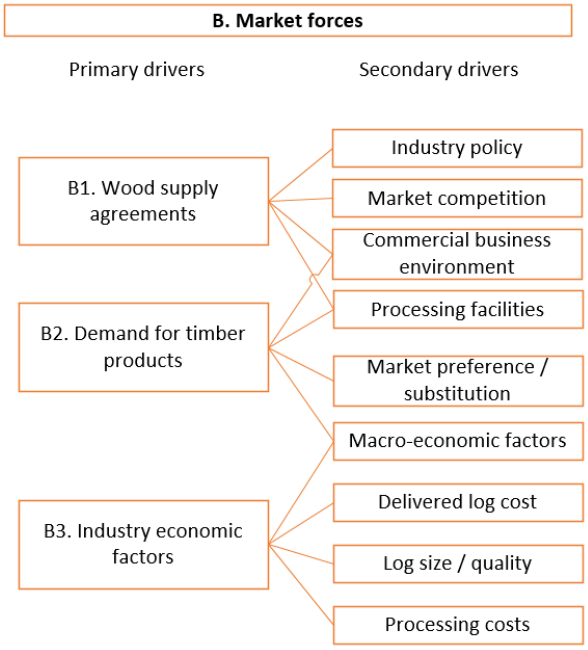
Growing stock, as at the reporting time, has varied more markedly, partly reflecting changes to data measurement and quantification of the impact of historical disturbances such as major fire events. Fire events have a fundamental impact on forest productivity (A2).

Forest productivity and species mix, environmental constraints, regional and industry policy, silviculture and other modelling constraints form primary drivers of resource availability.

Category B. Market forces

The demand drivers for native forest logs focus on the nature of the supply agreements in place, the inherent demand for timber products and other economic factors. These are influenced again by a suite of secondary factors as shown in ES Figure 3.

ES Figure 3 Market forces – primary and secondary drivers



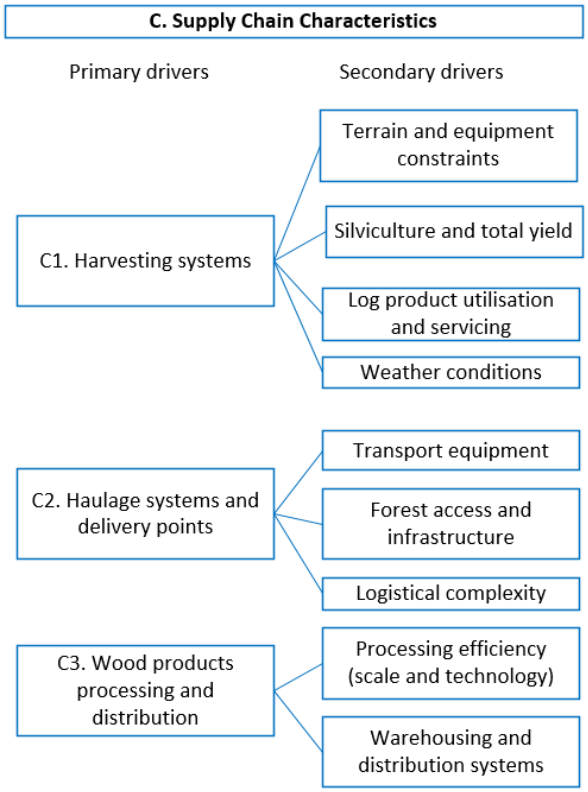
Market forces - summary

Market forces include supply agreements, the inherent demand for logs and wood products at a regional, national and global scale, and industry economic factors that may be relevant to a particular processing centre. Whilst lower value log products are subject to typical commodity supply and demand fluctuations, the scarcity of high quality native forest sawlogs largely means that supply is closely correlated with levels specified in supply agreements.

Category C. Supply chain characteristics

Supply chain drivers include harvesting and haulage systems, and wood processing and distribution facilities. These drivers directly influence production costs (and hence the economic factors described above) but can also impact supply over the short and medium term. Primary and secondary supply chain drivers are shown in ES Figure 4.

ES Figure 4 Supply chain characteristics – primary and secondary drivers



Supply chain characteristics - summary

Changes to technology, complimentary log product markets, industry rationalisation and weather impacts impact log supply. These factors impacted the cost of production and altered the approach to harvesting and transport.

Regional analysis of historic drivers of wood supply

The strength of implied causal correlation or links between a driver and the actual HQ supply was assessed to ascertain the relative influence of each driver category for each subregion. This included the duration of a driver's influence on the wood supply, where for example some drivers have influence over an extended (or ongoing) period, whereas others have a shorter or more defined period of influence.

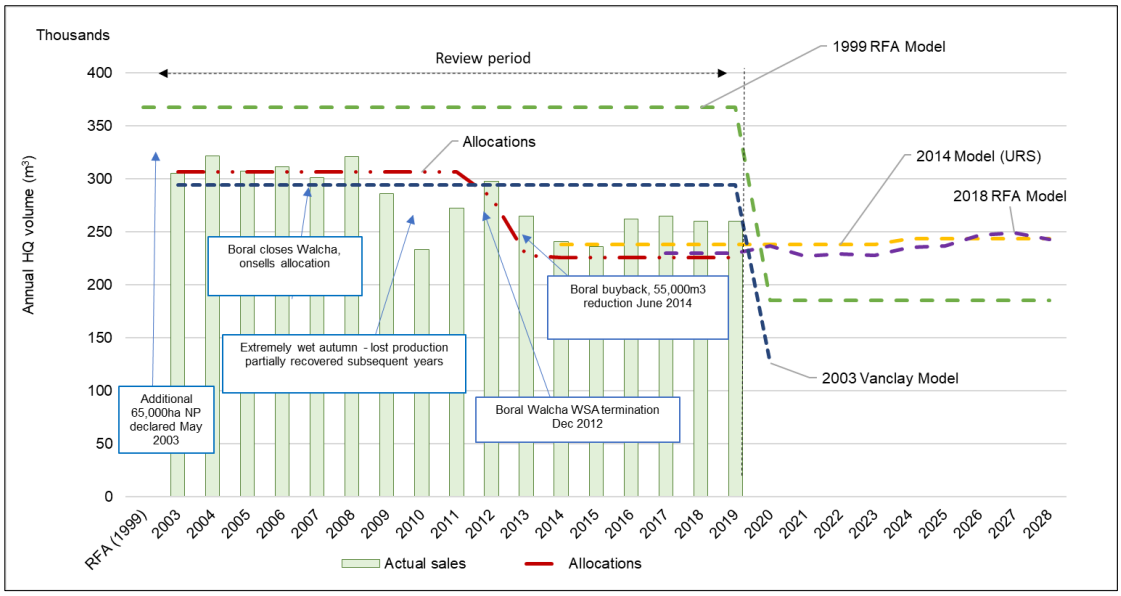
The following provides an overview of actual HQ supply against FCNSW supply agreements (termed 'allocations'), as well as the various iterations of supply modelling (dashed lines) completed at differing periods of time by FCNSW. The shape of the modelled supply varies over time and is presented including the modelled expected supply beyond the review period to provide an indication of how the intent of management over the medium term can influence supply within the review period.

Key events that have influenced supply are noted, in terms of key policy or commercial decisions, weather events and contractual matters.

North Coast analysis

The North Coast is the most complex region in terms of customer, grade and species combinations; as well as being affected by various policy decisions taken over the review period.

ES Figure 5 North Coast – key HQ supply events overview



Note that 'allocations' refers to the sum of the volume committed under various wood supply agreements at that time. Customers can vary annual supply by between 10% to 15% per annum, and carry forward under and overcuts such that there are periods where supply is under and over allocated. There was also some carry-forward of volume that was unable to be supplied during the wet conditions in 2009 – 2011.

The primary influences on the North Coast actual HQ supply were:

Resource availability – actual supply and allocations are closely aligned with modelled volume. Of note is the volume for the 1999 RFA and the 2003 Vanclay models were 'front-ended', with an expected significant decline in available volume following the completion of the supply agreement terms in 2023. The allocation was adjusted in 2013 to better reflect an smoothed supply of HQ in the period to at least 2030. This occurred through the adjustments made to long term allocations, and improved resource estimates, and revised modelling objectives. Actual supply is noted as closely aligning with the allocated volume.

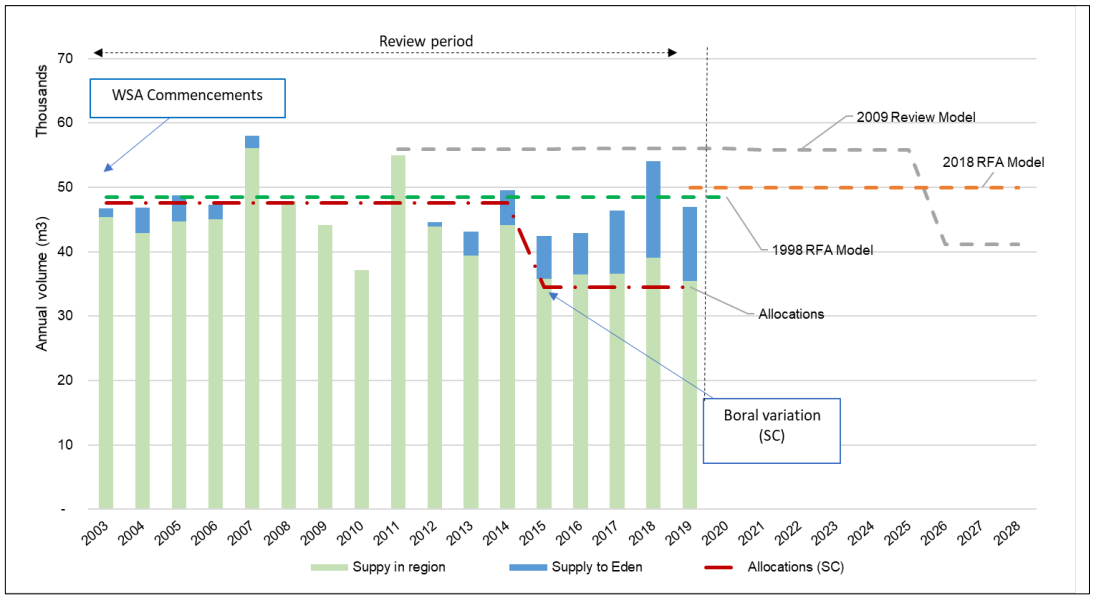
Market forces – wood supply agreements, aggregated to form the 'allocations' line, are the fundamental market force at play. Despite the cyclic nature of the timber market more broadly, demand for HQ sawlogs appears to have generally exceeded supply, such that supply is more influenced by other factors. The reduction on the Boral allocation in 2014 (which arose post the 2014 model review), significantly altered the overall HQ allocation and consequent supply level.

Supply chain characteristics – a key influence during the review period were the extended periods of wet weather in 2009 – 2011. These had a short-term impact on supply, part of which was recovered in subsequent years.

South Coast analysis

The South Coast has a simpler supply history. The original allocations were based on modelling undertaken for the RFA, with a reduced allocation occurring in 2014. Following this reduction, FCNSW supplied HQ from this region to processors in Eden.

ES Figure 6 South Coast – key HQ supply events overview



The primary influences on the South Coast actual HQ supply were:

Resource availability – allocations are closely aligned with 1998 modelled volume. Subsequent iterations of the long-term yield forecast supported the original estimates.

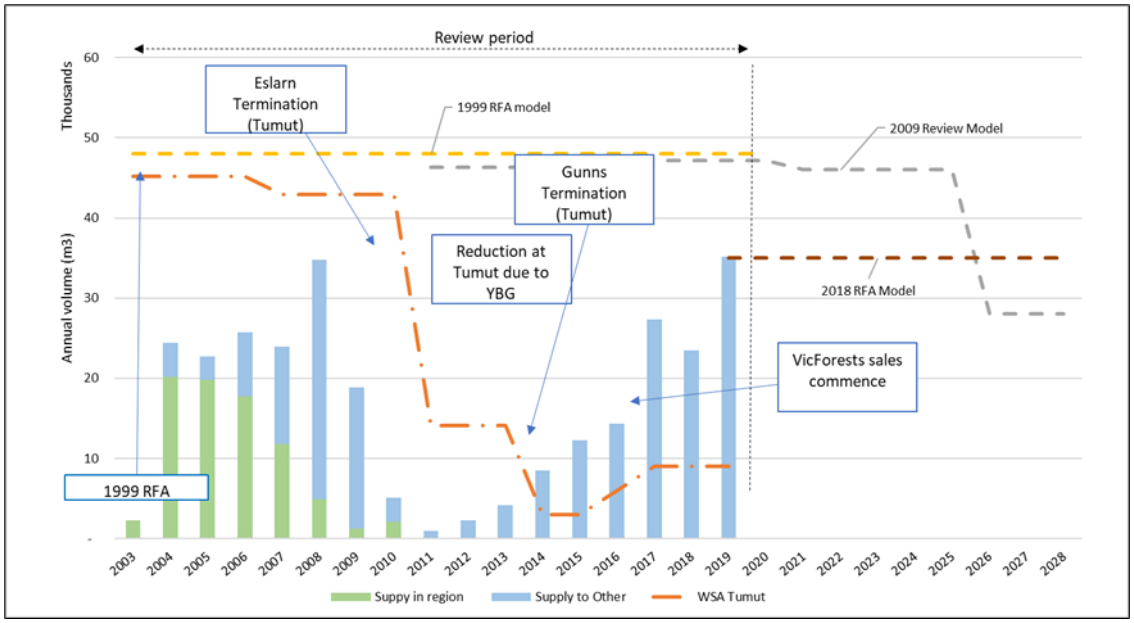
Market forces – the key market force is the commitment to supply under the high quality wood supply agreements, and volume supplied within the region closely aligned with the regional allocation.

Supply chain characteristics **–** the main change to supply arrangements during this period was the transition from stumpage sales to mill door sales in 2006/2007. This does not appear to have influenced the level of supply.

Tumut analysis

The Tumut wood supply has been variable over the review period, influenced by several factors.

ES Figure 7 Tumut - key HQ supply events overview



Resource availability – the restrictions associated with harvesting in areas of Yellow Bellied Glider habitat had a significant impact on resource availability from 2010 – 2012.

In addition, allocations varied markedly over the supply period, not directly in response to changes in modelled resource availability. High quality Ash logs formed the majority of the wood supplied, while non-preferred tableland species have not been consistently supplied.

The original allocations were based on modelling undertaken for the RFA with a significant buffer applied.

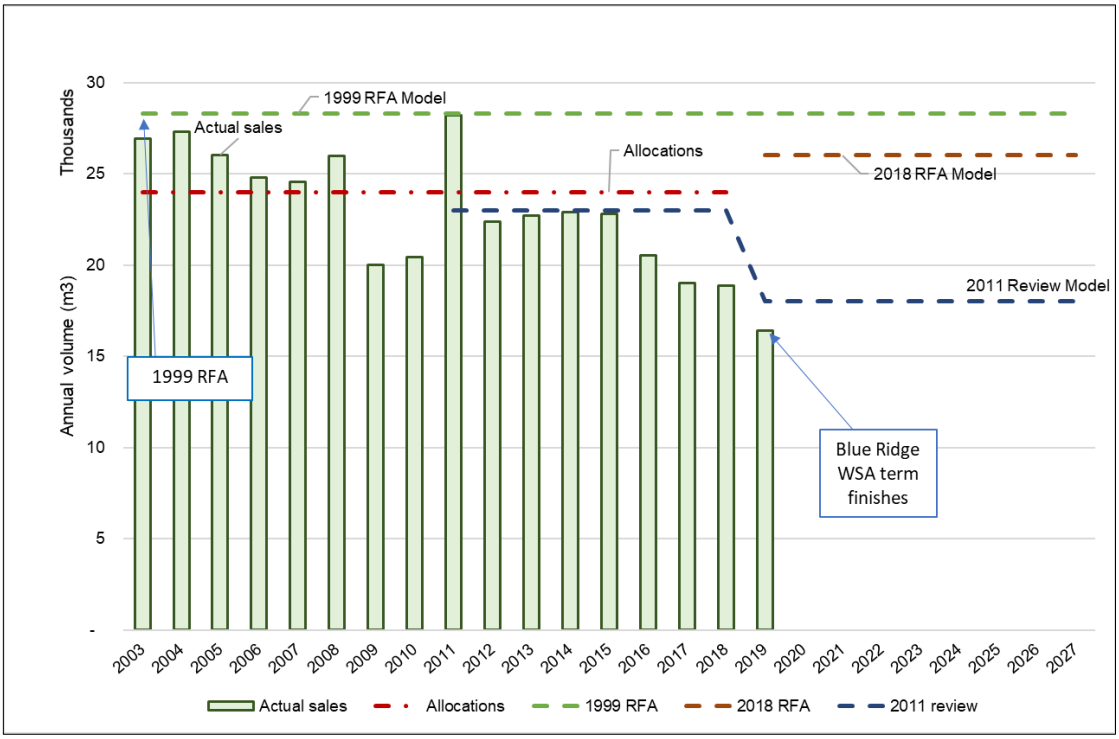
Market forces – Tumut supply has been characterised by significant changes to local processing capacity, the volatile commercial performance of key processors, and changes in ownership. The general trend has been a loss of local processors, with high quality logs being transported mainly into Victoria to sawmills at Corryong, Benalla and Heyfield.

Supply chain characteristics – the loss of local processing capacity has necessitated the transport of logs to other regions, primarily into Victoria.

Eden analysis

Actual sales in the Eden region aligned with the allocations through much of the review period until 2015. From this period, Eden supply declined compared to the allocation, due to South Coast supply being directed to Eden based processors.

ES Figure 8 Eden - key HQ supply events overview



The supply situation in the region was relatively simple with one primary HQ log customer.

Resource availability – the Eden regional resource contains a diminishing proportion of mixed-age forest that had produced reasonable quality sawlogs, while the regrowth forests were less preferred by the mills as the logs require specialist processing and generate a low return on structural high value products. Sawlog yield is forecast to slightly increase (as is evident from the 2018 RFA model) as a result of assumed increases in recovery of sawlog in the forest.

Market forces – HQ supply was generally in line with wood supply agreement (WSA) allocations, noting that mills have the ability to take +/- 10% of their annual allocation each year. The small-scale sawmill at Eden was able to perform consistently through much of the review period.

Supply chain characteristics – FCNSW has managed wood supply in the region on a stumpage basis. The high proportion of pulp logs harvested facilitates the management of harvesting by the pulp customer, who then directs sawlogs to the HQ customer.

Supply driver analysis

The relative significance of drivers of historical wood supply occurring across the four supply regions is summarized in ES Figure 9 below. The most significant drivers are shown in purple, grading through to less significant drivers of wood supply change (shading through lilac and then pale yellow as least significant) for the review period.

Each of the HQ supply drivers were assessed based on the change in the historic HQ wood supply, known events and discussions with FCNSW staff.

The most significant historical drivers in this review period relate to resource availability, and particularly net harvest area, modelling constraints, land use policy and industry policy decisions.

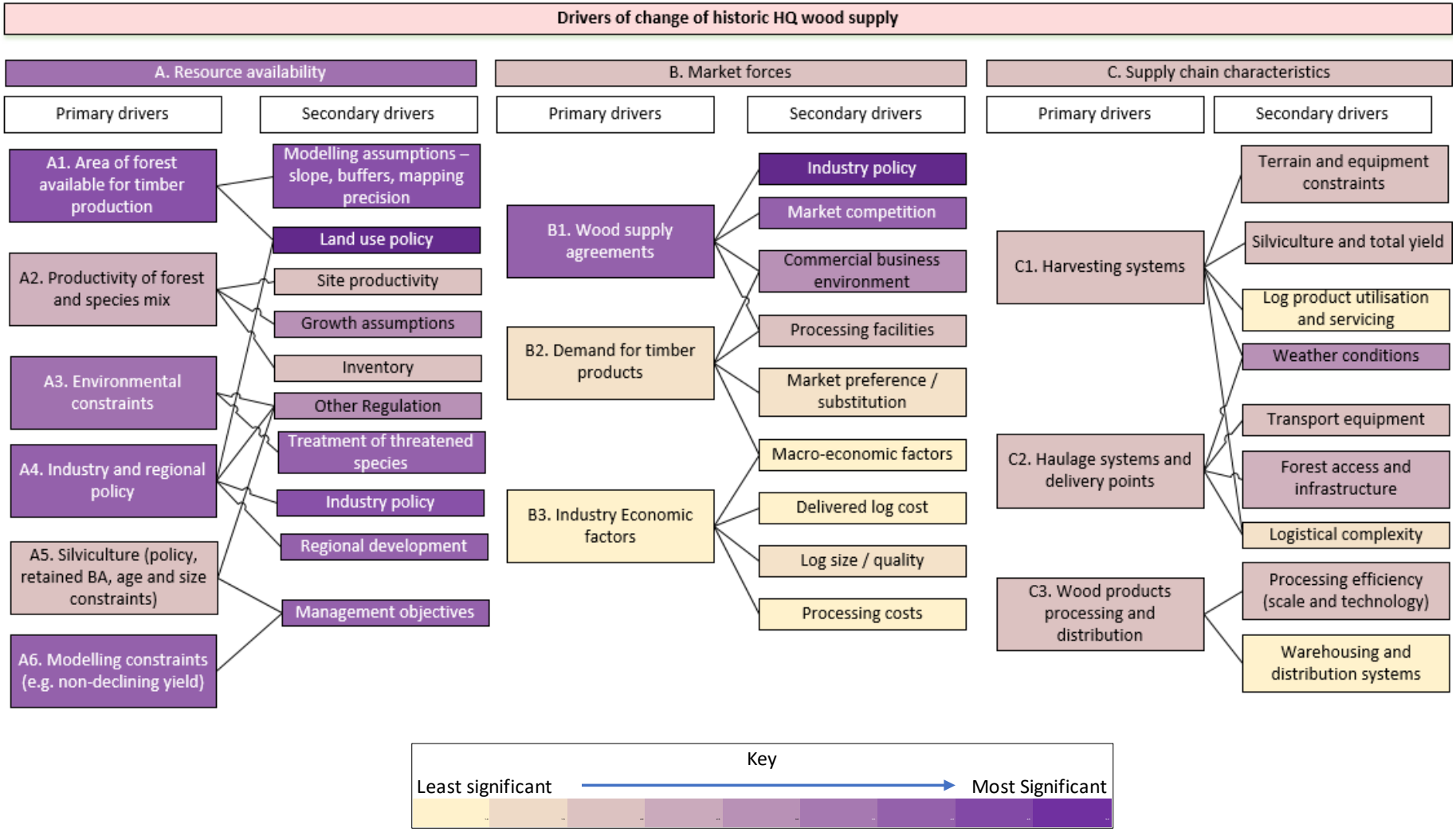
Summary and recommendations

The regulatory, commercial and operating environment in which FCNSW produce and supply high quality sawlogs is complex. This review has highlighted that for historical supply for the review period assessed:

- Overall supply was generally aligned to WSA allocations, and across the regions HQ supply generally aligns with WSA allocations
- Other drivers played a role including the commercial viability of individual mills, while weather events and specific regulatory constraints also influenced supply. However, these lesser influences have tended to be of a finite duration
- The volume specified in wood supply contracts was informed by resource modelling arrangements, and set by government land use and industry policies
- Resource modelling is dependent on net harvest area (function of land use and various assumptions regarding access and conservation area protection), growing stock and yield, and other modelling assumptions and goals
- The resource was highly constrained for HQ sawlogs and therefore supply during the review period was not generally influenced by demand factors.

Monitoring of future wood supply must consider changes to the resource model (objectives, goals, constraints, and assumptions) to account for changes in regulation, industry and land use policy, the impact of climate change, better information or a change to the process for determining harvestable area.

ES Figure 9 Wood supply driver categories colour coded relative to significance



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1. INTRODUCTION

1.1 Report purpose

Indufor Asia Pacific (Australia) Pty Ltd (Indufor) have been engaged by the New South Wales (NSW) Natural Resources Commission (NRC) based on a Request for Proposal (RFP) (dated 3rd December 2021) in respect to monitoring wood supply baseline and trends, and particularly requesting an evaluation of:

1. Historic actual wood supply from NSW coastal native state forests (2003-2019)
2. Drivers of change in wood supply from NSW coastal native forests (2003-2019).

The analysis of historical drivers of actual wood supply will assist the development of baselines for predicted wood supply from coastal native hardwood state forests. These relate to the conditions in the previous four Integrated forestry operations approval's (IFOA) that form part of the new Coastal IFOA (CIFOA), and under new conditions in the Coastal IFOA. The baselines will form a core component of the IFOA Monitoring Program.

IFOA monitoring program

The NRC are independently overseeing the design and implementation of the CIFOA and are implementing a monitoring program to assess the impacts of the CIFOA on how the conditions of the approval can affect wood supply over time. In order to achieve this, it is necessary to consider the trends in historic wood production data from 2003 to 2019 and the various factors influencing supply trends. Whilst production levels are relatively easily reported, developing an understanding of the drivers that have impacted supply over time, both in terms of their nature and relative influence, informs the development of a baseline level of supply.

The monitoring plan considers the following issues:

- Is the Coastal Integrated Forestry Operations Approval having a neutral, positive or negative impact on landscape-scale wood supply?
- Are conditions affecting current commitments to meet wood supply?
- Are conditions effectively supporting long-term sustainable wood supply?

Critically the monitoring plan defines the strategic objective of the monitoring is to be:

- Mapping the trajectory of wood supply from 2003 to present (the subject of this report)
- Establish a wood supply baseline under previous IFOA conditions for coastal native state forests
- Establish a scientifically valid method to track and evaluate the effectiveness or impacts of the Coastal IFOA on the maintenance of wood supply
- Determine if the Coastal IFOA conditions have met the NSW Government commitment of 'no net change to wood supply' as made ahead of the IFOA remake.

1.2 Scope

This report addresses the first strategic objective of the monitoring plan described above, to enable the wood supply baseline to be developed by mapping the trajectory of wood supply from 2003 to 2019 The scope has been confined to the types of logs, forest types, geographic region and time series described below.

Log grades

A critical consideration relates to the definition of 'Wood Supply' as adopted by the NRC, being:

"The volume, species and grade of native forest high quality logs (large and small), that can be economically and sustainably supplied to the forestry industry from a given region over the short

to medium term (5 to 20 years), while maintaining forest landscape values, as reflected in the Ecologically Sustainable Forest Management principles in Regional Forest Agreements, over the medium to long term (20 to 100 years).”

Whilst ensuring that this definition is consistently applied in the historical analysis, this report considers all species (see Appendix 2 for species list) and grades including LQ sawlogs, roundwood in the form of poles, piles and girders (PPG), and pulplogs (see Appendix 3 for list of log grades) in order to capture competitive and complimentary influences evident across segments of the resource supply, market and the functioning of the supply chain.

Forest type

Hardwood plantations are not regulated under CIFOA, however the volume harvested from plantations forms an integral component of the wood supply made available and processed within the North Coast supply chain. Both native forest and hardwood plantation wood supply from state forests is incorporated into the analysis where required to ensure consistency with modelled volumes under the Regional Forest Agreements.

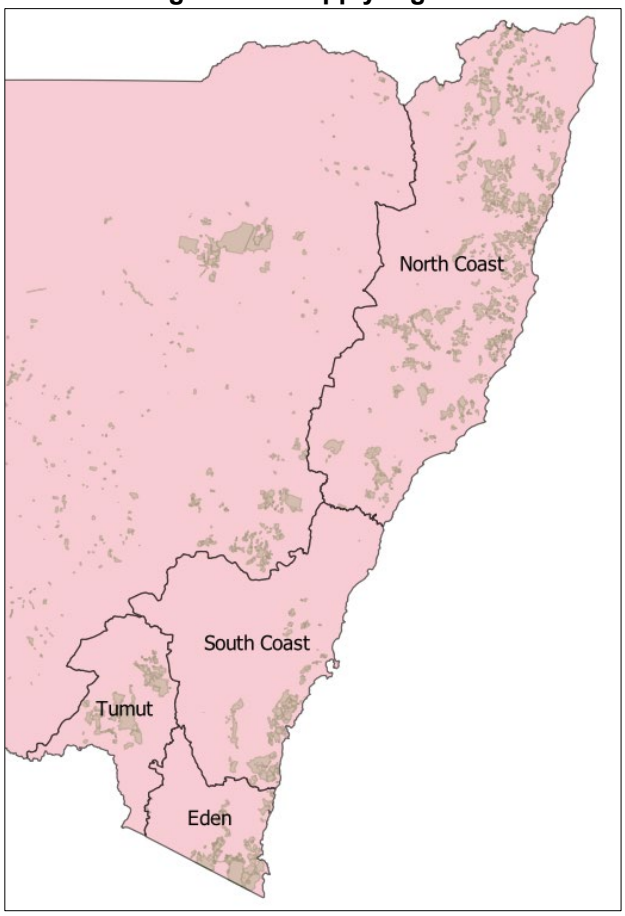
Review period

The review period assessed was from January 2003 through to December 2019.

Geographic area

The geographic scope encompasses the CIFOA area, being the four former IFOA regions - for the Eden, Southern, Upper North East and Lower North East regions. This report classifies the supply regions as the North Coast, South Coast, Tumut and Eden.

Figure 1-1: Supply regions



1.3 Study approach

The study was completed through a desktop analysis of data available to Indufor. This included publicly available data relating to NSW native forest supply, and responses from Forestry Corporation of NSW (FCNSW) to data requests from Indufor.

The list of information utilized in this report is provided in Appendix 4.

2. HISTORIC WOOD SUPPLY 2003 – 2019

FCNSW provided a comprehensive sales dataset for the review period spanning 18 calendar years from 2003 - 2019. The data has been aggregated by Indufor at a number of different levels to enable overall trends to be considered as well as regional and local specific factors.

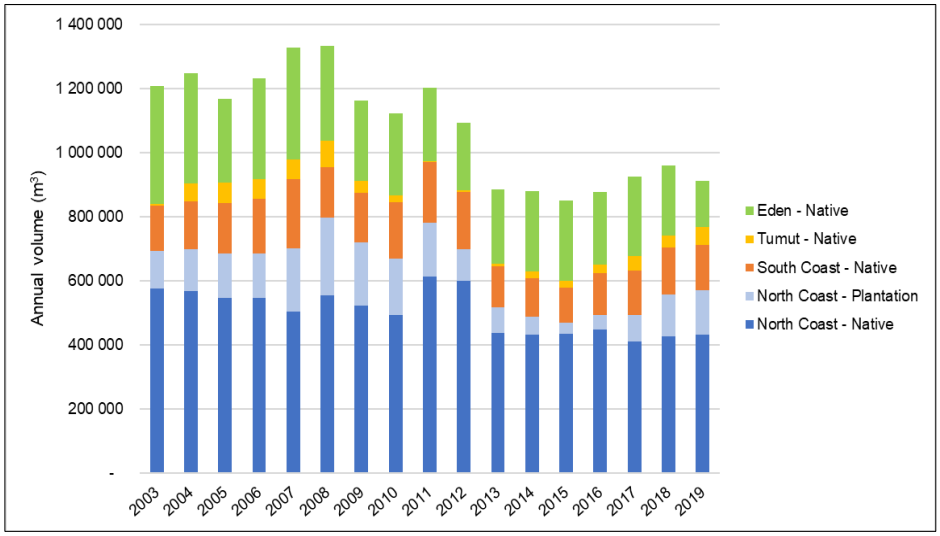
Note - the primary regional analysis covers the previous IFOA regions – now aggregated as North Coast, South Coast, Tumut and Eden. Throughout this report these areas are referred to as **regions**. Additionally, FCNSW attribute log sales by Price Zone. As this provides the best aggregation at which to consider wood supply source, this attribute is retained in this analysis but is referred to as '**supply zone'.**

2.1.1 Overall supply

The following charts detail the aggregated supply across all log grades. Note the inclusion of the plantation volume for the North Coast in Figure 2-1 to demonstrate the significant contribution this has made to overall volume.

Figure 2-1: Total volume (all products) by region (2003 - 2019)

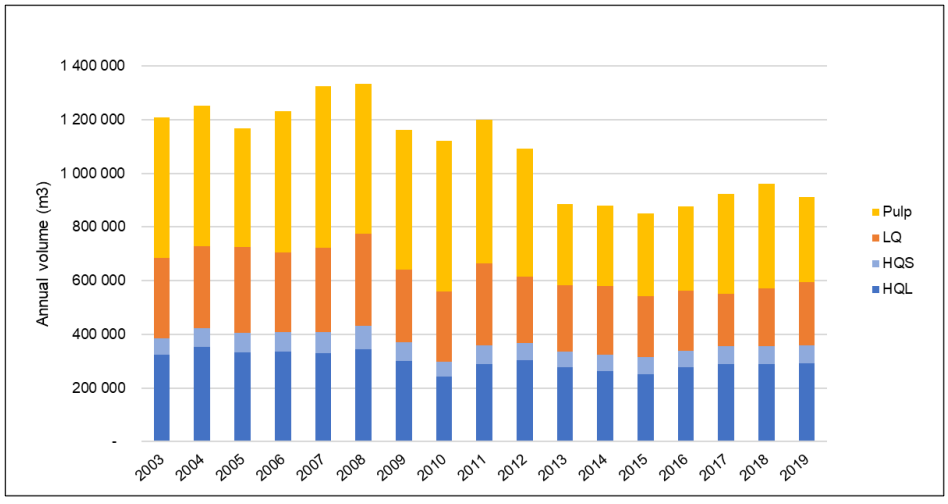
Over the review period, total volume declined from between 1.2M and 1.3M m³ per annum supplied in 2008, to 0.9M m³ in 2019



Source: FCNSW

Figure 2-2: Total volume by product (2003 - 2019)

The largest decrease in volume over the review period has been associated with pulplogs and LQ logs (approx. 40%) while HQ sawlog decreased by around 15% over the 2003-2019 period

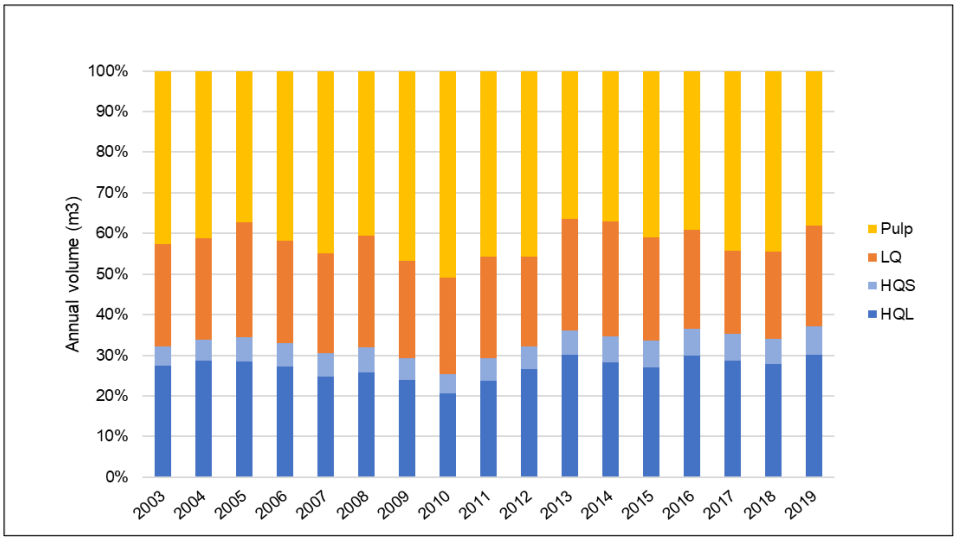


Source: FCNSW

Proportions of High Quality Large (HQL), High Quality Small (HQS) and Low Quality (LQ) were relatively consistent across the review period, although significant changes occurred within each of the regions. These changes are discussed in more detail in the following sections.

Figure 2-3: Total volume by product (proportional)

Proportions of HQL, HQS and LQ were relatively consistent, however pulp peaked at over 50%, reducing to less than 40% by the end of the period



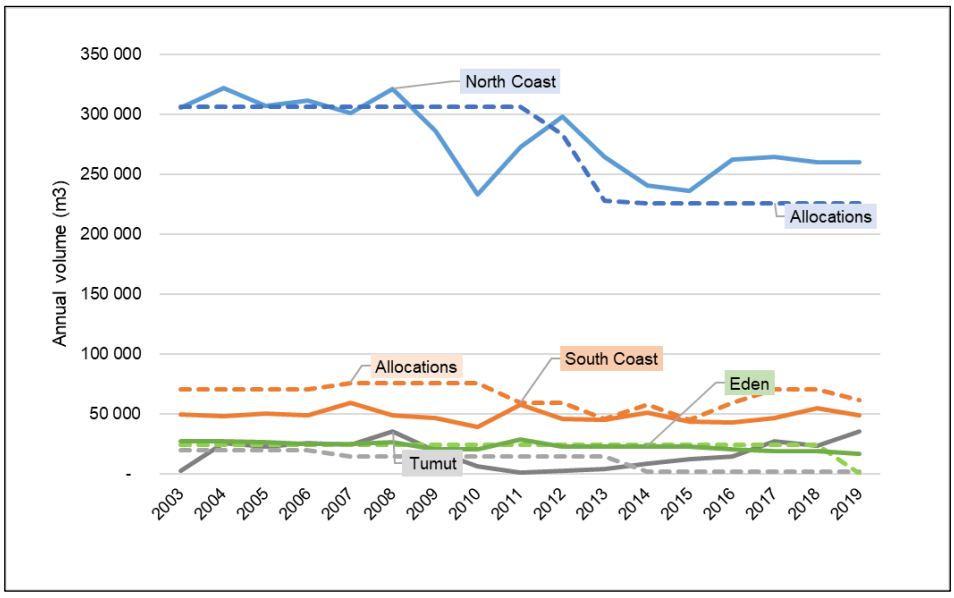
Source: FCNSW

FCNSW enters into agreements to supply for the various log grades. In this analysis, the agreements are noted as being 'allocations' made by FCNSW in respect to an expectation to supply a particular volume, The allocations shown in the following are the supply commitments held by FCNSW in each calendar year.

Supply relative to the allocations for HQ sawlogs is demonstrated in Figure 2-4. The variation (above and below allocated supply levels) for each of the regions is discussed further in the subsequent sections.

Figure 2-4: HQ volume compared to allocations (2003 - 2019)

HQ supply varied over the review period largely in line with changes in allocations



Source: FCNSW

2.1.2 Detailed historic supply – North Coast

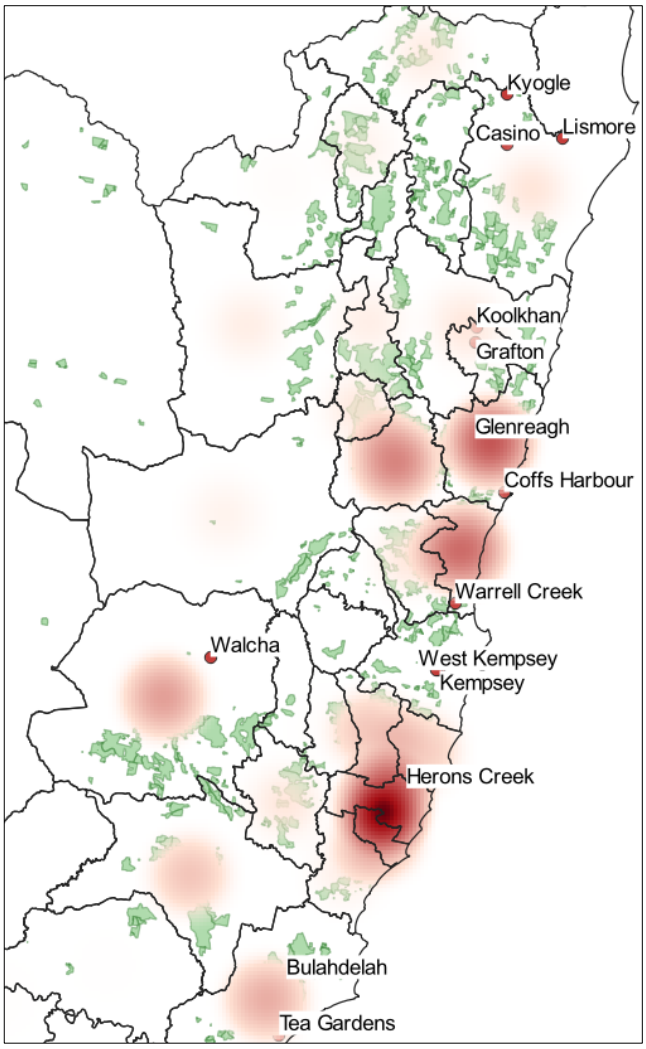
The following section addresses the historic wood supply on the North Coast, encompassing the previous Upper and Lower North East IFOA regions. The analysis has included the volume

from hardwood plantations as this volume forms a significant component of supply required to meet contract allocations.

Figure 2-5 shows the source of main supply activity across the North Coast, highlighting high levels of activity around the Coffs Harbour area and then further south around Herons Creek.

Figure 2-5: North Coast supply source weighted by total volume

Indicative relative importance of supply[1] zones for the North Coast



Source: FCNSW

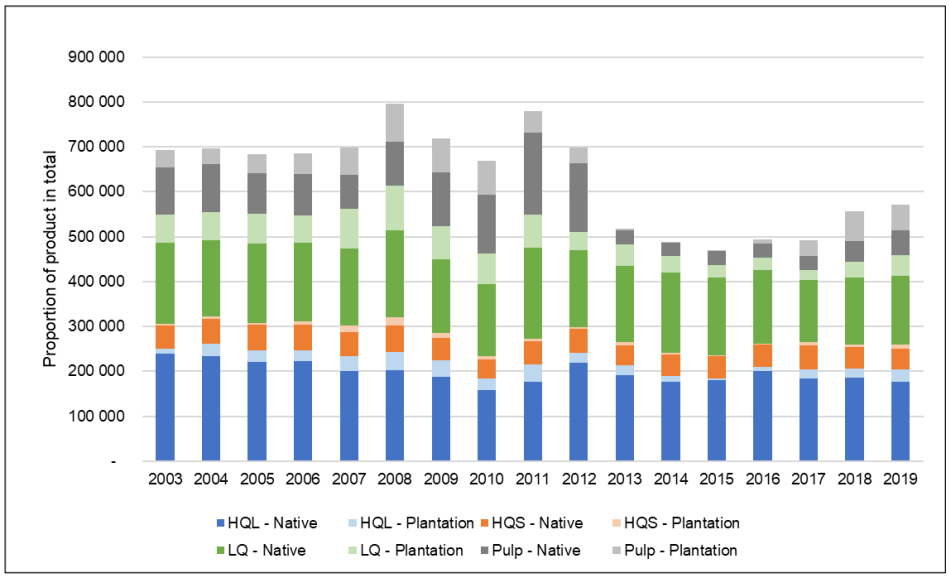
Total HQ supply over the review period declined from 300,000m^3 to 260,000m^3 (Figure 2-6) in line with contract allocations.

Pulpwood volumes were profoundly impacted by the closure of the Boral Tea Gardens facility in 2012, including a significant volume from plantations. The reduction in HQ from plantations was associated with the decline in older stands available for harvesting. The plantation resource consists of two age cohorts – those planted in the 1960's to 1970's, and those planted from 1995.

[1] Noting previous definition of 'supply zone' in the context of this report are equivalent to FCNSW price zones

Figure 2-6: North Coast volume by product group

Significant decreases in volume occurred in pulpwood supply from 2012 along with some decline in HQ logs

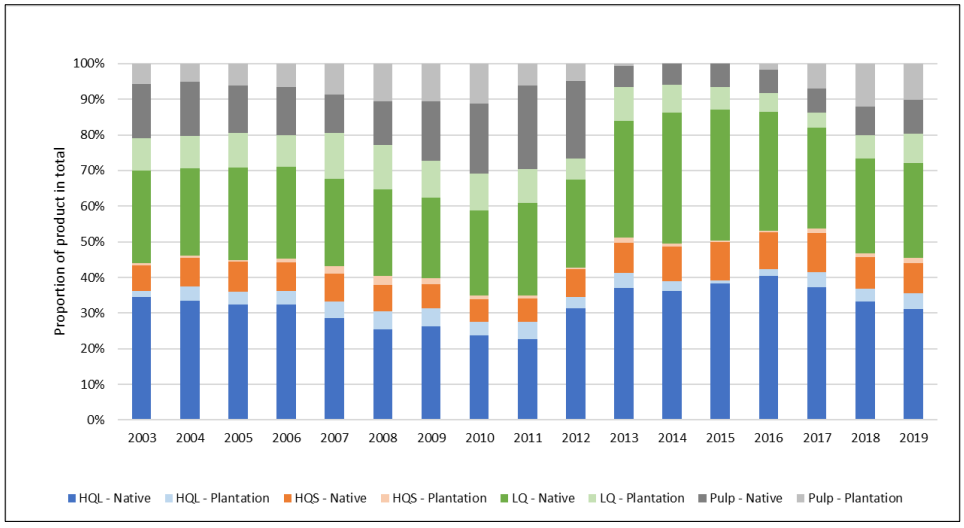


Source: FCNSW

The proportion of HQ clearly increased as a proportion of overall volume as a result of reduced pulp harvested from 2012. The impact of plantation HQ is small but not insignificant. Additional pulp sales from plantations since 2017 have supported an increased supply of HQ plantation sawlogs.

Figure 2-7: North Coast volume by product group – proportional

There has been an increase in HQ and LQ on a proportional basis of the overall North Coast supply

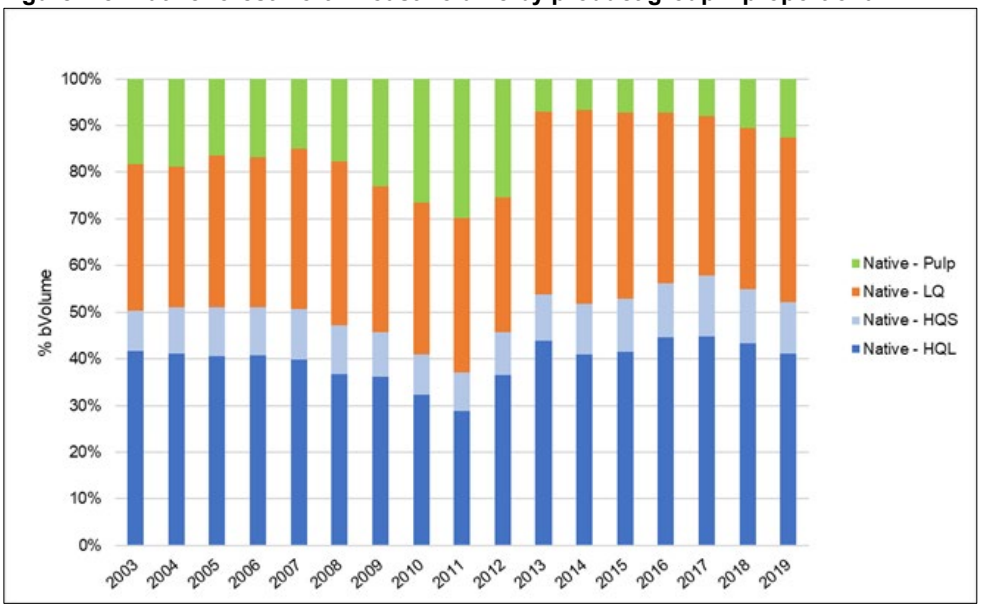


Source: FCNSW

The recovery of HQ and LQ sawlogs is significantly higher in native forests compared to plantations as demonstrated below in Figure 2-8 and Figure 2-9. The ratios between HQ and LQ in native forests have been relatively consistent over the review period, despite marked changes in the native forest pulp log supplies.

Figure 2-8: Native forest North Coast volume by product group – proportional

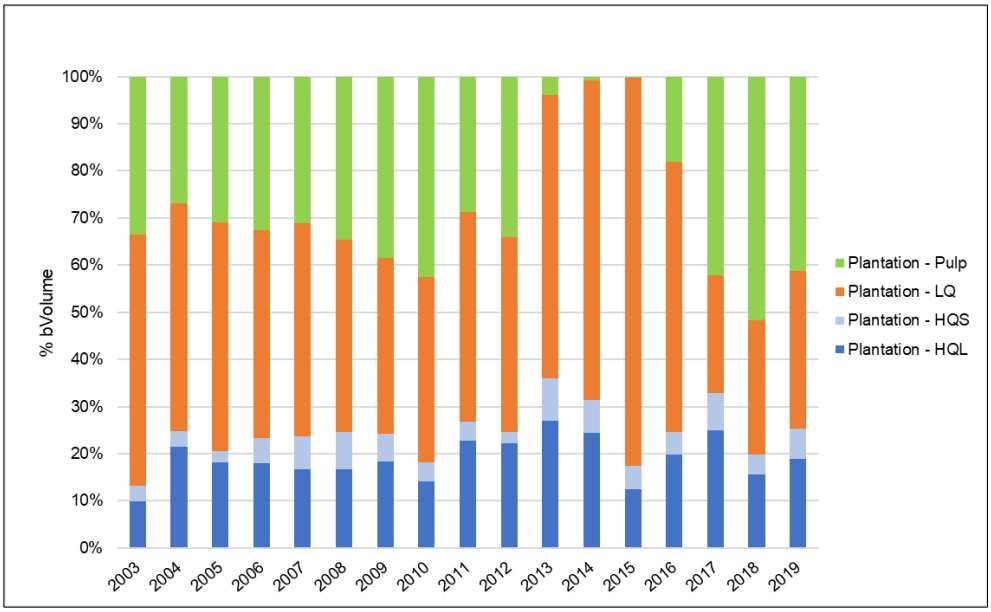
In native forest HQ recovery was generally between 40% and 60%, depending on the volume of pulp harvested



Source: FCNSW

Figure 2-9: Plantation North Coast volume by product group – proportional

In plantations HQ recovery was generally less than 30%



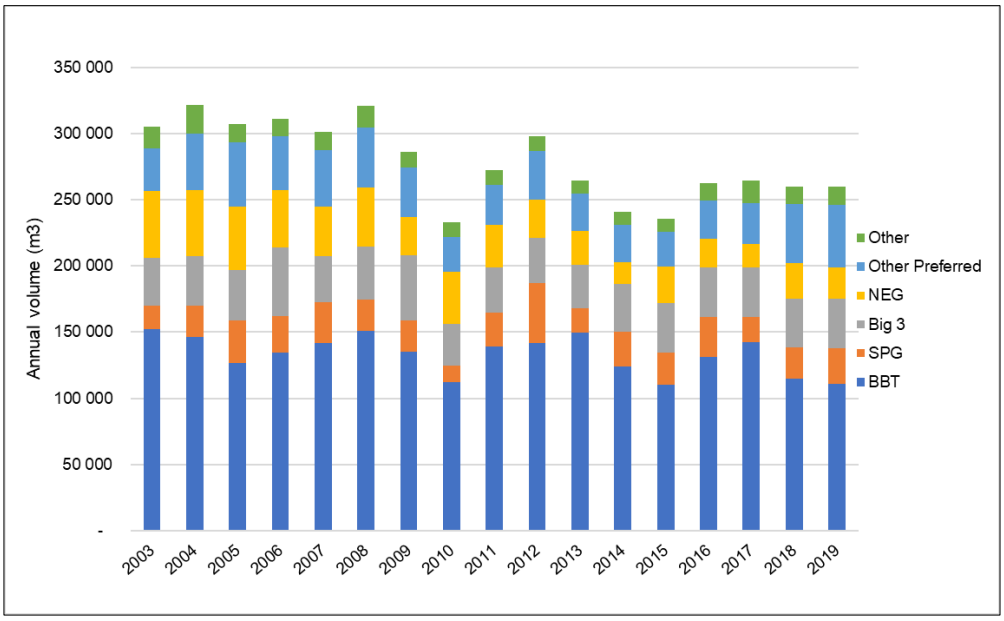
Source: FCNSW

Pulp supplied from plantations increased significantly from 2017, predominantly through an increase in plantation thinning operations that are generally pulp only operations. Pulplogs can also be produces as falldown, or residue from sawlog clearfall operations.

Species mix is a critical consideration of wood supply, particularly in the context of the North Coast given the marked preference from wood processors for differing timber species. The volume and relative proportions of each species supplied over the review period is charted below.

Figure 2-10: North Coast HQ volume by species[2]

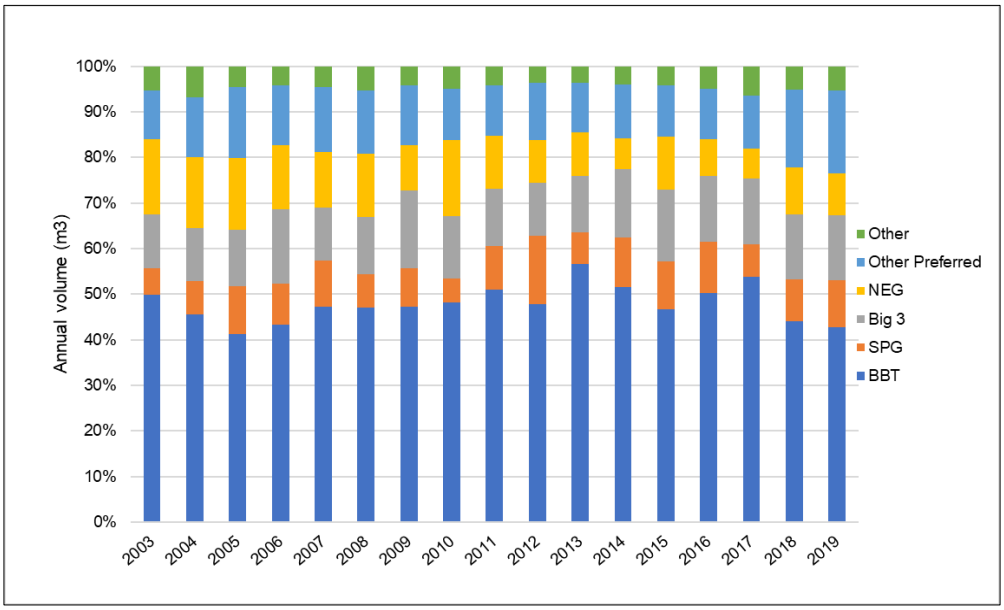
While overall volume supply has declined, the species mix supplied has been reasonably consistent across the review period



Source: FCNSW

Figure 2-11: North Coast HQ volume by species – proportional

General decrease in the proportion of Blackbutt (BBT) from 2013



Source: FCNSW

All HQ customers generally have a preference for the key species, particularly Blackbutt and Spotted Gum. Until renegotiated in 2012, the Boral Wood Supply Agreement committed FCNSW to supplying a minimum of 60% of the annual volume to Boral as Blackbutt, with additional thresholds for other species. As a result, species considerations have had a significant impact on the harvesting areas selected by FCNSW and the allocation to non-Boral customers of FCNSW.

Species mix is discussed further in relation to modelling in Section 3.

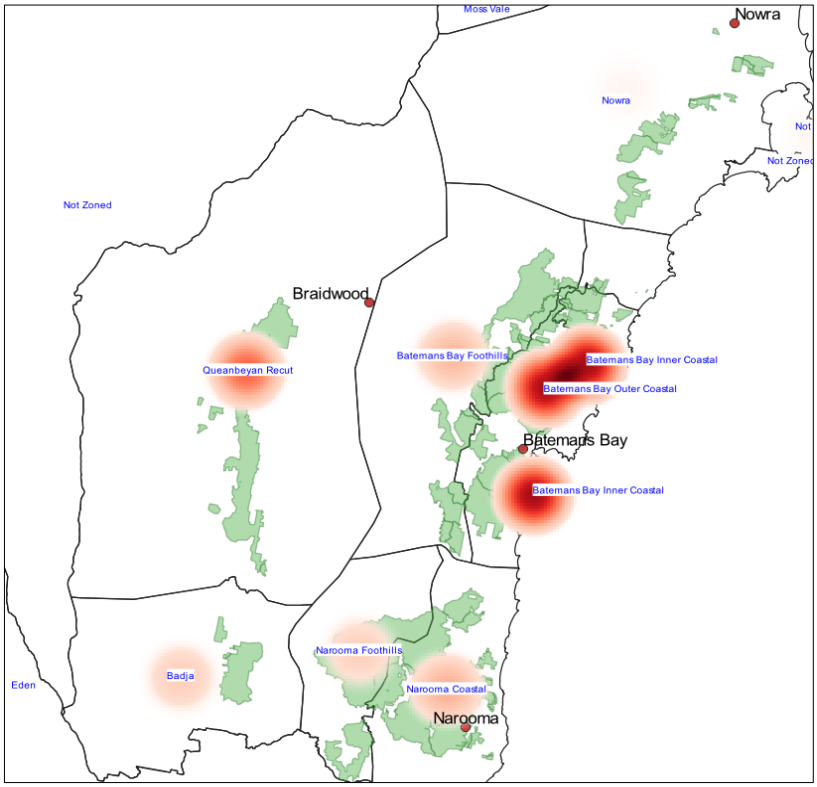
[2] BBT – Blackbutt (*E. pilularis),* SPG - Spotted gum (*C. maculata*), Big 3 include Blue gum (*E. saligna),* tallowwood (*E. microcorys*) and brush box (*Lophostemon confertus),* NEG – New England species. Refer to Appendix 2 for species group descriptions.

2.1.3 Detailed historic supply - South Coast

The coastal price zones north and south of Batemans Bay have supplied the bulk of logs over the review period on the South Coast. Figure 2-12 provides an indication of the main supply zones. Species composition varies across the region, with Spotted Gum more prevalent in the coastal forests, while other species such as Brown Barrel as prevalent in the hills and tablelands areas.

Figure 2-12: South Coast wood supply source weighted by volume

Indicative relative importance of supply zones for the South Coast

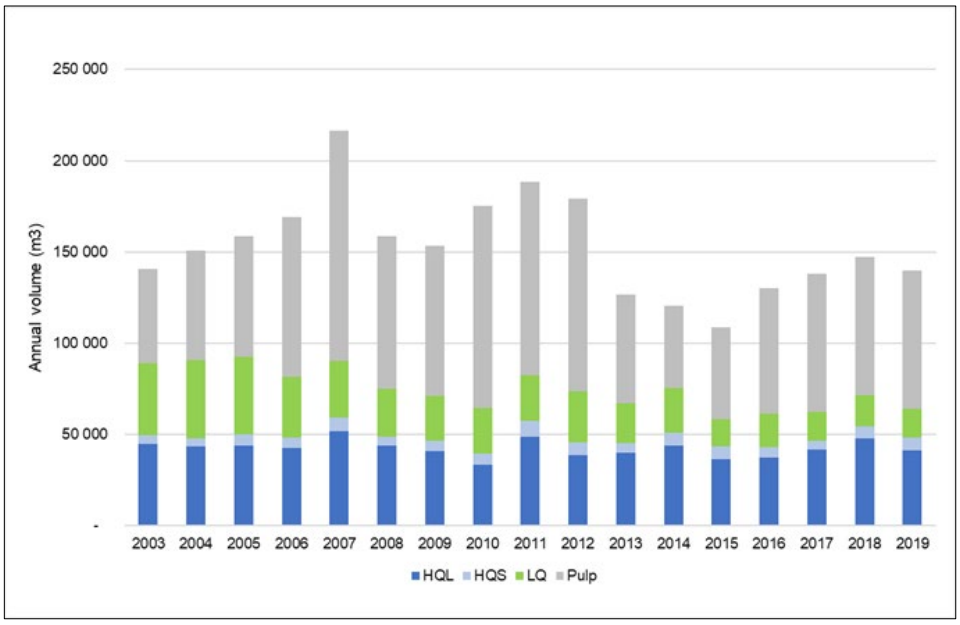


Source: FCNSW

Total annual supply from South Coast has declined from up to 210,000m^3 in 2007 to less than 180,000m^3 by 2019 (Figure 2-13). HQ sawlog has consistently been around a supply level of 55,000m^3, with a minimum of 37,000m^3 in 2010, and a maximum of 60,000m^3 in 2007. The proportion of HQ sawlogs has been generally around 30% as per Figure 2-14.

Figure 2-13: South Coast volume by product group

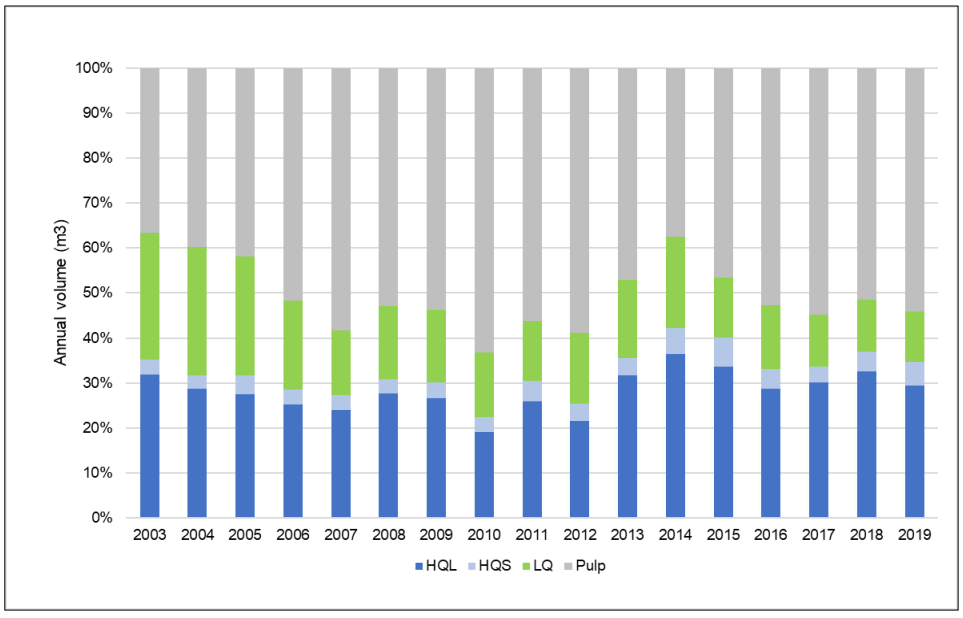
HQ sawlog supply consistently around 50,000m^3, while an overall decline in pulplogs occurred



Source: FCNSW

Figure 2-14: South Coast volume by product group – proportional

Variable supply of LQ sawlogs, with slight increase in HQ proportion

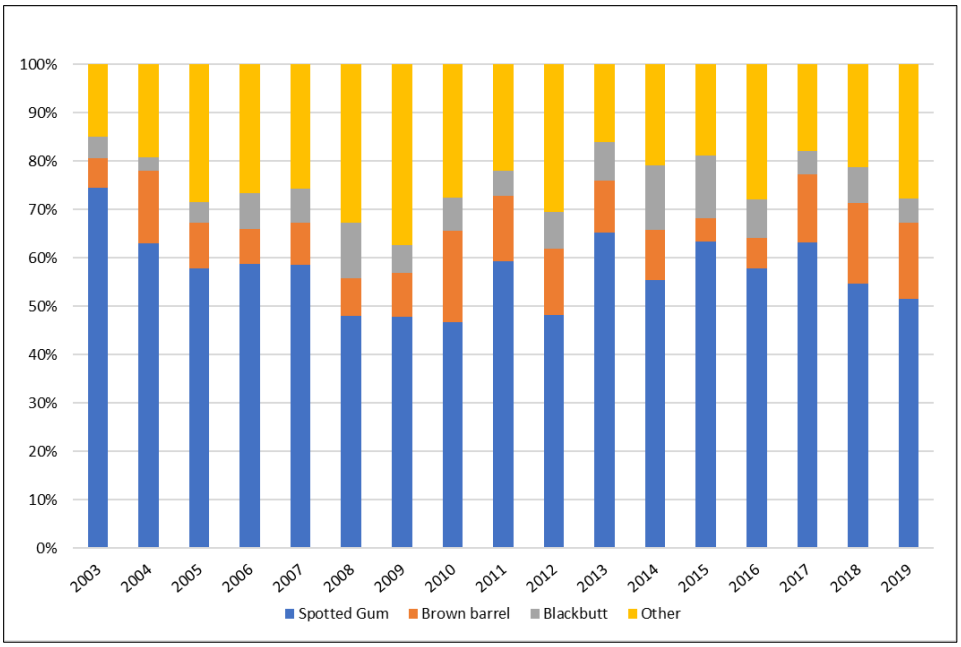


Source: FCNSW

The species mix on the South Coast is dominated by Spotted Gum, as evident in Figure 2-15, generally contributing over 50-60% of the total volume, although there is evidence of a gradual reduction this contribution.

Figure 2-15: South Coast HQ species mix

HQ supply dominated by Spotted Gum, albeit a reducing contribution

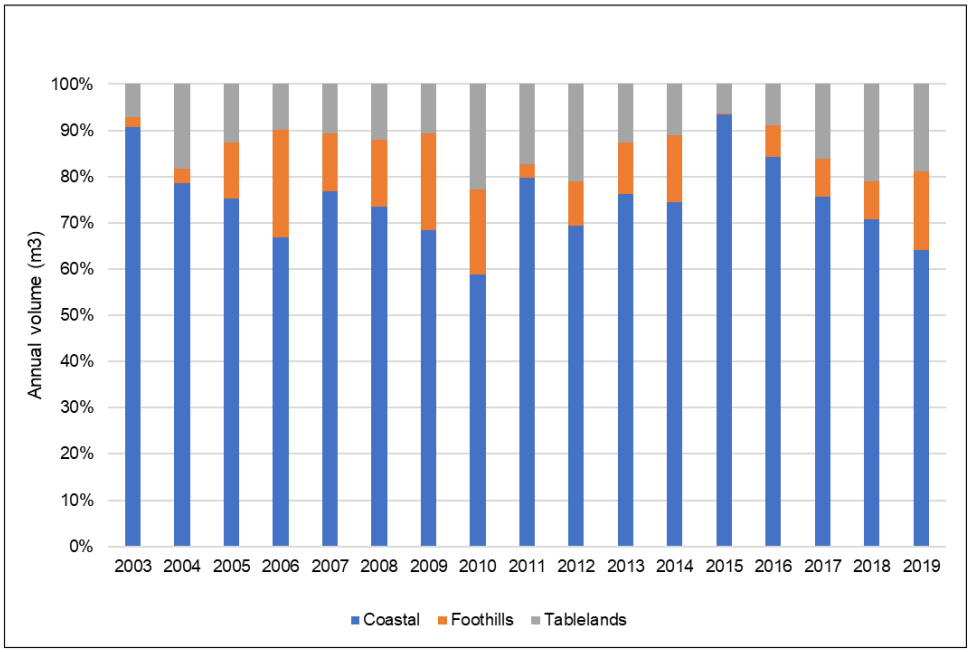


Source: FCNSW

Figure 2-16 demonstrates that the coastal forests (refer to Figure 2-12) provide the primary source of volume for the region, which reflects the contribution of Spotted Gum as described above. The Tablelands supply zone provides the bulk of the less-preferred species.

Figure 2-16: South Coast HQ by supply zone

70% of the South Coast supply from the Coastal forests



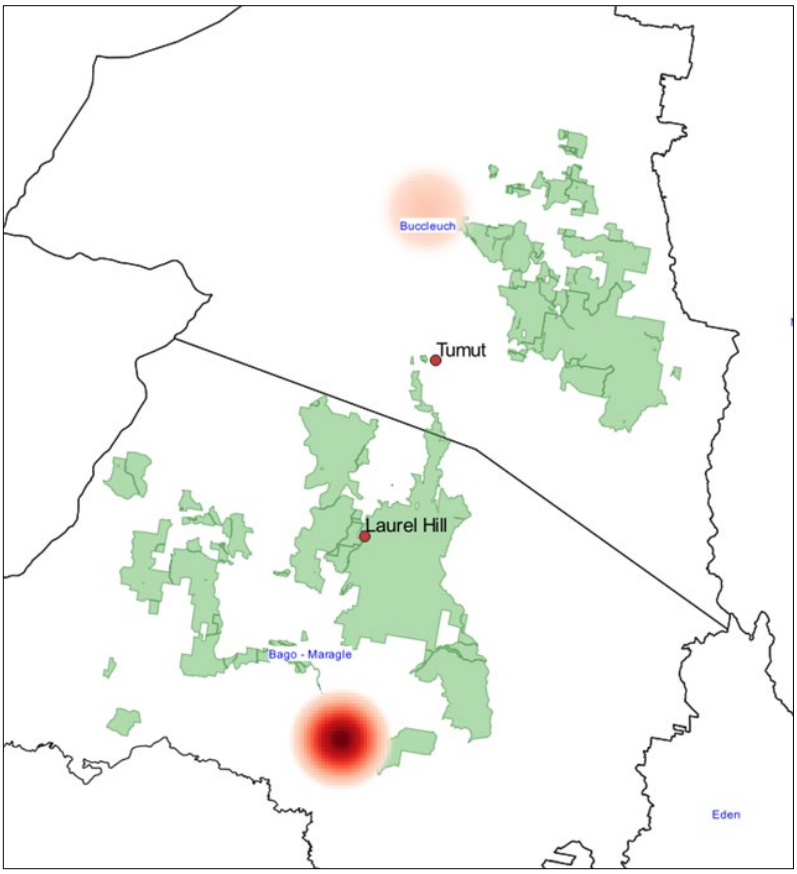
Source: FCNSW

2.1.4 Detailed historic supply – Tumut

The Tumut region comprises two supply zones – Buccleuch and Bago–Maragle. The latter comprises the majority of the Alpine Ash resource and forms the dominant source of supply over the review period.

Figure 2-17: Tumut wood supply source weighted by volume

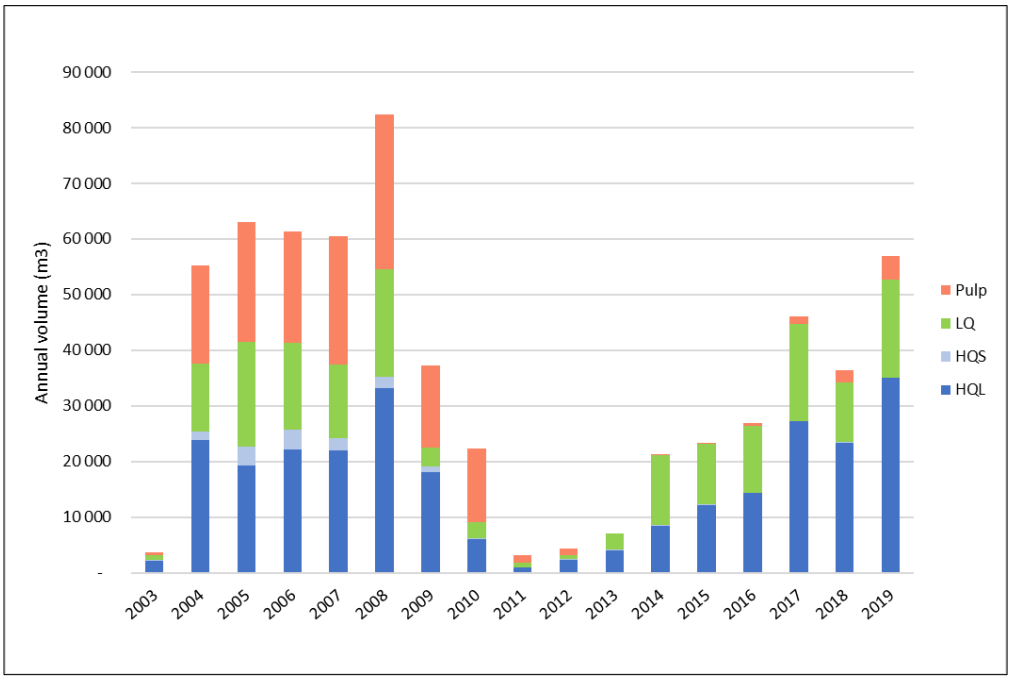
Indicative relative importance of supply zones for the Tumut region



Source: FCNSW

Supply from the Tumut region has been influenced by changes in local processing capacity and more critically, the revised access to stands whilst regulatory issues regarding the management of the Yellow-Bellied Glider from 2010 – 2013 were resolved (Figure 2-18). The direct implications are discussed in more detail in Section 3.

Figure 2-18: Tumut volume by product group

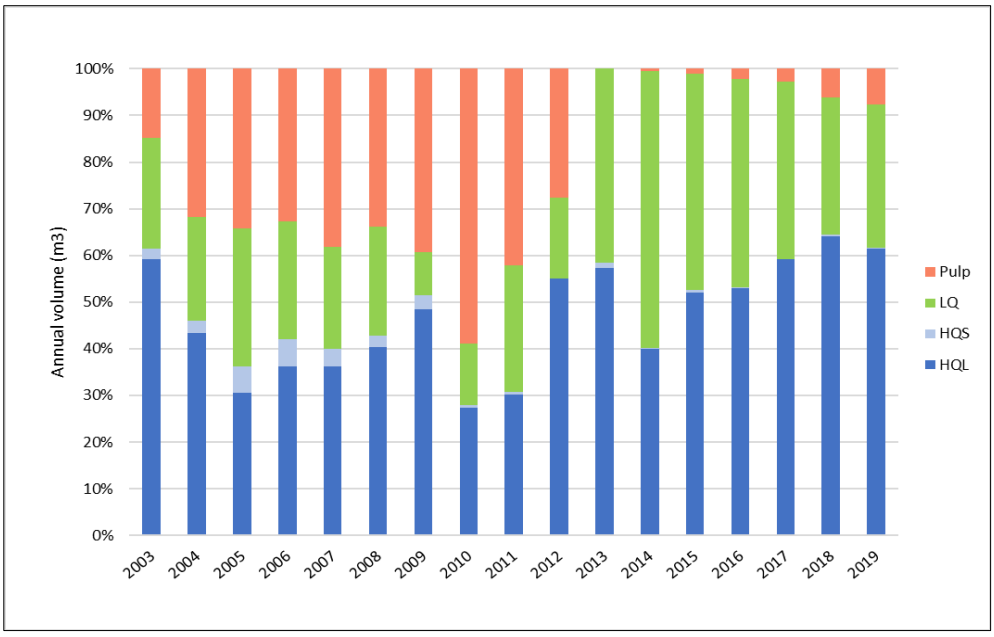


Source: FCNSW

Significant changes in supply levels primarily associated with threatened species management

HQ supply from the Tumut region forms a relatively high proportion of the supply (Figure 2-19) with the proportion of pulp being supplied declining markedly through the second half of the review period.

Figure 2-19: Tumut volume by product group - proportional



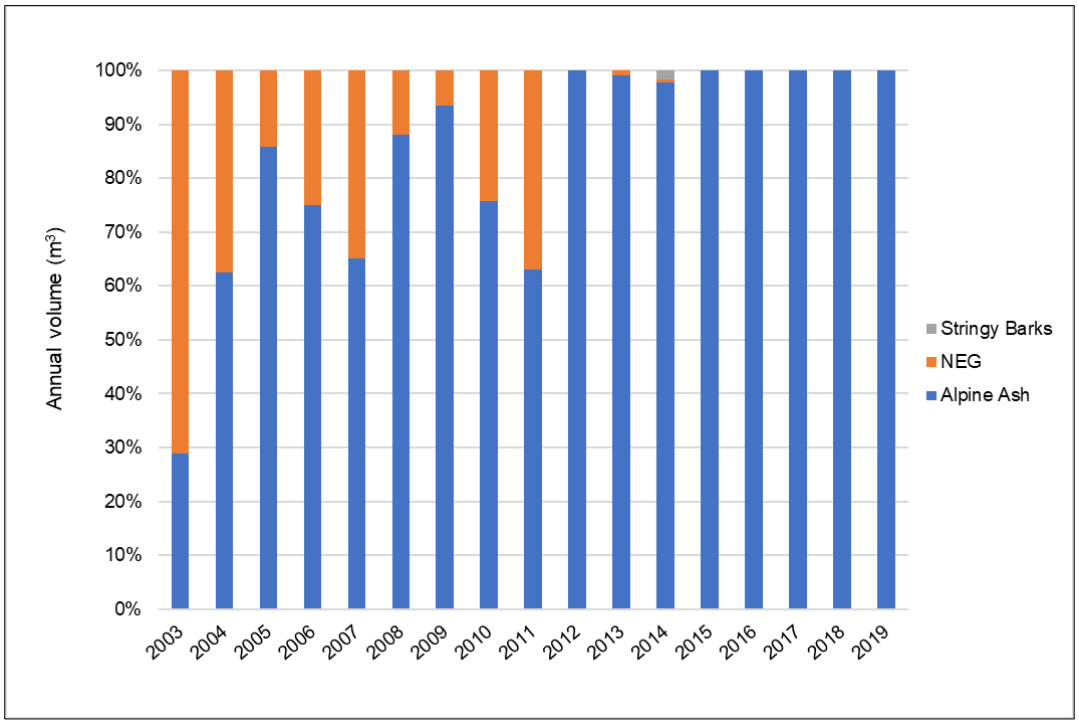
Source: FCNSW

Increase in a proportional basis of HQ and LQ in line with reduction in pulp market

Alpine Ash has formed the bulk of the species mix from the Tumut region, with mixed species (NEG) largely unharvested since 2014 (Figure 2-20).

Figure 2-20: Tumut HQ species mix

Supply increasingly dominated by Alpine Ash



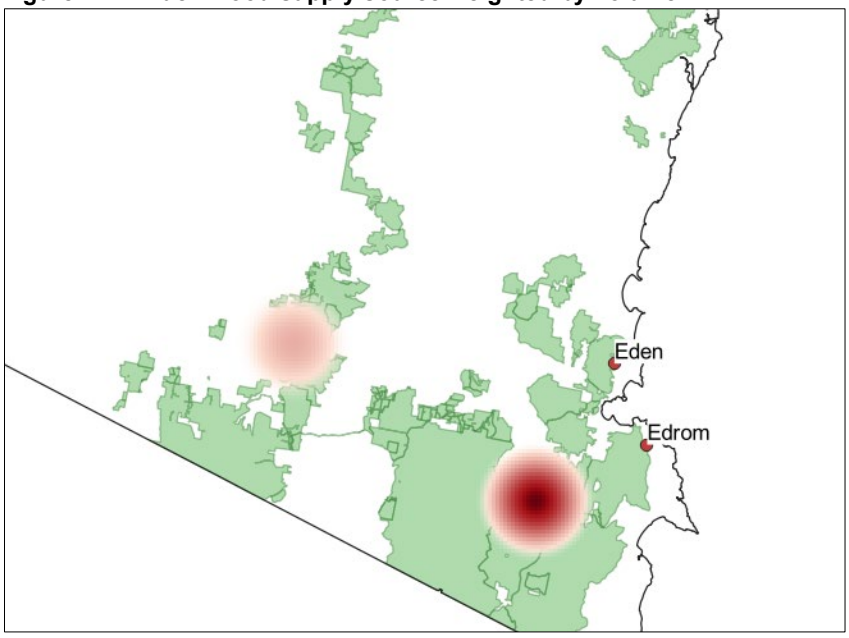
Source: FCNSW

2.1.5 Detailed historic supply – Eden

FCNSW has supplied logs to the industry within the Eden region under a stumpage basis (where harvesting and haulage services are engaged by the timber customers). Within the single supply zone, the following map portrays the location of the native forests relative to the key destinations of Eden and Edrom, and the relative volume from the tablelands and coastal forests.

Figure 2-21: Eden wood supply source weighted by volume

Indicative relative importance of supply zones for Eden



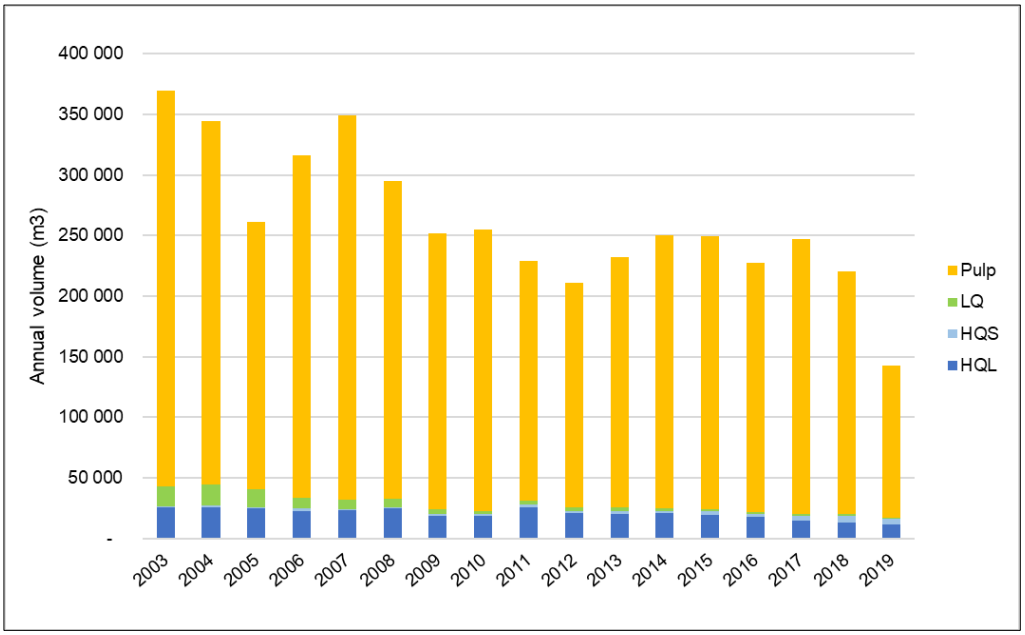
Source: FCNSW

Total supply in Eden has declined over the review period largely due to pulpwood declining from 326,000m^3 in 2003 to 124,000m^3 in 2019. (Figure 2-22). HQ sawlog forms a small proportion of the overall volume, generally less than 10% (Figure 2-23), with very little LQ having been produced since 2006.

The decline in pulp was primarily market driven with global factors and market preference impacting on native forest woodchip demand.

Figure 2-22: Eden volume by product group

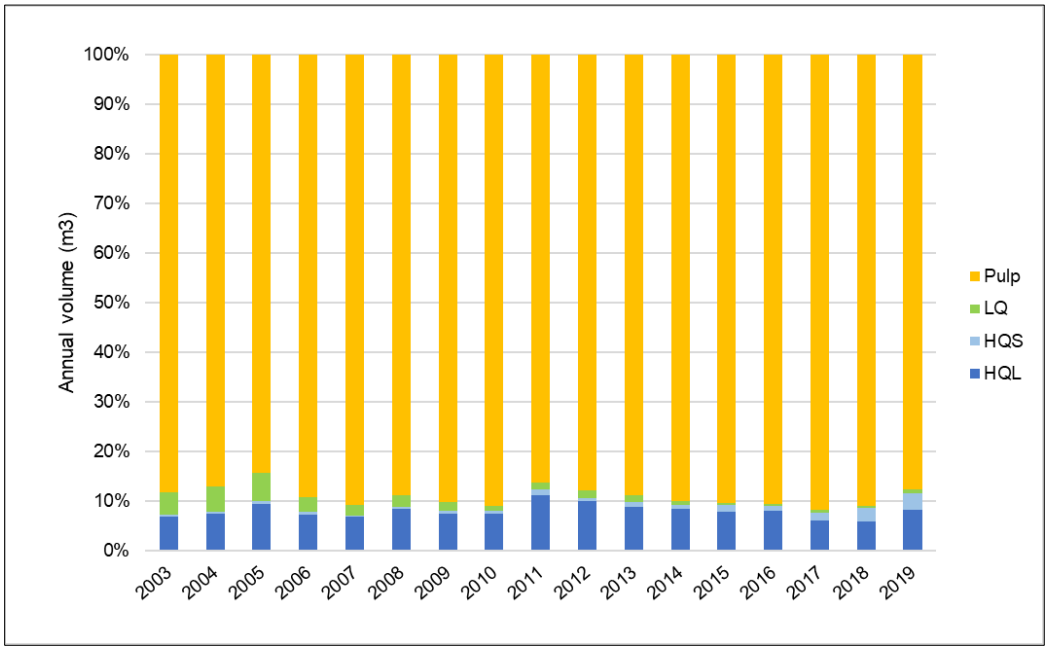
Large reduction in volume almost entirely associated with pulpwood



Source: FCNSW

Figure 2-23: Eden volume by product group - proportional

Increase in a proportional basis of HQ and LQ



Source: FCNSW

3. DESCRIPTION OF DRIVERS OF CHANGE IN WOOD SUPPLY 2003 – 2019

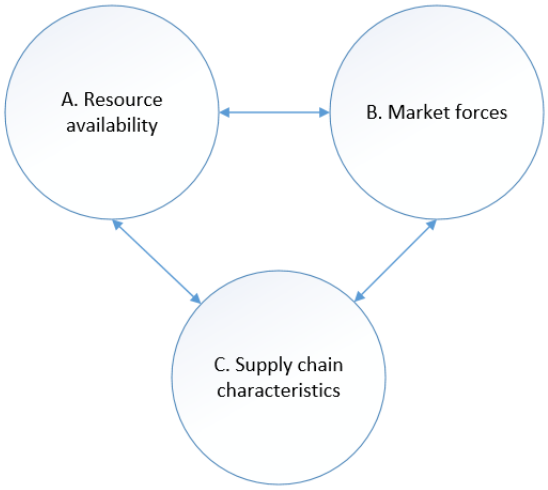
Wood supply drivers have been classified into three broad categories, as discussed below.

3.1 Indicative suite of drivers of historical wood supply

Wood supply, particularly within the native forest industry in NSW, is a function of various policy regulatory, logistical, operational and physical frameworks and operating environments that impact and influence supply, and demand drivers (contracts and markets). Given the complexity of the potential suite of drivers influencing historical supply, the drivers are considered in this analysis in three broad categories, being **resource availability**, **market forces**, and **supply chain** characteristics (Figure 3-1). These form the primary drivers, which are in turn are influenced by a range of secondary factors.

The following categories all have various inter-relationships which will be explored later in this section 3.

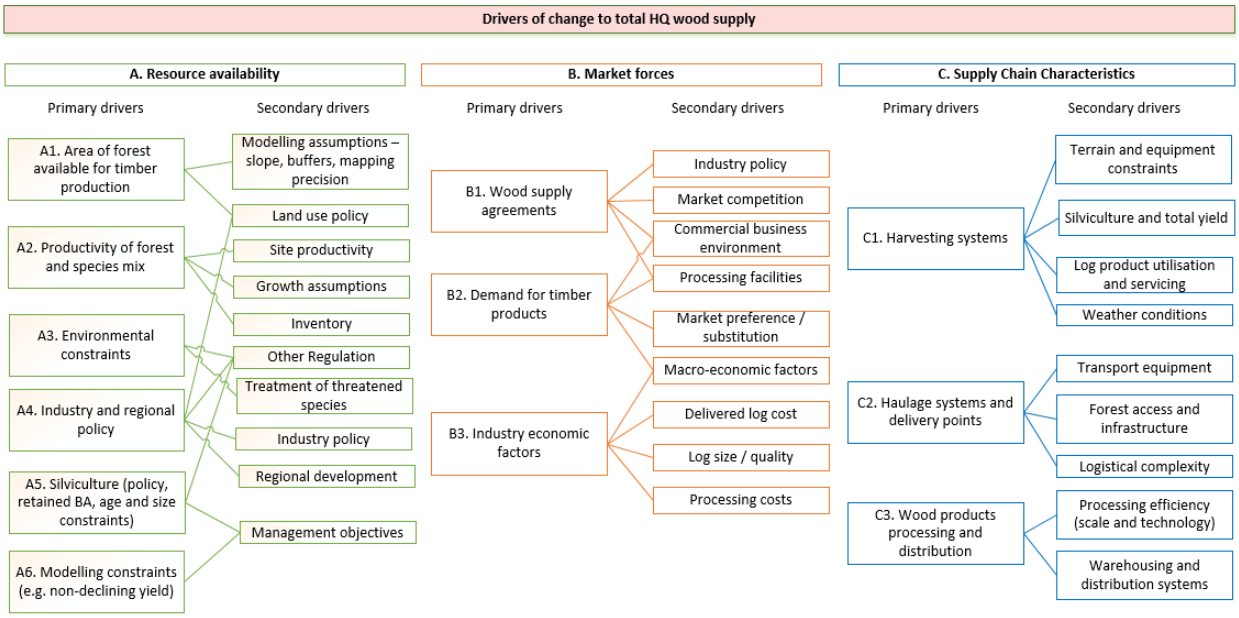
Figure 3-1: Supply driver categories



Within each category, a series of primary individual drivers exist, many of which are closely related. In addition, this analysis considers secondary drivers that are also described that impact on the primary drivers.

Figure 3-2 maps out the primary and secondary drivers, and the related interlinkages, within each of the three broad categories considered to impact on wood supply. The relative contribution of each of these primary and secondary drivers are discussed further in this section 3.

Figure 3-2: Relationships of primary and secondary drivers on wood supply



3.2 Category A. Resource availability

The basis of resource availability is FCNSW's strategic wood supply plan. The process by which FCNSW undertake this is continually evolving to incorporate new data, additional constraints and altered assumptions. An outline of the resource modelling system (FRAMES) is provided below.

Strategic Wood Supply Planning

The FRAMES model informs strategic planning processes and decision making in NSW State forests. The key purpose of FRAMES is to model the availability of high-quality sawlogs.

FRAMES comprises biophysical aspects, within commercial settings that incorporate costs and revenues related to the provision of the log products, and policy settings in respect to industry supply chains. This includes:

i. An estimation of **net harvestable area** – the gross area is determined and systematically reduced to account for issues such as streamside **buffers**, **high conservation** value forests, wetlands, rocky outcrops, **steep** areas, heaths and mapped species-specific exclusion areas. **Modifiers** are then applied to account for unmapped exclusions such as unmapped drainage and threatened species prescriptions which are identified in the field.

ii. Verification using field-based **inventory** plots – plots, which are a tenth of a hectare in size, are measured across the forest landscape using systematic random sampling. All trees greater than 10 centimetres in diameter overbark are measured and a record is made of the species, height and potential wood product using a peer reviewed scientific method.

iii. **Growth** and yield simulation – using a number of models that address stand and tree growth, mortality, recruitment, tree volume and taper, proportioning of trees into log products and modifiers that account for harvesting practices. In addition, the risks associated with various unknowns that cannot be modelled are accounted for as 'headroom' – that is an additional buffer between the yield estimated to be available and the volume allocated in supply agreements.

   Due to the lack of data currently available to support the modelling of the direct impacts of climate change, any short to medium term impacts would be incorporated into any headroom. Over time, impacts such as additional mortality will be reflected in measured plot data, growing stock estimates and growth models.

iv. **Yield scheduling** – independently developed forest modelling software is used to determine the level at which logs from within an identified portion of the forest estate are appropriate to harvest each year.

v. Development of estimates of growing stock – defining the amount of timber by species group and log grades (HQ) within each modelled period.

During the review period, improvements in the spatial delivery of data have been made to enhance the utility of FRAMES for detailed wood supply planning. These include:

- Light Detection and Ranging (LiDAR) technologies have been used to develop more precise digital terrain models that improve the estimates of net harvestable area
- LiDAR has also enabled development of a structural index layer which provides spatial extent of relative productivity
- An event management system has been developed to capture the spatial extent and time of harvesting events providing a link between FRAMES predictions and the results of actual harvesting operations
- The net harvest area modifiers have been revised to reflect changes in harvesting technology from primarily hand falling to increasingly mechanised harvesting. A study was conducted in 2011 to refine the strike rate modifiers used to account for area set aside from harvesting through application of flora and fauna prescriptions, with further adjustments made to reflect the potential impact of the CIFOA (refer to Section 3.2.1 below). The net mapped area database was also reviewed to remove small and isolated areas that cannot be practically accessed.

The FRAMES modelling is completed through the application of a suite of goals, constraints and assumptions in respect to the biophysical and commercial environments of FCNSW wood supplies, and seeking to maximise an objective function of the modelling optimisation to determine potential wood supply over a 100 year timeframe, with wood supply determined in four yearly periods.

Source: FCNSW

Two key quantitative parameters from the modelling process include the net harvestable area (NHA), and the management of growing stock within the NHA. These are discussed further below.

During the review period, a number of modelling positions have been completed by FCNSW and reported as being an updated view on intended forest management outcomes. These modelled outcomes arose due to various policy or management resets, including Regional Forest Agreements (RFA), industry reviews (i.e. 2014 URS Review) or model enhancements.

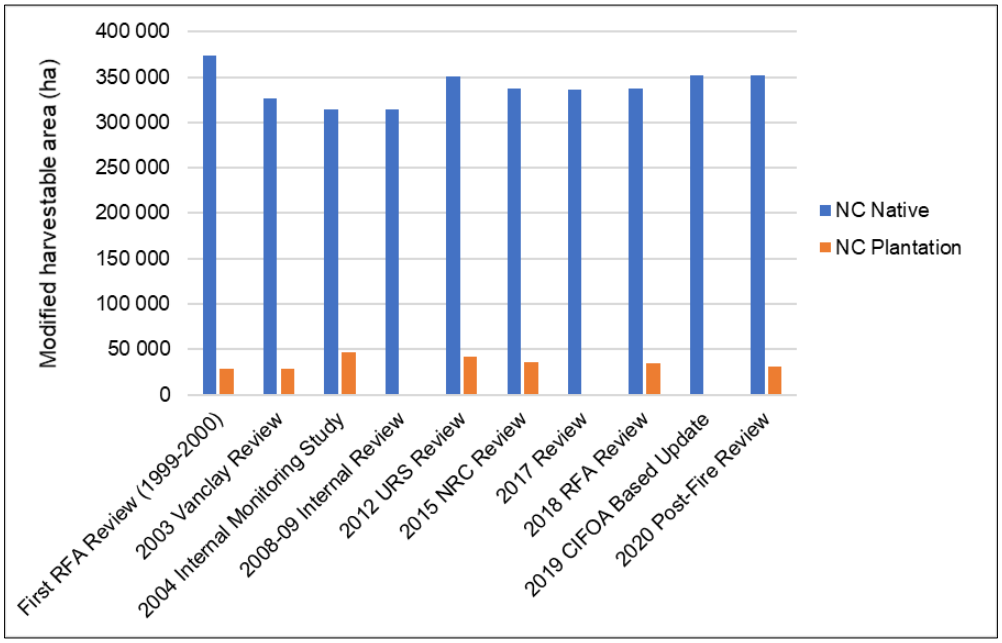
3.2.1 Net harvestable area impacts on resource availability

The area made available for harvesting would logically be a significant influence of wood supply. This section describes the changes that have been made to the modelled harvest area over the review period. It highlights that with the exception of Eden, harvest area has remained relatively constant, with variations associated with mapping accuracy and assumptions in relation to buffers and unmapped exclusions.

North Coast Native

NHA for the North Coast has varied both up and down over the review period, reflecting the changes in a variety of metrics, including data precision and treatment of unmapped NHA adjustments (Figure 3-3).

Figure 3-3: Changes to modelled net harvestable area (North Coast)



Modelled net harvest area has fluctuated for various reasons but has largely been maintained

Source: FCNSW

Note: Plantation NHA reported as per various documents

The RFA review (1999-2000) adopted an approach that assumed 'buffer-on-buffer' areas would be available for harvest. This assumption was reviewed through further studies and this position was varied and incorporated into the 2003 Vanclay review resulting in a decrease of NHA. In addition, there were also extra area reductions in ~2003 linked to land use change from state forest being converted to national park.

Net harvest area modifiers (which account for unmapped area adjustments which are confirmed only through field inspections) were reviewed and revised in 2011. Estimates after this date incorporated updated modifiers, which resulted in an increase in the assumed NHA. In addition, the 2012 URS review was the first analysis to incorporate more precise slope and drainage feature mapping resulting from LiDAR.

The area estimates between 2012 and the 2018 RFA Review varied, to some extent by differing algorithms that were used for catchment analysis and filter strip modelling. FCNSW continued to refine and confirm their estimates of NHA, applying enhanced data precision and application of the regulatory frameworks.

The estimates after 2018 incorporate revised area availability assumptions associated with the new CIFOA. The CIFOA introduced significant increases in complexity for spatial data management (tree retention clumps, wildlife clumps, landscape level adjacency constraints, etc). The estimates after 2018 incorporate a de-construction of net harvest area modifiers s to avoid double accounting steep areas and unmapped drainage that are now accurately modelled by LiDAR (relative to the older remotely sensed data). As these two factors account for the majority of the modifier reductions, the net impact of the LiDAR based area estimate was an increase in harvestable area.

FCNSW report that the full impacts of the CIFOA on net harvest area modifiers has not been completed at the time of this report production.

North Coast Plantations

The resource models incorporated various components of the plantation estate. The RFA estimate included only Pre-94 plantations (the older part of the estate planted in the 1960's and 1970's) and just under 5,000 hectares of new land purchases. The 2004 review included the expanded new plantation resource to that point in time. The area estimates reduce after this assessment mostly due to the rationalisation of the joint venture resource. There was also a

reduction of the harvestable area in the older resource when planted filter strips were permanently reserved after the first harvest (which reduced the area by about 20%).

South Coast

There have been no significant changes of NHA through to 2018 (Figure 3-4). The CIFOA net harvest area modifier review (see above) accounts for the area increase observed in 2020.

Tumut

The 2018 Review included a reduction for uneconomic yield associations that accounts for the ~3,000 ha difference. The inventory was updated to include these areas in 2019 with the area added back in.

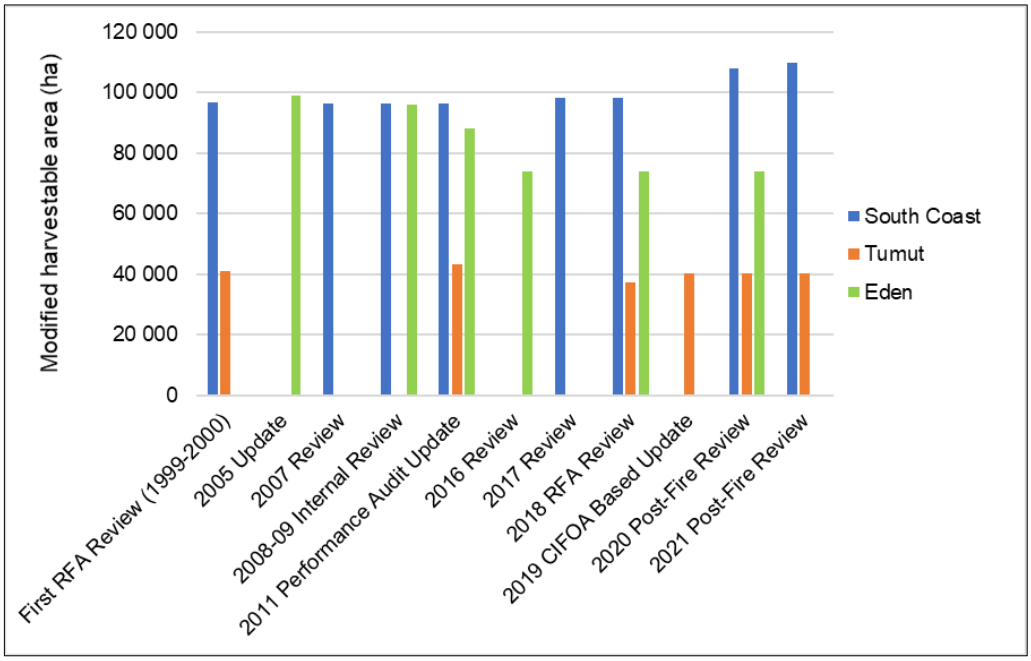
Eden

The harvestable area for Eden was not available prior to 2005. The 2011 review incorporated the results of the new net harvest area modifier study (this was the first application of modifiers for this sub-region). The area reductions after 2011 are primarily associated with refinements in the estimate of economically viable area that remained in multi-aged forest.

Figure 3-4: Changes to assumed net harvestable area (other regions)

South Coast and Tumut NHA have been generally maintained.

Greater than 20% reduction at Eden due to uneconomic forests being excluded



Source: FCNSW

Net harvest area - summary

Net harvest area has remained relatively constant over the review period for three of the four regions. It has varied for a number of reasons including the use of better data and changes to the assumptions used to model the impact of various regulations. Nevertheless it is clearly a key driver of overall supply, with other factors as described below.

3.2.2 Growing stock impacts on resource availability

Growing stock represents an estimate of the standing timber volume at a point in time. It is a useful guide to the sustainability of a resource model – if growing stock is rising or declining

over a modelling timeframe (i.e. comparing the growing stock in year 0 with the growing stock at year 100 of the modelling), this suggests that the rate of harvest is either less than or exceeds the forests' regrowth through that same timeframe.

Modelling approaches can reasonably plan growing stock to rise and fall over a modelling timeframe, as this might reflect differing forest ages or government policy (i.e. land use, conservation or industry policy), and the impact of long term legacy perturbations such as fire or historical land use.

Growing stock trends require careful interpretation as they reflect the interaction of growth with dependent and partially dependent factors such as area changes, changes in inventory data and inventory approaches, or improvements in biometrics and volume recovery modifiers, and changing industry utilisation factors. In addition, growing stock reflects a desired suite of forest structures that enhances forest resilience and forest values, as well as taking into consideration forest values being sought across the wider forested landscape.

Table 3.2-1 sets out the reported levels of growing stock for each of the various models prepared across the four regions at the beginning of each modelling timeframe. The comments below point to the complexity of the factors that contribute to the model parameters.

North Coast

The North Coast growing stock has varied over the review period. The North Coast estimate reduced significantly in 2009 when merchantability assumptions were revised. In 2020, the modelling system was improved to enable more comprehensive reporting of growing stock and incorporated the even-aged regrowth resource.

South Coast

Like the North Coast, reported growing stock for the South Coast varied over the review period. More recent changes include the rise in the 2019 estimate due to the increase in harvestable area from the introduction of the CIFOA as discussed above. The 2020 estimate included the first projections of fire damage based on a combination of qualitative assessments and data from studies of damage caused by fires in 2015 and the Black Summer fires. The 2021 estimate introduced quantitative assessment of damage and Black Summer fire killed losses, which FCNSW report has resulted in a reduction of growing stock not observed in 2020.

Tumut

The growing stock for the Tumut area reduced markedly in the 2011 review due to revisions of new and revised estimates of the recovery from hardwood species. In this review, the Alpine Ash estimates did not change significantly however recovery studies for the other species resulted in reduced HQ sawlog volumes. Similar to the South Coast, the 2020 estimate included the first projections of fire damage based on qualitative assessments, while the 2021 review included comprehensive API assessment of fire killed Alpine Ash, and confirmed the resource growing stock had been reduced as a result of the Black Summer fire impacts. Future wood supply modelling will need to take into account this change in growing stock.

Eden

The estimate of HQ growing stock in Eden increased through time given the young age of the regrowth resource. The 2020 post-fire estimate also included the combination of resource growth since the last estimate (modelled as at 2014) and the first projections of damage using data from studies of damage caused by fires in 2015. The net combination of these factors was an increase in volume.

Table 3.2-1: Assumed growing stock values for models prepared over review period

Standing Volume (HQ growing stock - m^3, at commencement of modelling period)					
Review Date	**NC Native**	**NC Pltn**	**SC**	**Tumut**	**Eden**
RFA (1997-2000)	11 919 200		1 687 300	3 031 400	Different System (estimates not available)
2004	11 043 000		NA	NA	
2007	10 435 000		NA	NA	
2009	9 211 000		2 494 000		
2011 Performance Audit	NA		2 494 000	2 199 000	133 700
2014 URS (GS@2012)	10 213 000		NA	NA	NA
2016 Review (GS@2014)					500 200
2017 Review (GS@2015)	7 997 000		1 839 800		
2018 RFA (GS@2011)				2 199 000	
2018 RFA (GS@2014)					500 200
2018 RFA (GS@2017)	7 997 000		1 749 900		
2019 Review (GS@2019)				2 174 600	
2020 Post-Fire (GS@2020)	8 789 000	602 000	1 861 000	1 681 000	686 846
2021 Post-Fire (GS@2020)			1 369 000	1 085 100	

Source: FCNSW

Growing stock - summary

Changes to growing stock provide an indication of potential longer term adjustments to wood supply, as forest yields can move up and down as can growing stock.

Growing stock is best considered over the longer term, taking into account modelled changes up and down, and providing an indication to how a forest management system is sustaining a desired forest structure and age, and yield.

Reporting of growing stock over a modelling timeframe could be a useful parameter to include in a baseline monitoring process.

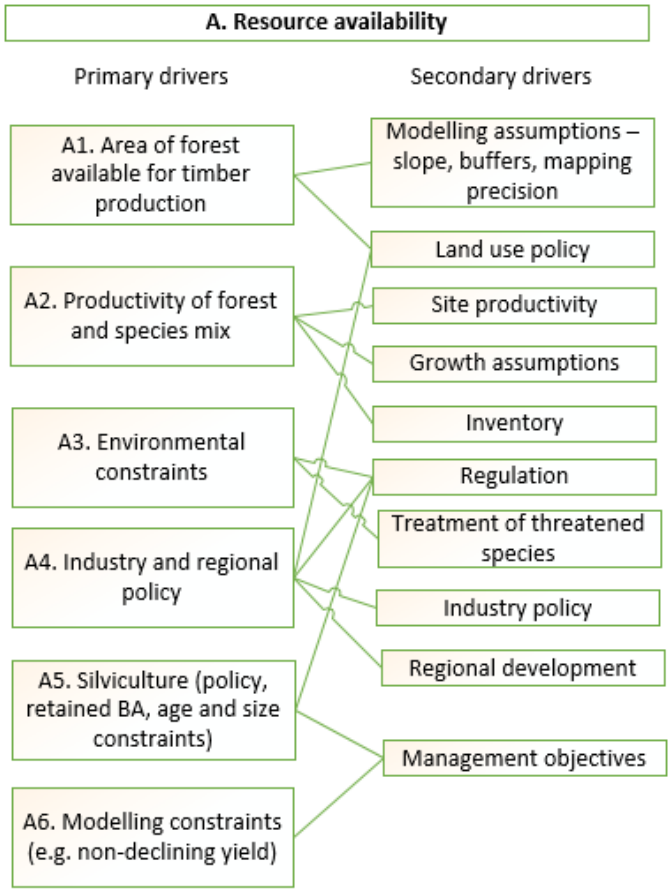
3.2.3 Other driver impacts on resource availability

Resource availability can be directly influenced by the area made available for timber production (net harvest area), but also the assumed productivity of the forest and the species within it.

Importantly a range of other drivers can influence resource availability. These include environmental objectives and constraints, government land use and industry policies, and the silviculture systems adopted. Finally, the assumptions used on modelling yield (growing stock and others) will directly impact the way in which woodflow is modelled and therefore influence the long-term decisions regarding potential wood supply allocations, both from a government policy and commercial perspective within FCNSW.

These various drivers are noted in Figure 3-5 below. The assumed importance of these primary and secondary drivers will be defined in Section 4.

Figure 3-5: Resource availability primary and secondary drivers



Resource availability - summary

Net harvest area and growing stock are two key quantitative parameters in the resource model. Net harvest area has changed only modestly over the review period.

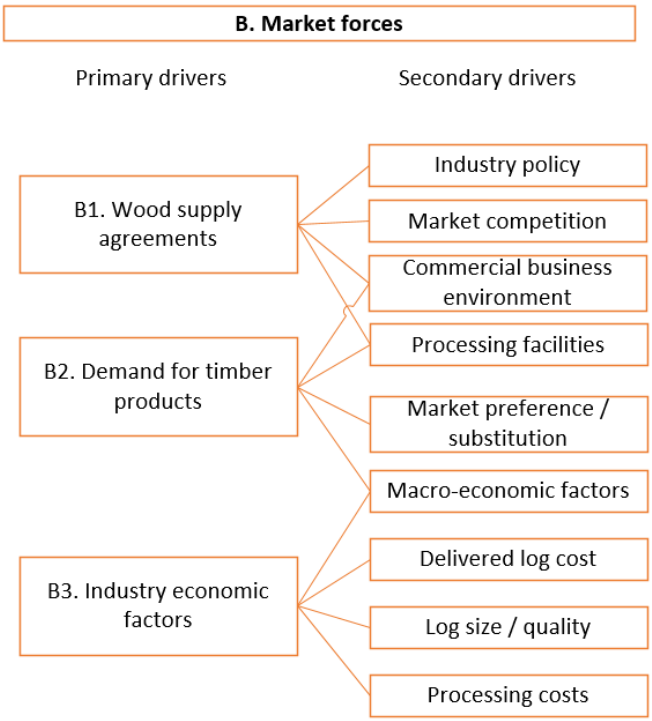
Growing stock, as at the reporting time, has varied more markedly, reflecting changes to data measurement and quantification of the impact of disturbances such as major fire events. Fire events have a fundamental impact on forest productivity (A2).

Forest productivity and species mix, environmental constraints, regional and industry policy, silviculture and other modelling constraints form primary drivers on resource availability.

3.3 Category B. Market forces

The demand drivers for native forest logs focus on the nature of the supply agreements in place, the inherent demand for timber products and other economic factors. These are influenced again by a suite of secondary factors.

Figure 3-6: Market forces - primary and secondary drivers



In the NSW native forest context, supply agreements will be strongly influenced by government industry policy and other directives that will be employed to balance environmental and regional development objectives. Within the policy settings, commercial considerations such as the local and regional competition for timber and the relative strength of potential log customers are critical in determining the parameters of any supply agreements – volume, term, species, grade and price.

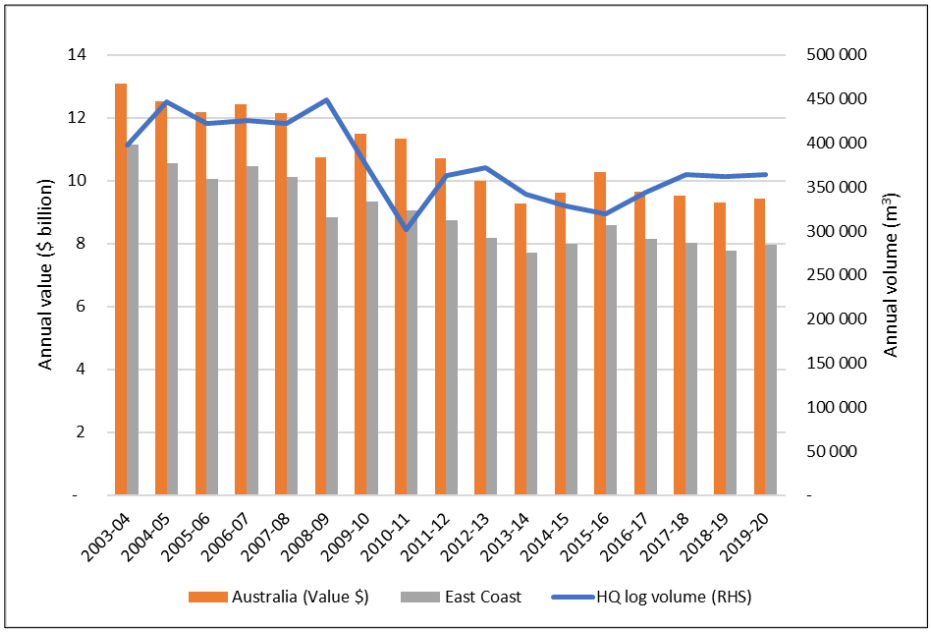
As high quality hardwood sawlogs are essentially a scarce commodity, demand appears to have exceeded supply throughout the review period, as sawlog supply has only declined marginally as can be seen by the supply curves in Figure 2-2. NSW timber processors sell their products in relatively open and highly contested marketplaces, with the Australian timber market readily accessible to imported products, as well as having timber products moving freely and efficiently around the nation. Some of the NSW finished timber products have unique properties which are recognised in the marketplace (i.e. durability, specific colours, stability and expected life of the finished product), while others have direct or indirect competitors of similar product types. Therefore demand for finished products will influence the type of products produced by the NSW processors, where the processor takes into account the price and production cost, and therefore the commercial returns for parties in the supply chain.

Potential substitution such as imported hardwood timber and various solid wood and engineered wood products can play a role in the underlying demand for hardwood logs. NSW and imported products are often used as part of Australia's alterations and additions activities, particularly of the residential markets, as well as being used in new housing construction.

Figure 3-7 and Figure 3-8 provide an indication that the relationship between key market indicators (value of alterations/additions and new housing starts) and the volume of HQ logs supplied is relatively muted. This suggests that regardless of the strength of the Australian alterations/additions and housing market, hardwood HQ log supply is relatively constant given that supply is constrained and demand has appeared to exceed supply potential.

Figure 3-7: Key market indicator (alterations/additions) compared to HQ log volume

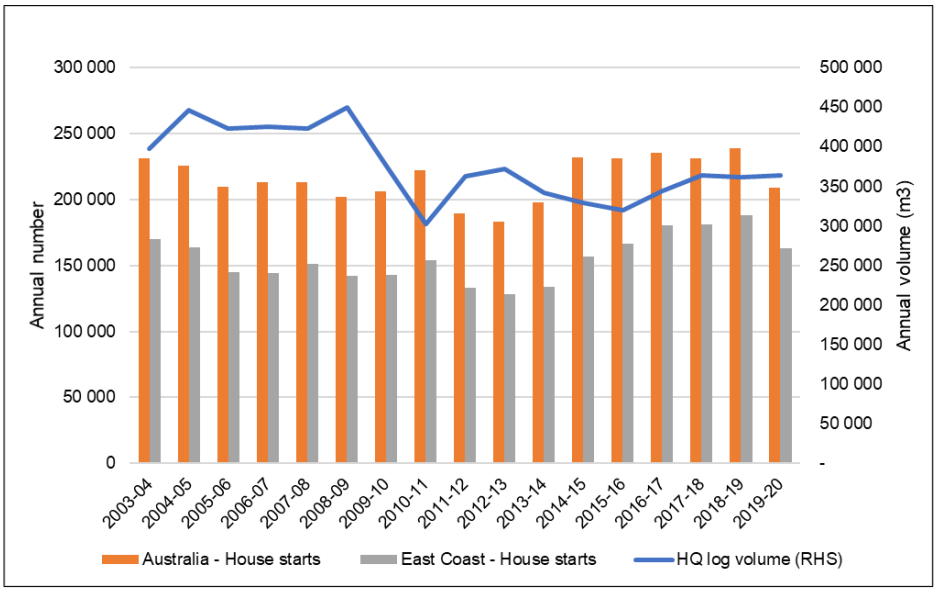
Weak correlation between the HQ log volume relative to the value of alterations / additions



Source: ABARES Australian Forest and Wood Product Statistics, FCNSW

Figure 3-8: Key market indicator (house starts) compared to HQ log volume

Limited relationship between HQ log volume and house starts



Source: ABARES Australian Forest and Wood Product Statistics, FCNSW

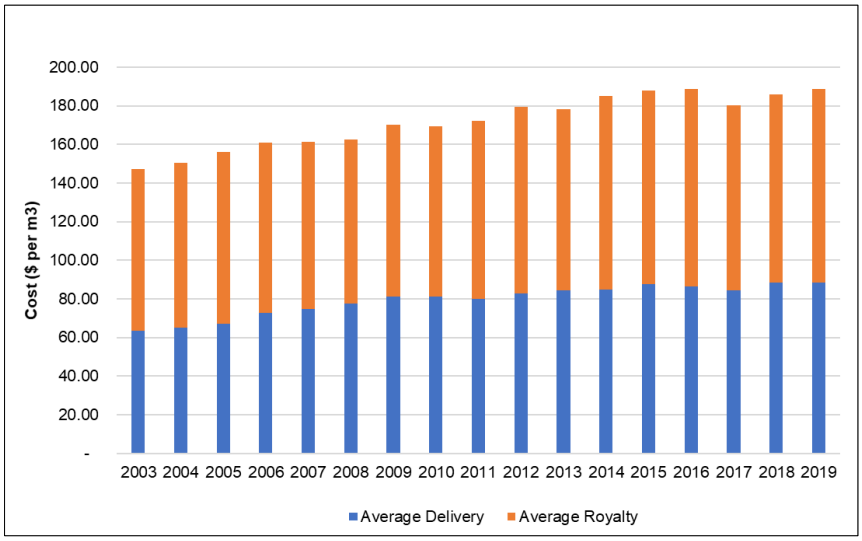
Finally, economic factors such as the cost of logs at the sawmill gate, the size and quality of those logs and the efficiency with which logs can be processed will all influence the capacity of the industry to be competitive. For example, changes to the log availability with resultant changes to log cost, grades, volumes and location of supply relating to former and existing processing facilities has an economic impact on the delivery of timber under the wood supply agreements entered into by FCNSW. This economic impact includes the efficiency of the harvesting and haulage operations as well as the volume available to wood processors which influences their scale of their operations.

The charts below provide an indication of the cost of all HQ logs delivered to HQ customers in each region. The costs comprise a log royalty or 'stumpage' component, and a delivery charge

that notionally covers harvest and haul costs. There has been a modest increase in delivery costs in each of the regions except Tumut. Royalty has increased significantly on the North Coast, marginally on the South Coast and declined in real terms at Eden.

Figure 3-9: North Coast HQ log royalty and total delivered log costs (real $2019)

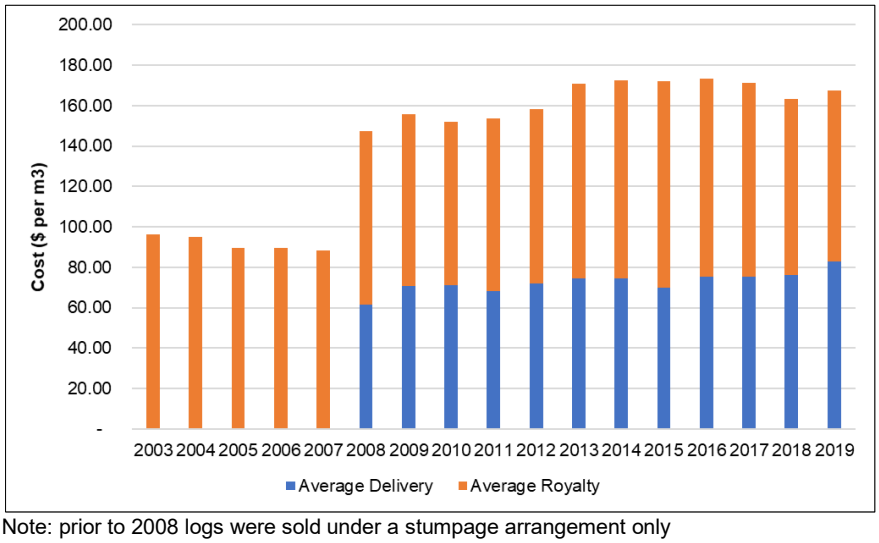
Significant increase in delivered log costs on the North Coast through to 2015 then relatively flat



Source: FCNSW

Figure 3-10: South Coast HQ log royalty and total delivered* log costs (real $2019)

Marginal increase in delivered log costs on the South Coast through to 2013 then relatively flat in real terms

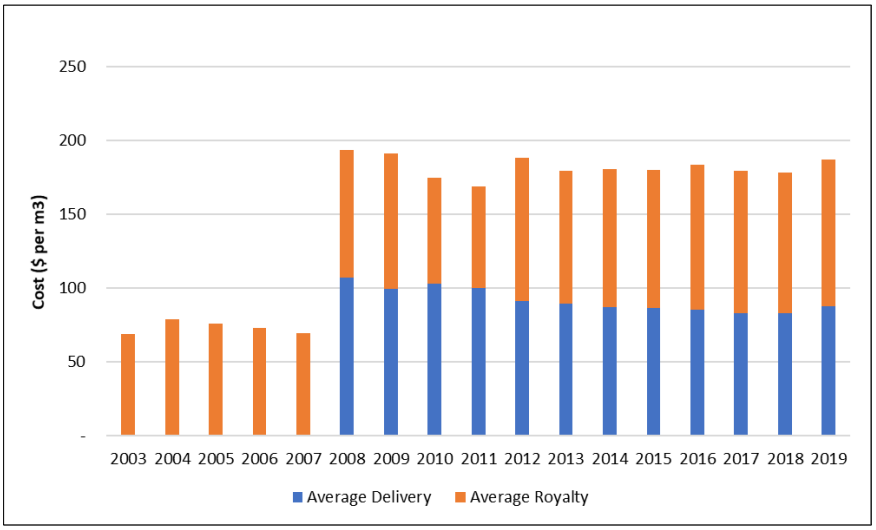


Note: prior to 2008 logs were sold under a stumpage arrangement only

Source: FCNSW

Figure 3-11: Tumut HQ log royalty and total delivered* log costs (real $2019)

No increase in real costs from Tumut

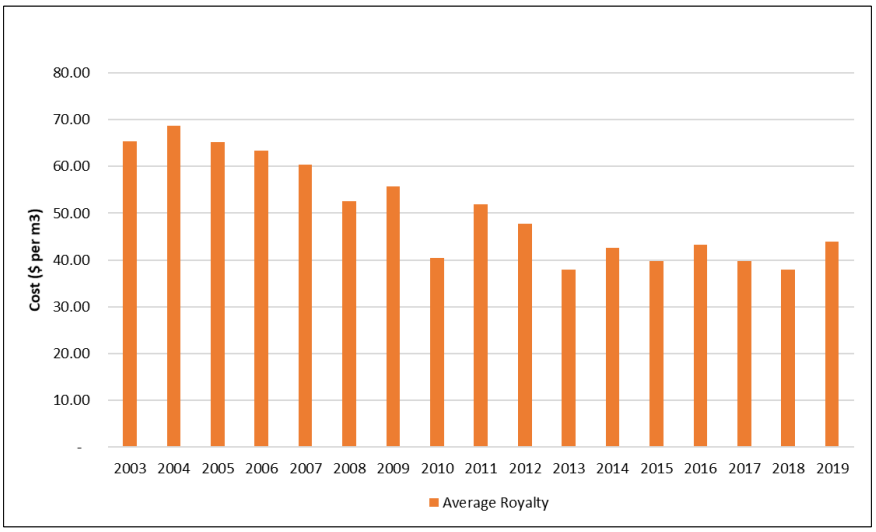


Note: prior to 2008 logs were sold under a stumpage arrangement only

Source: FCNSW

Figure 3-12: Eden HQ log royalty costs (real $2019)

Decline in HQ royalty in real terms at Eden



Note: Logs were sold under a stumpage arrangement only

Source: FCNSW

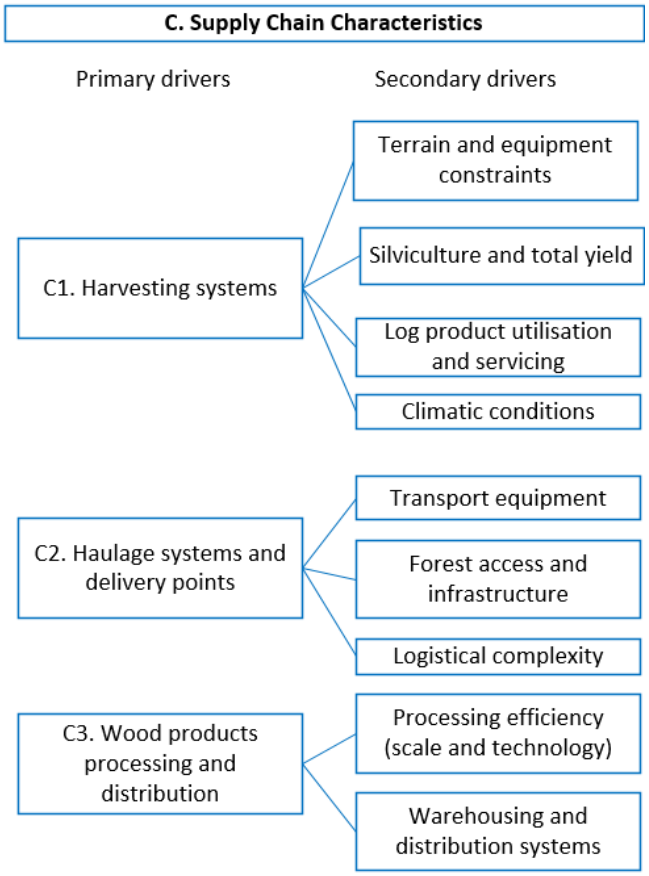
Market forces - summary

Market forces include supply agreements, the inherent demand for logs and wood products at a regional, national and global scale, and industry economic factors that may be peculiar to a local processing centre. Whilst lower value log products are subject to typical commodity supply and demand fluctuations, it is apparent that the scarcity of high quality native forest sawlogs largely means that supply is correlated with levels specified in supply agreements.

3.4 Category C. Supply chain characteristics

A third critical category of supply drivers encompasses the characteristics of the supply chain. These will have a direct influence on costs (end hence the economic factors described above) but will also have an impact on supply over the short and medium term.

Figure 3-13: Supply chain characteristics - primary and secondary drivers



Harvesting systems will influence, and be influenced by, the type of terrain that is accessible to be harvested. 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 transition to mechanization. The consequences of this have been 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.

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 impose a cost in terms of identifying, protecting and managing them during the harvest operation.

Silvicultural prescriptions are developed in order to meet different objectives. Of increasing relevance in NSW is the retention of trees to meet threatened species prescriptions, and the provision of habitat across the harvested areas.

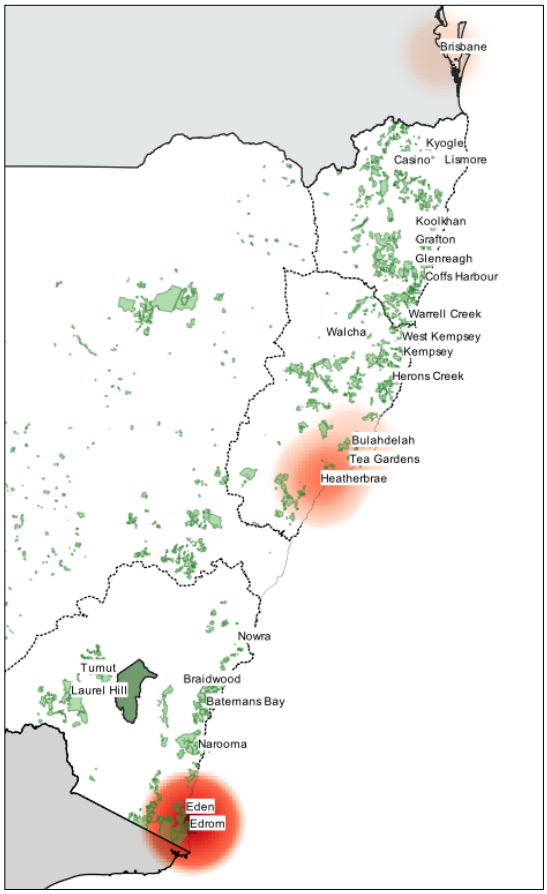
Once a tree or patch of trees is identified as needing protection, felling and extraction of other trees must be undertaken in such a fashion to have no impact on the retained tree or patch.

Log product utilisation - 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. In addition, many FCNSW timber harvesting operations involve multiple species from the same harvest area, commonly having differing market value.

Forest and harvesting managers aim to ensure that there are markets for each grade of product harvested. However, this is a challenging task given the highly variable nature of NSW native hardwood forests, the geographic spread of forests and processing facilities, and the markets that exist at the time of production. Markets for low grade products such as salvage logs and pulp are particularly susceptible to economic downturns where a high degree of competition can exist.

The NSW native forest woodchip market is a case in point. The chip export terminal at Eden has been operating for over 50 years, facilitating the ongoing harvest of relatively low quality forest within an economic range. This has included pulplogs from the South Coast on a reasonably consistent basis. The volume processed through this facility has varied markedly over the review period, partly reflective of changing market conditions and demand for this product. Similarly the North Coast had a significant volume of pulp processed by Boral at Tea Gardens between 2004 and 2012.

Figure 3-14: Pulp markets weighted by volume all years



This was regionally significant, being the only chip export facility between Eden and Brisbane. This facility was closed in 2013, reportedly due to challenging market conditions and declining

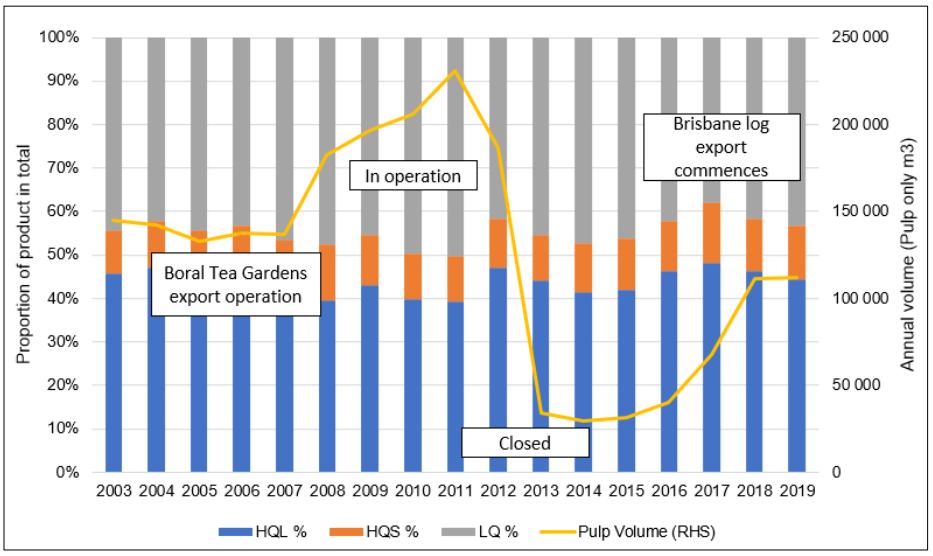
demand for this particular product.[3] Following the closure of Tea Gardens, very little pulp was harvested on the North Coast until Brisbane provided an outlet from 2016 for the upper north coast forests.

The lack of a market for low quality logs can result in: (i) the cost of harvesting HQ logs within lower yielding forests may rise; (ii) a necessary change in silviculture to reduce the amount of low quality logs produced; and (iii) a greater amount of waste produced during harvesting potentially increasing costs.

However, the data indicates that North Coast HQ and LQ proportions were relatively consistent across the review period regardless of the pulplog volume (see Figure 3-15).

Figure 3-15: North Coast – proportion of HQ and HQ, relative to pulplog volume (RHS)

HQ and LQ proportions were relatively consistent regardless of pulplog volume



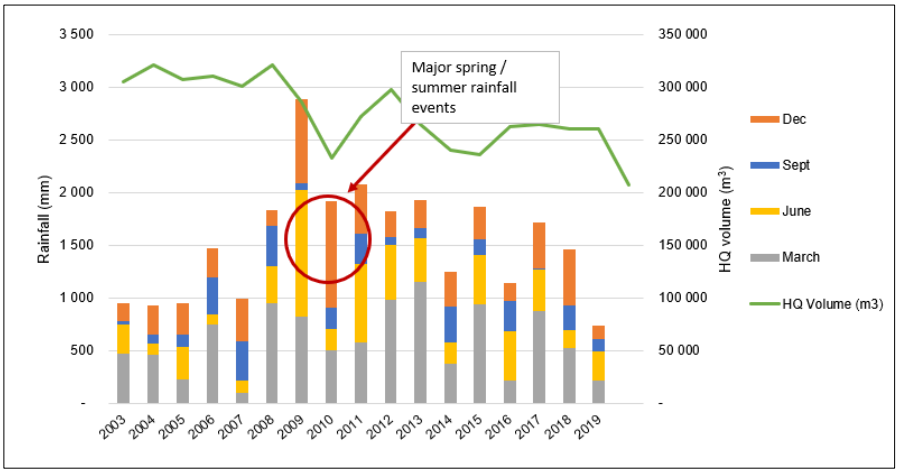
Weather events such as extended periods of wet weather can have an impact on wood supply over the short and sometimes the medium term.

This is evident on the North Coast as per Figure 3-16. The green line represents HQ supply, with the columns representing the amount of rainfall received in the year and in each quarter. An exceptionally wet year in 2009 was followed by a very wet late spring / early summer in 2010, and again in 2011, contributed to a significant drop in supply.

[3] https://www.boral.com/sites/corporate/files/media_library/documents/13-6-19_Media_Release-Continued_Restructuring_in_Boral_Timber.pdf
https://www.abc.net.au/news/2013-06-20/boral-to-close-two-of-its-hunter-operations/4768354

Figure 3-16: Seasonal rainfall and total HQ volume (North Coast)

Consecutive wet years 2009 – 2011 (particularly in Dec quarter) contributed to the reduction in supply



Rainfall commencing in Oct 2010 and again in November/December 2011 led to FCNSW issuing Force Majeure (a right to suspend contractual supply obligations) notices to their customers. This points to the impact that successive extended weather events may have. FCNSW have the capacity to maintain supply through harvesting alternative sites (including plantations), and through managing log stockpiles. However, options can become exhausted after a period of time.

Access and infrastructure can have an impact on supply, particularly in wet weather. The transition to larger, more efficient haulage vehicles has helped mitigate an industry-wide increase in transport costs, however this places additional requirements on forest roads.

Logistics complexity - the commercial wood supply arrangements from native forests in NSW is complex, with over 270 customers being supplied 10 different products across 32 species over the review period, from two administrative regions and four IFOA regions, and multiple supply / price zones. A high degree of management and expertise is required to meet this logistical challenge, and defining the best supply arrangement which meets the requirements of the contracted supply and customer preferences.

Finally, the **processing efficiency** of the industry is a key to maintaining competitiveness and being able to value add timber products. This is most apparent in the consolidation of the major processors such as Boral Timber. Up to 13 sites were operating over the early part of the review period, and have been largely consolidated to four in total at the end of the review period with two each on the North and South Coast (Figure 3-17 and Figure 3-18).

Figure 3-17: North Coast Boral supply by location

Consolidation of Boral facilities to Herons Creek and Koolkhan

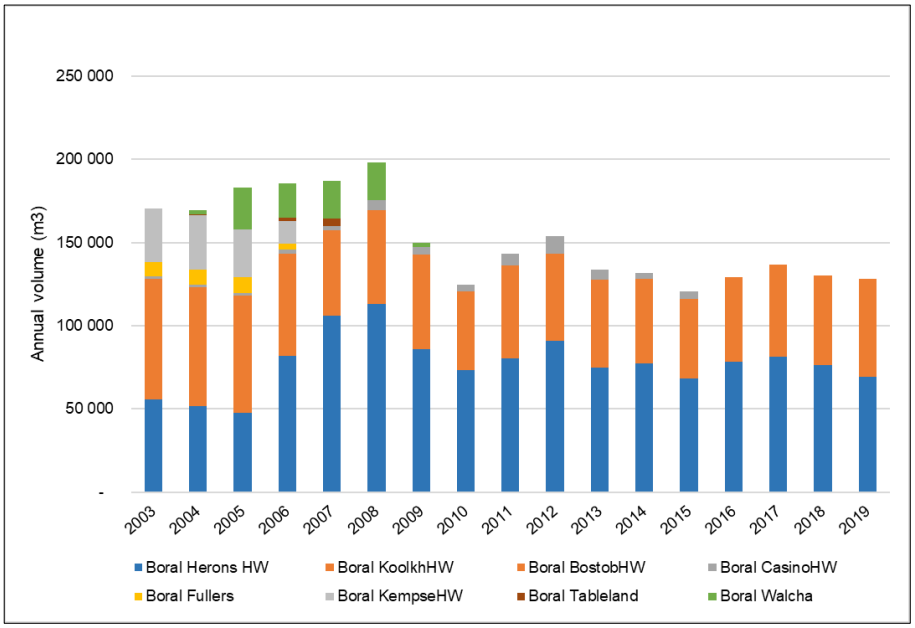
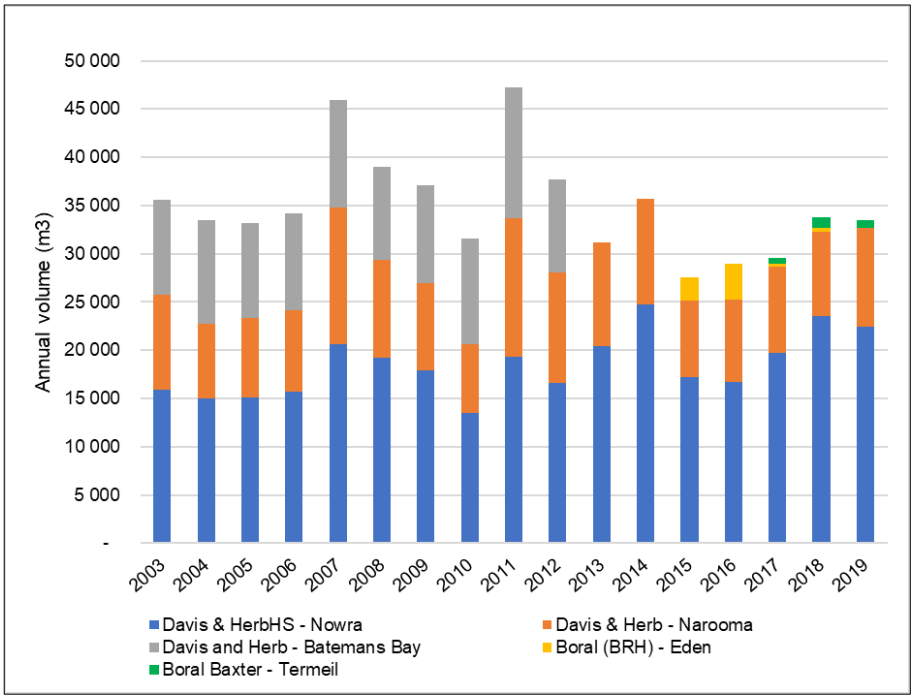


Figure 3-18: South Coast – Boral supply by location

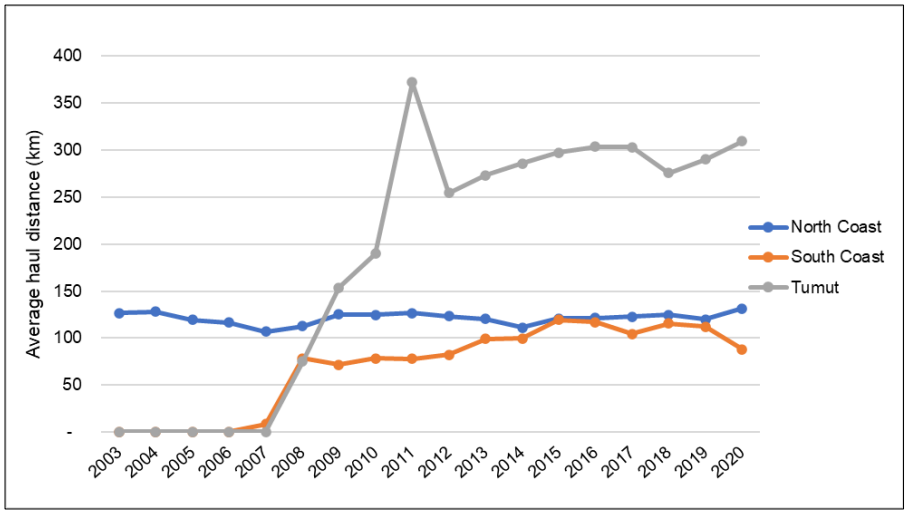
Consolidation of Boral facilities to Narooma and Nowra



A further implication of mill consolidation is the impact on transport distance and hence delivered log cost. Processors will make a commercial decision to increase transport costs as a trade off for being able to increase throughput at a more efficient facility. Figure 3-19 shows the relative haul distance for the North and South Coast and Tumut regions. This indicates that there have been general increases across all regions as facilities were rationalised and logs transported further. Notably, the Tumut HQ logs are transported in excess of 250km, reflecting the lack of larger processing facilities within the region, but also the highly valued quality of the Alpine Ash logs. High quality logs can 'afford' to be transported due to their relative scarcity across all Australian states.

Figure 3-19: Average HQ haul distance by region* (2003 - 2019)

Variable transport distance will have a significant impact on delivered log cost

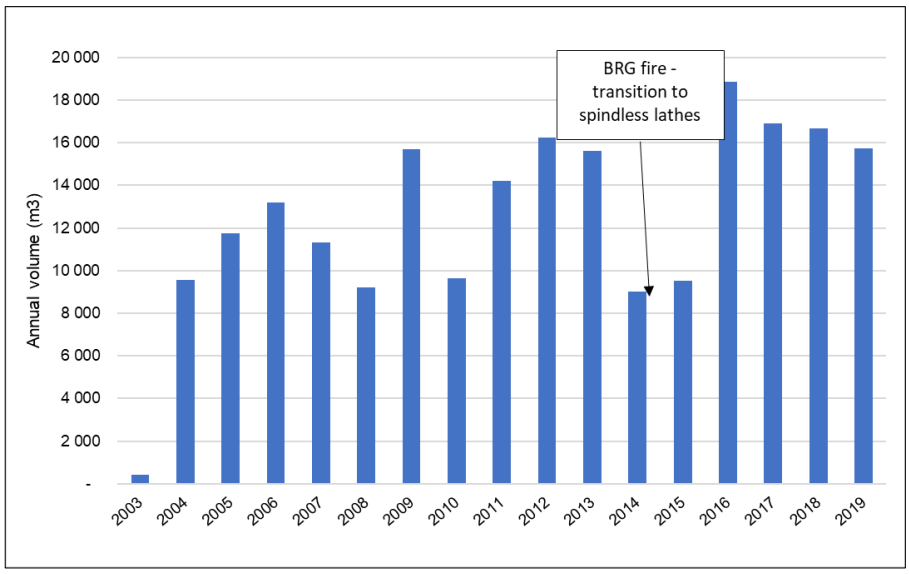


*Note – Eden distance data is not available

Other market factors directly linked to processing facilities expansion or unplanned events can have an impact on demand. An example is presented below in terms of the change in supply of veneer logs to Big River Timbers. A fire in November 2014 reduced the capacity of the plant until replacement equipment and new technology was commissioned in 2016. The new equipment also changed the preferred log mix, allowing the plant to process smaller logs, partially outside the traditional HQ specifications.

Figure 3-20: North Coast – veneer supply

Supply disruption due to fire at veneer plant and transition to new technology



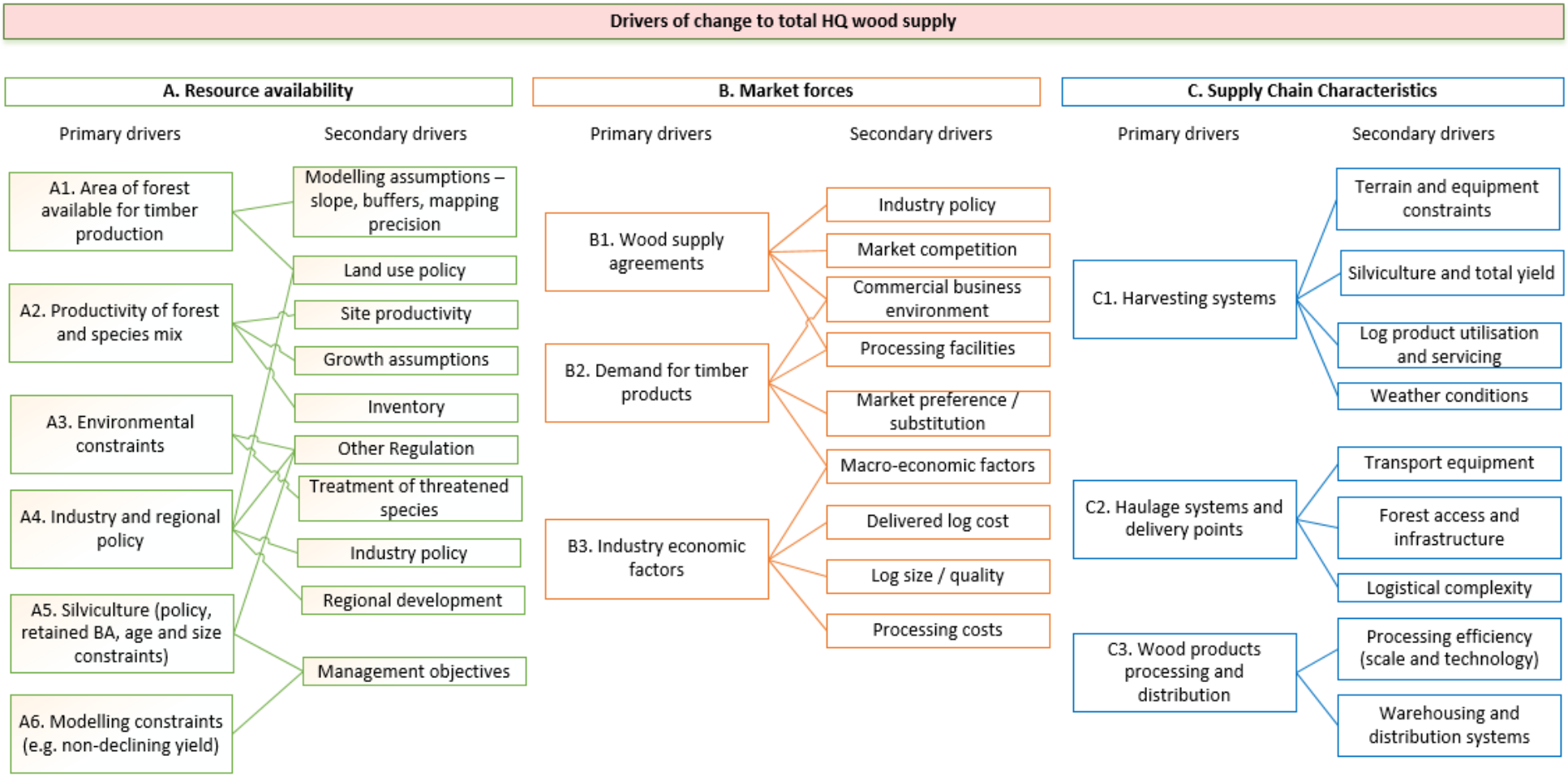
The **warehousing and distribution** systems for the processors will also influence economic returns. There has been a general trend towards vertically integrated operations in the industry, providing timber producers with more control over this aspect of the supply chain.

Supply chain characteristics - summary

There are numerous factors that impact on log supply that arise because of the nature of the supply chain including changes to technology, complimentary log product markets, industry rationalisation and climatic impacts. These factors have to some extent variously impacted the cost of production and altered the approach to harvesting and transport.

A consolidated view of the primary and secondary drivers of change in wood supply is provided in Figure 3-21. The relative importance of each is discussed in Section 4.

Figure 3-21: Primary and secondary HQ supply drivers



4. ANALYSIS OF HISTORIC WOOD SUPPLY - DRIVERS OF CHANGE

Based on the data summarised in Section 2 and the supply drivers outlined in Section 3, the following section further draws linkages between actual supply and potential key influencing drivers.

The strength of any implied causal correlation or link between a driver and supply is assessed to ascertain the relative influence of each driver category. This includes the key sub-categories, or secondary drivers that might be a pre-dominant influence on the supply. This includes the duration of a driver's influence on the wood supply over the review period, where for example some drivers have influence over an extended (or ongoing) period, while other drivers might have been of influence for a shorter or more defined period.

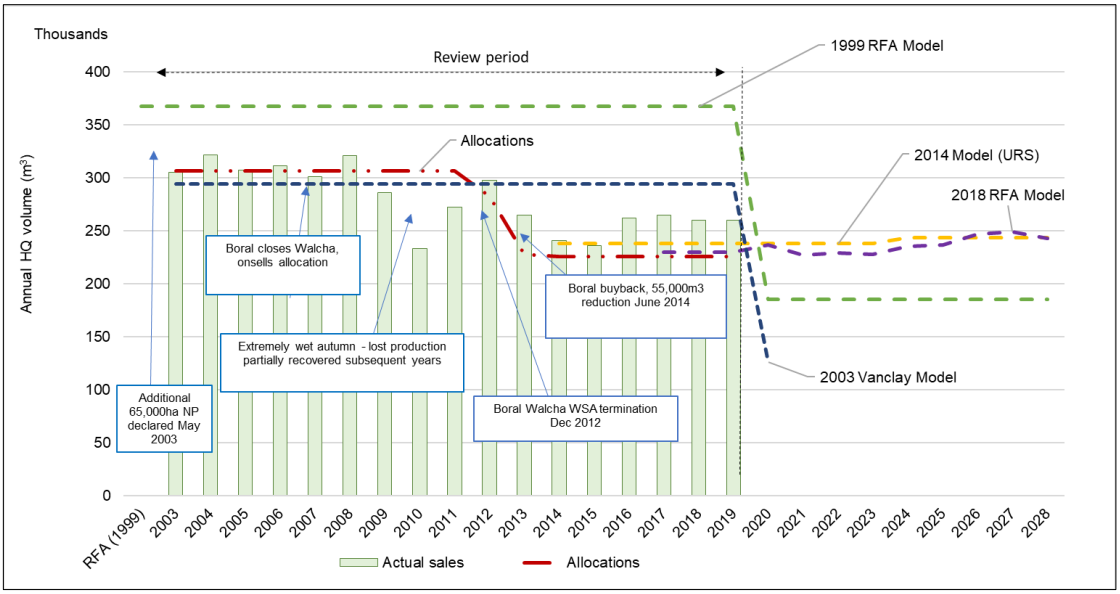
An overview of wood supply and related drivers such as modelled and allocated volume, as well as specific events, is provided for each of the regions in the following section, followed by a summary of the relative importance of the drivers.

4.1 Overview of supply and key events- North Coast

As noted in Section 2.1.2, the North Coast is the most complex region in terms of customer, grade and species combinations; as well as the various policy decisions taken over the review period. Figure 4-1 provides an overview of actual supply against supply agreement allocations, as well as the various iterations of supply modelled (dashed lines). The shape of the modelled supply has varied over time, and is presented including expected supply outside the review period as this provides an indication as to the intent of management over the medium term can influence supply within the review period.

Key events that have influenced supply are also noted, in terms of key policy or commercial decisions, weather events and contractual matters.

Figure 4-1: Key HQ supply event overview (North Coast)



Note that 'allocations' refers to the sum of the volume committed under various wood supply agreements at that time. Customers can vary annual supply by between 10% to 15% per annum, and carry forward under and overcuts such that there are periods where supply is under and over allocated. There was also some carry-forward of volume that was unable to be supplied during the wet conditions in 2009 – 2011.Whilst the supply situation is complex, the chart demonstrates the categories of supply drivers outlined in Section 3.

The following are key observations of this analysis.

i. **Resource availability** – allocations are closely aligned with modelled volume. Of note is the volume for the 1999 RFA and the 2003 Vanclay models were 'front-ended', with an expected significant decline in available volume following the completion of the supply agreement terms in 2023. The allocation was adjusted in 2013 to better reflect an expected smoothed supply of HQ in the period to at least 2030. This occurred through the adjustments made to long term allocations, and improved resource estimates, and revised modelling arrangements.

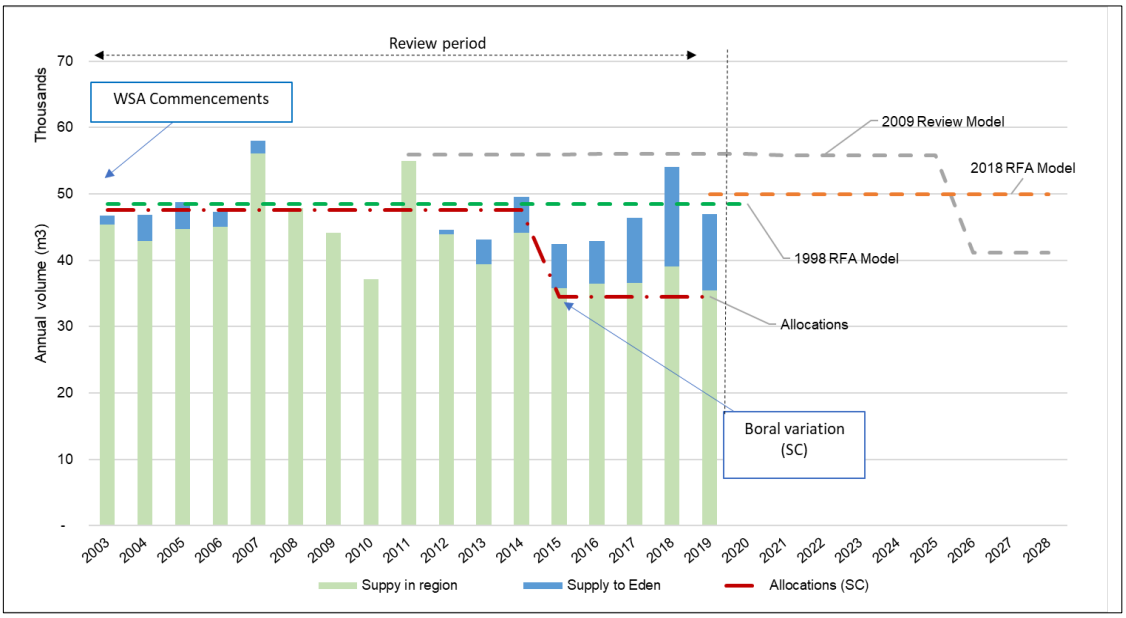
ii. **Market forces** – the fundamental market force at play are the wood supply agreements, aggregated to form the 'allocations' line in Figure 4-1. Despite the cyclic nature of the timber market more broadly, demand for HQ sawlogs has generally exceeded supply, such that supply is more influenced by other factors. The reduction on the Boral allocation in 2014 significantly altered the overall HQ allocation and consequent supply level.

iii. **Supply chain characteristics** – the key influences during this period were the extended periods of wet weather in 2009 – 2011. These had a short term impact on supply, part of which was recovered in subsequent years.

4.2 Key HQ supply event overview - South Coast

The South Coast has a simpler supply history to evaluate against potential drivers. The original allocations were based on modelling undertaken for the RFA with appropriate buffers.

Figure 4-2: Key HQ supply event overview (South Coast)



The chart demonstrates the categories of supply drivers outlined in Section 3.

i. **Resource availability** – allocations are closely aligned with modelled volume with buffers to ensure 'headroom'. Subsequent iterations of the long-term yield forecast supported the original estimates.

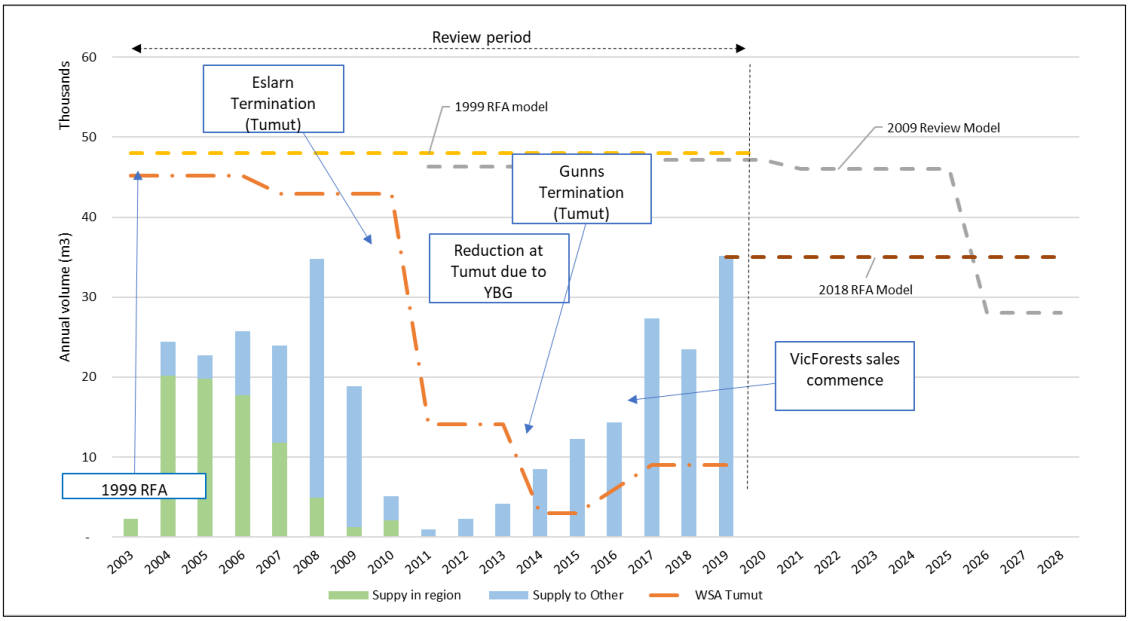
ii. **Market forces** – the key market force is the commitment to supply under the high quality wood supply agreements.

iii. **Supply chain characteristics –** the main change to supply arrangements during this period was the transition from stumpage sales to mill door in 2006/2007. This does not appear to have influenced the level of supply.

4.3 Overview of supply and key events - Tumut

The original allocations were based on modelling undertaken for the RFA with appropriate buffers.

Figure 4-3: Key HQ supply event overview (Tumut)



The chart demonstrates the categories of supply drivers outlined in Section 3.

iv. **Resource availability** – The restrictions associated with harvesting in areas containing the Yellow Bellied Glider had a profound impact on resource availability from 2010 – 2012. Allocations varied markedly over the supply period, not necessarily directly in response to changes in modelled resource availability, but to other factors described below. The key point to note is the availability of high quality Ash logs forming the majority of the resource, non-preferred tableland species have not been consistently harvested.

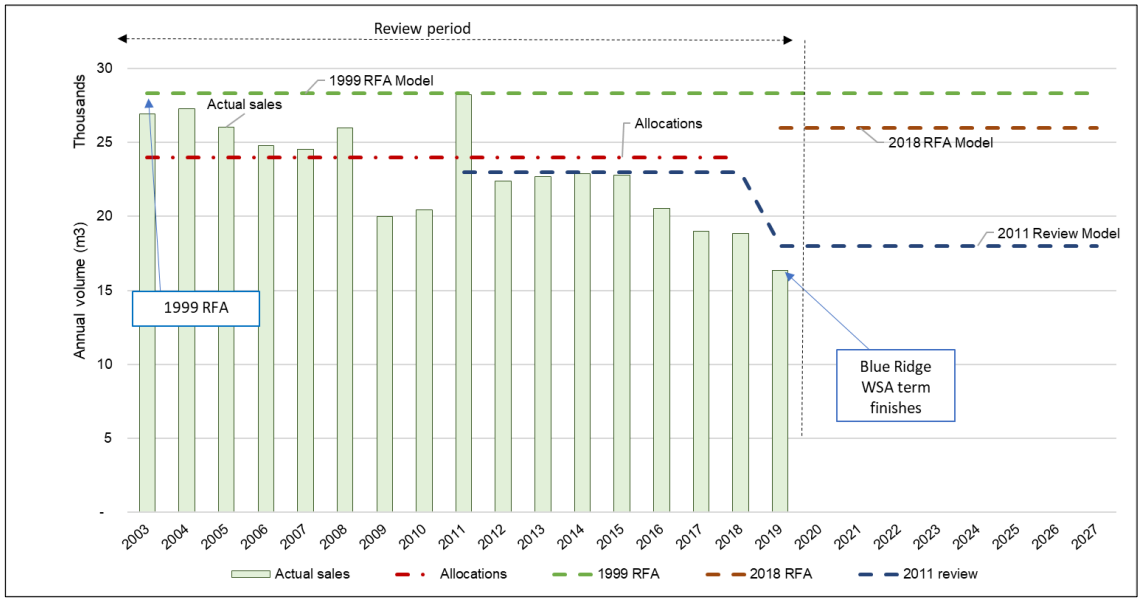
v. **Market forces** – Tumut supply has been characterised by significant changes to local processing capacity, the volatile commercial performance of key processors, and changes in ownership. The general trend has been a loss of local markets, with high quality logs being transported mainly into Victoria to sawmills at Corryong, Benalla and Heyfield.

vi. **Supply chain characteristics –** The loss of local processing has necessitated the transport of logs to other regions, primarily into Victoria. This is evident in the distances charted in Figure 3-19.

4.4 Overview of supply and key events - Eden

The original allocations were based on modelling undertaken for the RFA with appropriate buffers.

Figure 4-4: Key HQ supply event overview (Eden)



The supply situation in the region was relatively simple with one primary HQ log customer.

i. **Resource availability** – The regional wood supply is pulpwood rich evident in the proportion of pulp logs harvested (see Figure 2-23). The resource contains a diminishing proportion of mixed-age forest that produced reasonable quality sawlogs. The regrowth forests are not preferred by the mills as the logs require specialist processing and generate a low return on structural high value products. The cessation of HQ sawlogs in 2019 was primarily due to the closure of the Blue Ridge mill. Sawlog yield is forecast to slightly increase (as is evident from the 2018 RFA model) as a result of assumed increases in recovery.

ii. **Market forces** – HQ supply was generally in line with WSA allocations, noting that mills will have the ability to take +/- 10% of their annual allocation each year. The small-scale sawmill at Eden was able to perform consistently throughout the review period. The transition to the regrowth resource post 2019 was likely to require different processing equipment and markets.

iii. **Supply chain characteristics –** FCNSW has managed wood supply in the region on a stumpage basis. The high proportion of pulp logs harvested facilitates the management of harvesting by the pulp customer, who then directs sawlogs to the HQ customer. It is not known to the extent this has influenced HQ supply.

4.5 Supply driver analysis

Each of the supply drivers discussed in Section 3 have been assessed based on the change in the historic HQ wood supply, known events and discussions with FCNSW staff. As the impact of each driver varies between the regions, the drivers have been assessed specific to each region. For example, HQ supply is highly constrained relative to processing capacity on the north coast, whereas at Tumut the main issue impacting supply has been the management of threatened species, and local processing capacity has been diminished through closure of facilities.

As a guide to the significance of the relative impact of each driver, Indufor proposes a scaling is completed for each driver and region. In the absence of substantiative data, this is based on professional judgement of Indufor post analysis of the evidence and discussions with FCNSW personnel.

The relative influence has been rated based on scores from 1 (low) to 5 (high) during the review period. A full list of drivers assessed is tabled in Appendix 1. A guide as to the potential duration

of any single influence is also provided. Whilst policy decisions and modelling constraints will influence supply over the long term (5 to 100 years), market forces tend to be over a shorter timeframe (1 to 5 years), and weather impacts usually only measured over months.

Table 4.5-1: Supply driver impact assessment

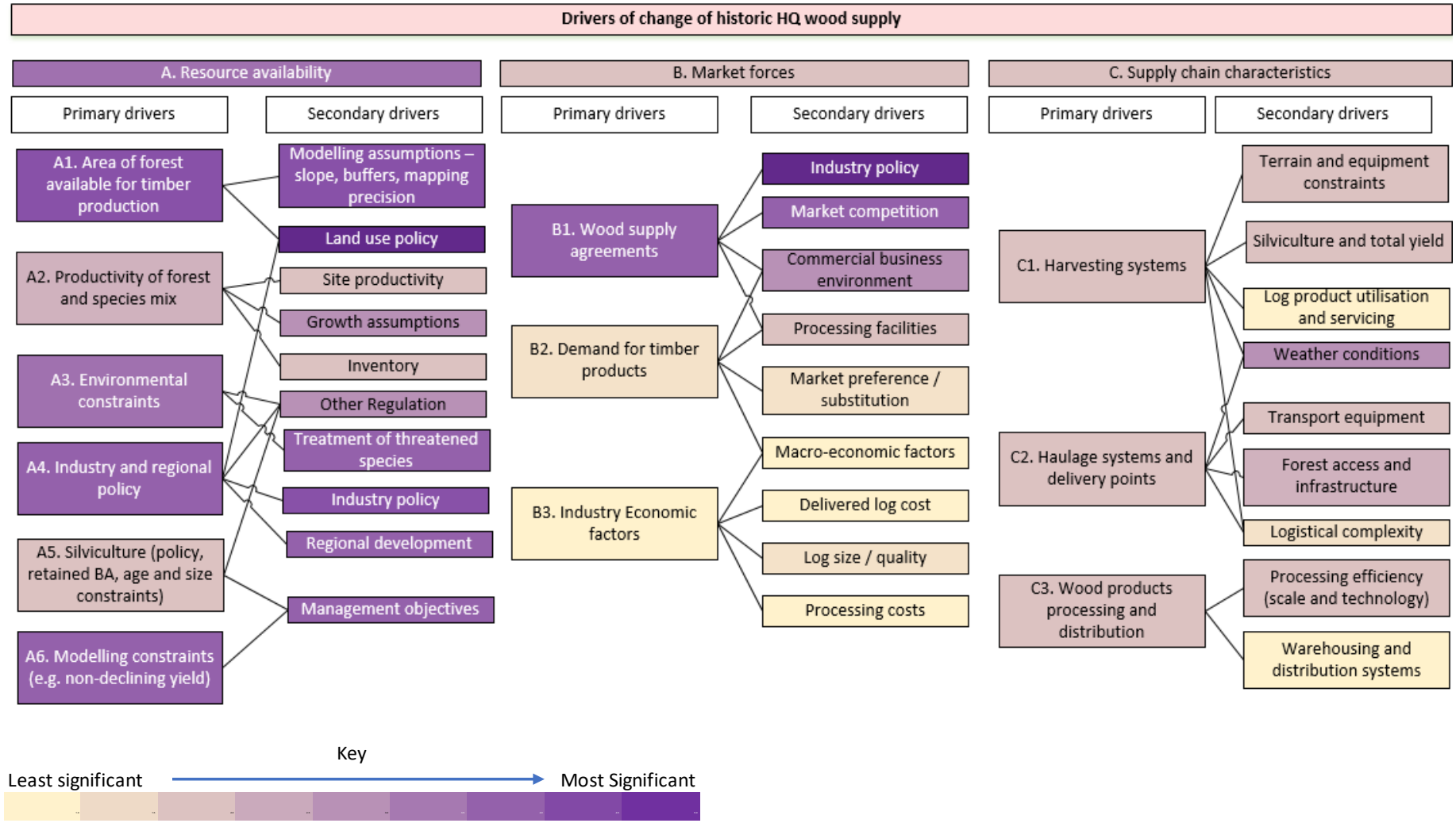
How significant are each of these drivers to change in HQ wood supply during the review period?		Region			
	Duration	NC	SC	Tumut	Eden
A. Resource availability		3.4	3.4	3.3	3.5
A1. Area of forest available for timber production	Long	4.5	4.5	4.5	4.5
A2. Productivity of forest and species mix	Long	2.3	2.3	2.3	2.3
A3. Environmental constraints	Long	3.5	3.5	4.0	3.5
A4. Industry and regional policy	Long	4.3	4.3	3.3	4.5
A5. Silviculture (policy, retained BA, age and size constraints, tree selection)	Long	2.0	2.0	2.0	2.0
A6. Modelling constraints (e.g. non-declining yield)	Long	4.0	4.0	4.0	4.0
B. Market forces		2.0	2.3	2.7	2.8
B1. Wood supply agreements	Long	4.0	4.0	4.3	3.7
B2. Demand for timber products	Medium	1.0	1.7	2.3	2.7
B3. Industry economic factors	Medium	1.0	1.3	1.3	2.0
C. Supply chain characteristics		2.2	1.6	1.5	1.6
C1. Harvesting systems	Short	2.3	1.8	1.8	1.5
C2. Haulage systems and delivery points	Medium	2.3	1.7	1.7	1.7
C3. Wood products processing and distribution	Medium	2.0	1.5	1.0	1.5

Although clearly somewhat subjective, the assessment above provides a guide as to the relative influence of each driver. This analysis suggests that **resource availability** is the primary driver, which in turn is heavily influenced by the area made available for timber production, a function of land use policy decisions and the assumptions made in modelling the resource regarding exclusions.

In summary, with the exception of Tumut, actual wood supply has been generally aligned with modelled yield, modelled yield strongly correlated with the area available for harvesting which in turn is dependent upon policy settings and the assumptions built into the resource model. Market forces and supply chain characteristics have both a shorter-term influence as well as a lower impact in that they either involve cyclical events that ultimately even out over the long term, or demand side elements that are less influential when supply is inherently constrained.

Considering this analysis, the primary and secondary drivers within each of the 3 categories are classified below with the key drivers identified in purple.

Figure 4-5: Driver categories colour coded relative to significance



5. SUMMARY AND RECOMMENDATIONS FOR ESTABLISHING SUPPLY BENCHMARKS

The regulatory, commercial and operating environment in which FCNSW produce and supply high quality sawlogs is complex. This review has highlighted that;

- Overall supply was generally aligned to WSA allocations historically, and across the regions HQ supply aligns with WSA allocations
- Other drivers played a role including the commercial viability of individual mills, while weather events and specific regulatory constraints can also influence supply. However, it is noted that these lesser influences tend to be of a finite duration
- The volume specified in wood supply contracts is informed by resource modelling and set by government land use and industry policies
- Resource modelling is dependent on net harvest area (function of land use and various assumptions regarding access and conservation area protection), growing stock and yield, and other modelling assumptions and goals
- The resource is highly constrained for HQ sawlogs and therefore supply during the review period was not generally influenced by demand factors.

Monitoring of future wood supply must consider changes to the resource model (objectives, goals, constraints, and assumptions) to account for changes in regulation, industry and land use policy, better information or a change to the process for determining harvestable area.

GLOSSARY

CIFOA	Coastal Integrated Forestry Operations Approval
Force Majeure	A right to suspend contractual supply obligations
FRAMES	FCNSW modelling system - Forest Resource and Management Evaluation System
Growing stock	The measure of standing timber volume at a point in time by log grade
HQ	High quality sawlogs
HQL	High quality sawlogs – large (generally > than 35cm in diameter at the small end of the log)
HQS	High quality sawlogs – small (generally < than 35cm in diameter at the small end of the log)
LQ	Low Quality sawlogs
NRC	Natural Resources Commission
PPG	Piles, poles aand girders
Region	Geographic area in this report equivalent to the previous IFOA regions
RFA	Regional Forest Agreement
Silviculture	The practice of establishing or regenerating forests, and managing the forest through thinning, pruning, and harvesting to meet specific objectives
Supply zone	Geographic area in this report equivalent to FCNSW Price Zone
Utilisation	The manner and degree to which an area of forest is harvested and the trees made into commercial log products
WSA	Wood Supply Agreement

APPENDIX 1: SUPPLY DRIVER ANALYSIS

The following table provides the rating system applied to clarify the important drivers of supply as detailed in Section 4.5.

How significant are each of these drivers to wood supply?

Category	Duration	NC	SC	Tumut	Eden	Total
A. Resource availability		3.4	3.4	3.3	3.5	3.4
A1. Area of forest available for timber production	Long	4.5	4.5	4.5	4.5	4.5
Land use policy	Long	5.0	5.0	5.0	5.0	5.0
Area related modelling assumptions – slope, buffers, mapping precision	Long	4.0	4.0	4.0	4.0	4.0
A2. Productivity of forest and species mix	Long	2.3	2.3	2.3	2.3	2.3
Growth assumptions	Long	3.0	3.0	3.0	3.0	3.0
Inventory	Long	2.0	2.0	2.0	2.0	2.0
Site productivity	Long	2.0	2.0	2.0	2.0	2.0
A3. Environmental constraints	Long	3.5	3.5	4.0	3.5	3.6
Treatment of threatened species	Long	4.0	4.0	5.0	4.0	4.1
Other regulation	Long	3.0	3.0	3.0	3.0	3.0
A4. Industry and regional policy	Long	4.3	4.3	3.3	4.5	4.2
Industry policy	Long	4.5	4.5	4.5	4.5	4.5
Regional development	Long	4.0	4.0	2.0	4.5	3.8
A5. Silviculture (policy, retained BA, age and size constraints, tree selection)	Long	2.0	2.0	2.0	2.0	2.0
A6. Modelling constraints (e.g. non-declining yield)	Long	4.0	4.0	4.0	4.0	4.0
Management objectives	Long	4.0	4.0	4.0	4.0	4.0
B. Market forces		2.0	2.3	2.7	2.8	2.2
B1. Wood supply agreements	Long	4.0	4.0	4.3	3.7	4.0
Industry policy	Long	5.0	5.0	5.0	5.0	5.0
Market competition	Medium	4.0	4.0	3.0	3.0	3.8
Commercial business environment	Medium	3.0	3.0	5.0	3.0	3.2
B2. Demand for timber products	Medium	1.0	1.7	2.3	2.7	1.5
Processing facilities	Medium	1.0	3.0	3.0	3.0	1.9
Market preference / substitution	Medium	1.0	1.0	2.0	3.0	1.3
Macro-economic factors	Medium	1.0	1.0	2.0	2.0	1.2
B3. Industry Economic factors	Medium	1.0	1.3	1.3	2.0	1.2
Delivered log cost	Medium	1.0	1.0	1.0	1.0	1.0
Log size / quality	Medium	1.0	2.0	2.0	4.0	1.7
Processing costs	Medium	1.0	1.0	1.0	1.0	1.0
C. Supply Chain Characteristics		2.2	1.6	1.5	1.6	1.9
C1. Harvesting systems	Short	2.3	1.8	1.8	1.5	2.0
Terrain and equipment constraints	Medium	2.0	2.0	2.0	2.0	2.0
Weather	Short	4.0	2.0	2.0	2.0	3.1
Log product utilisation and servicing	Short	1.0	1.0	1.0	1.0	1.0
Silviculture and total yield	Medium	2.0	2.0	2.0	1.0	1.9
C2. Haulage systems and delivery points	Medium	2.3	1.7	1.7	1.7	2.0
Forest access and infrastructure	Medium	3.0	2.0	2.0	2.0	2.6
Logistical complexity	Medium	2.0	1.0	1.0	1.0	1.6
Transport equipment	Medium	2.0	2.0	2.0	2.0	2.0
C3. Wood products processing and distribution	Medium	2.0	1.5	1.0	1.5	1.7
Processing efficiency (scale and technology)	Medium	3.0	2.0	1.0	2.0	2.4
Warehousing and distribution systems	Medium	1.0	1.0	1.0	1.0	1.0

Key

Least significant → Most Significant

APPENDIX 2: KEY SPECIES AND SPECIES GROUPINGS

The definition of ***wood supply*** incorporates reference to key species and species groupings. Lists of key species and species groupings relevant to this method are set out below. The species groups are reflected in the charts and tables of this report.

Table A2.1: Species and groupings in South Coast region

#	Species or grouping	Species in groupings
1	Spotted gum	Spotted gum (*Corymbia maculata*)
2	Blackbutt	Blackbutt (*Eucalyptus pilularis*)
3	Other hardwoods	Includes blackbutt (*E. pilularis*), bluegum (*E. saligna*) and the ironbark (e.g. *E. fibrosa* and *E. crebra*) and stringybark species groups (e.g. *E. laveopinea* and *E. cameronii),* which typically make up remaining minor components

Table A2.2: Species and groupings in Eden region

#	Species or grouping	Species in groupings
1	Silvertop ash	Silvertop ash (*E. sieberi*)
2	Brown barrel	Brown barrel (*E. fastigata*)
3	Blackbutt	Blackbutt (*E. pilularis*)
4	Other hardwoods	Includes stringybark/gum forest types (e.g. *E. muellerana* and *E. cypellocarpa* amongst others) in the coastal and foothills forests, which typically make up remaining minor components

Table A2.3 - Species and groupings in Tumut sub-region

#	Species or grouping	Species in groupings
1	Alpine ash	Alpine ash (*E. delegatensis*)
2	Other hardwoods	Includes Mountain Gum (*E. cypellocarpa*), Narrow Leaved Peppermint (*E. radiata*) and various other commercial and non-commercial species)

Table A2.4: Species and groupings in North Coast region

#	Species or grouping	Species in groupings
1	Blackbutt	Blackbutt (*E. pilularis*)
2	Spotted gum	Spotted gum (*C. maculata*)
3	Big 3 Hardwoods	Blue gum (*E. saligna*), tallowwood (*E. microcorys*) and brush box (*Lophostemon confertus*)
4	New England Hardwoods	High quality log species that occur in association in tablelands forests across northern NSW, including New England blackbutt (*E. campanulata*), messmate (*E. obliqua*), ribbon gum (*E. nobilis*), brown barrel (*E. fastigata*), peppermints (e.g. *E. radiata* and *E. dives*) and various stringybark species (e.g. *E. laveopinea* and *E. cameronii*).
5	Other Hardwoods	All other species not covered in the previous groups

APPENDIX 3: LOG PRODUCTS AND GROUPS

The following table sets out the attribution of the log products within the FCNSW sales system. The ModelGrp attribute is reflected in the charts and tables within this report.

Product_LU		
Product (as per FCNSW sales system)	Prod_Group	ModelGrp
Girders	PPG	HQL
Piles	PPG*	HQL
Poles Grade 1	PPG*	HQL
Veneer Grade 1	Veneer*	HQL
Large Sawlog	Sawlog	HQL
Veneer Grade 2	Veneer*	HQL
Poles Grade 2	PPG*	HQL
Industrial Grade	Salvage	LQ
Small Sawlog	Sawlog	HQS
Salvage Grade 3	Salvage	LQ
Salvage Grade 2	Salvage	LQ
Veneer Grade 4	Veneer	HQL
Miscellaneous Grade 1	Other	LQ
Salvage Grade 1	Salvage	LQ
Industrial Grade	Salvage	LQ
Miscellaneous Grade 3	Other	LQ
Pulp Grade 2	Pulp	Pulp
Firewood	Other	Pulp
Salvage Grade 4	Salvage	LQ
Pulp Grade 1	Pulp	Pulp
Pulp Grade 4	Pulp	Pulp

*FCNSW have advised that piles and poles may comprise a small component of LQ grade. Veneer may also include a proportion of HQS, particularly with the introduction of new technology. For the purposes of simplifying the dataset, these grades have been assumed to be in the HQ category. The net impact is likely to be less than 6000m^3 overall.

APPENDIX 4: DATA SOURCES

Workshop discussion	FCNSW and NRC (29/3/2022)
Personal communication	T.Parkes (FCNSW) – FRAMES modelling history
	M.Grealy (FCNSW) – sales contracts history

Data Group	Data filename
ABARES	afwps_tabular_datasets_2020_v1.0.0 (2).xlsx
	Australia's_State_of_the_Forests_Report_2003_v1.0.0.pdf
	Australia's_State_of_the_Forests_Report_2008_v1.0.0.pdf
ABS	CP_ABS Alt_Add data_Jun-21.xlsx
BOM data	Rainfall_Bucca.xlsx
FCNSW ancillary	Datawarehouse Customer Location Summary - 2 Mar 2022.docx
	Major Customer - Historical WSA Summary - Hardwood and Cypress - Feb 2022.xlsx
FRAMES description	2012 FRAMES-Net-Harvest-Area-Modifiers.pdf
	NC Area summaries by cpt as at Nov2007.xls
	NC_2018_RFA_Model_Final.xlsx
	NC_9_Julyl2018_RFA_CapacityAnalysis_10RetainedTrees_incl_Residue.rsps
GTIS	CP_NSW HW trade data by Port and TMS price indices.xlsx
	CP_NSW HW trade data by Port and TMS price indices_v2.xlsx
Resource report	Eden Resource Presentation_June2016_small.pdf
	Eden Strategic Post-Fire modelling Summary 2020a.docx
	EdenRegrowth_2020c_PostFire_24thJune_FinalScenario_20200630_1902 (1).xlsx
	ErdleReview-SustainableYieldEsimateReport-June-2021.pdf
	Forest-Res-FRAMES-Eden-0009_Woodstock Design for SE NSW FINAL.pdf
	Forest-Res-FRAMES-Eden-0015_2011_area_v3.xlsx
	Forest-Res-FRAMES-Eden-0018_Eden Timber Supply Review2011_industry.pptx
	Forest-Res-FRAMES-Eden-0020_EMA_Strategic_v6.zip
	Forest-Res-FRAMES-Eden-0021_Eden Presentation_final_3_11_2015.pptx
	Forest-Res-FRAMES-NC-0034_WS2004_Final.doc
	Forest-Res-FRAMES-NC-0091_NORTH COAST WOOD SUPPLY HISTORY asat MAY 2014.xlsx
	Forest-Res-FRAMES-NC-0094_2015 Constraints.xlsx
	Forest-Res-FRAMES-NC-0102_2015_Area_Reports.xlsx
	Forest-Res-FRAMES-NC-0105_Base case for IFOA Sensitivity Analysis-ms-20150116.pdf
	Forest-Res-FRAMES-NC-2007-0003_FRAMES_Yield_Simulator_CMZ_NER.doc
	Forest-Res-FRAMES-NC-2007-0004_North Coast FRAMES - 2008 Update.ppt
	Forest-Res-FRAMES-NC-2007-0009_NCTSS 2009_Industry 040609c.ppt
	Forest-Res-FRAMES-NC-2007-0012_NC2009_archive.zip
	Forest-Res-FRAMES-Sth-0017_NFSI_SC_v9a.zip
	Forest-Res-FRAMES-Sth-0036_South Coast Timber Supply 2009 Final.ppt
	Forest-Res-FRAMES-Sth-0038_Southern RFA Tumba Review.pptx
	Forest-Res-FRAMES-Sth-0041_Yield estimates report-South Coast-final-20111123.docx

Data Group	Data filename
	Forest-Res-FRAMES-Sth-0042_Tumbarumba Timber Supply 2010_2.ppt
	Forest-Res-FRAMES-Sth-0043_Yield estimates report-Tumbarumba-final-20111123.docx
	Forest-Res-FRAMES-Sth-0046_Yield estimates report-Eden-20120530-FixedFinal.docx
	Forest-Res-FRAMES-Sth-0047_Tu2011_5.zip
	Forest-Res-FRAMES-Sth-0054_SC_2015_Basecase_Re-explore_SmootherOutcome_20Delays.rsps
	Forest-Res-FRAMES-Sth-0055_SC_2015_RerunWith20Delays_SmoothedFutureHQ.xlsx
	Independent Review Post Fire Resources Eden FINAL.pdf
	Independent Review Post Fire Resources North Coast 2021 Final.pdf
	Independent Review Post Fire Resources South Coast 2021 Final.pdf
	North Coast RFA Final Charts.xlsx
	NorthCoast Strategic Post-Fire modelling Summary 2020_FinalDraft_to_CB_17thDec.pdf
	NRC_2016_IncorporatingTEC Maps_Final.xlsx
	NRC_2016_IncorporatingTECMaps_v9.rsps
	nsw_ed_projects.pdf
	nsw_sthn_ns19es.pdf
	SC_2020_6_FireImpact_FinalScenario_20200625_0630 (1).xlsx
	SC_Resource_Review_2017_v3.pptx
	SOFR_2018_web.pdf
	sofr2013-web2.pdf
	South Coast RFA Charts_20180823.xlsx
	SouthCoast Strategic Post-Fire modelling Summary 2020a.docx
	TEC_NHA_Impact_Breakdown.xlsx
	Über_Database_v3a_06_09_2012.xlsm
RFA	sustainable-yield-in-NSW-RFA-regions.pdf
	Various reports, variations
Sales data	2010_NF.csv
	2011_NF.csv
	2012_NF.csv
	2013_NF.csv
	2014_NF.csv
	2015_NF.csv
	2016_NF.csv
	2017_NF.csv
	2018_NF.csv
	2019_NF.csv
	2020_NF.csv
	LOGS_2003.csv
	LOGS_2004.csv
	LOGS_2005.csv

Data Group	Data filename
	LOGS_2006.csv
	LOGS_2007.csv
	LOGS_2008.csv
	LOGS_2009.csv
Woodstock data	EdenRegrowth2016_v1a.rsps
	EdenRegrowth2016_v1a_RePublished.rsps
	EdenRegrowth2016_v1a_SmoothedYields_June2018.xlsx
	EdenRegrowth2020c._opt
	EdenRegrowth2020c._seq
	NC2020b_FireImpact_Scenario3_Improved_SZandGS_Control_20200715_1647 (1).xlsx
	NC2020b_RAFIT._opt
	NC2020b_RAFIT._seq
	NC2020b_RAFIT_FireImpact_Scenario3_Improved_SZandGS_controls.rsps
	RFA_SC_2017_1_VeryHeavySTS_0_30_EvenFlow_AllHQ.rsps
	SC_2020_6_Max_HQ.rsps

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