An Analysis of the "Upstream Portion" of the New Zealand Forest Industry Supply Chain as Seen Through a Health and Safety Lens

A report prepared for Worksafe NZ

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Executive Summary

Forestry, and particularly forest harvesting, is an occupation involving high hazards and risks that need to be consistently, carefully and robustly managed. Typically, the focus of enforcement has been at the coalface – on the worksites of forest harvesting crews and the actions of individuals in the crew and the immediate crew management.

The Health and Safety at Work Act 2015 places obligations "upstream" of the harvesting crew i.e. on parties who, through their actions and inactions, contribute directly or indirectly to poor health and safety outcomes. The two key responsibilities for those parties upstream of the harvesting crew in this regard fall under the general headings "Higher Order Controls" and "Safety by Design".

The supply chain in the New Zealand forestry industry has become longer and more complex in the last 30 years as forest ownership has broadened considerably. Although there are a number of traditional forestry companies involved, the many new players, include a number of overseas pension and other investment fund managers who although they often have little or no prior exposure to commercial production forestry, are well-motivated to ensure compliance with legislation. Also, the forest managers employed by these parties are generally significant forestry companies with substantial in-house expertise.

New players also include New Zealand investors and farmers – many of whom are driven by a desire to maximise what is a one-off return on their investment. Māori are also relatively new players as forest owners – particularly as Crown Forest Licences are surrendered and re-negotiated; and in some instances iwi-owned entities are taking on forest management directly.

Financial drivers continue to hugely influence the behaviour of forest owners. This in turn can place pressure on forest management companies and harvesting contractors right down the supply chain.

There are two key issues facing the entire industry, both of which place pressure on the functioning of the supply chain:

- The (ongoing) "boom-bust" nature of an industry exposed to a very large degree on demand for logs coming out of Asia and the consequent prices received by New Zealand forest owners. Although market demand is critical, other factors such as shipping cost and exchange rate can also lead to and exacerbate sudden and precipitous price falls.

- The changing level of harvest in New Zealand and future predictions of harvest are also important. At present, the New Zealand annual harvest is continuing what has been a trend over the past decade of year-on-year increases in harvest volume thanks to a surge of new forest plantings in the 1990s. During much of that time log prices have been favourable. This has placed pressure on harvesting contractors at a time when it has been difficult to attract and retain a high-performing workforce. This rise in annual harvest is forecast to peak in 2025, following which there will be a significant (35%) decrease in annual harvest volume over the period 2026 to 2035. This will have a major impact on the size of the industry and there is an almost inevitable risk that competition for declining work will lead to pressure on harvesting contractors.

Pressures on harvesting contractors are eased when those contractors are contracted by large forest owners with ongoing harvest (who own around two thirds of the planted forest) although there are still many areas where the quality of contractual arrangements can be improved to provide better balance in the relationship. This part of the sector is well-known and forest owners and managers are easily found, along with the harvesting operations they oversee. The real pressure is and will be on those contractors whose work is concentrated on the harvest of single/limited age-class forest

(estimated as around a third of the annual harvest) where owners are very focused on the export log market and spot log price; as well as on reducing costs when this can be achieved. These operations are more likely to have poorer quality contractual arrangements leaving harvesting contractors exposed when the market turns and are, almost inevitably, harder for Worksafe as the regulator to find and track.

Other key areas of the upstream portion of the supply chain where the actions of forest owners and managers impact on health and safety performance are:

- **Contracts (between the forest owner/manager and the harvesting contractor)**

These need to be of sufficient duration to allow a harvesting contractor to maintain a viable business and need to reflect what should be more of a "strategic partnership" arrangement rather than a simple contract for services.

- **Rate Setting (determining the log and load price paid to harvesting contractors)**

This process needs to ensure all costs are counted, production estimates are reasonable and there are review provisions in contractual arrangements.

- **Mechanisation**

Widespread (but not 100%) mechanisation of the two most hazardous operations in forestry (tree felling and breaking out) has had a significant impact on health and safety performance but there remains work to do, particularly around cable harvesting. Forest owner/managers are able to influence this directly, as they are also able to do when they specify the harvesting system and configuration of machines needed for a job. In addition to posing financial risks for harvesting contractors when longer terms contracts are not made available or when production is curtailed, mechanisation comes with some "minuses" that need to be managed including an aging workforce and the need to ensure that manual tree felling experience remains available even in mechanised felling operations.

- **Harvest Planning and Particularly, the Provision of Within Forest Access**

Whilst many second and subsequent rotation forests are well-served with existing access, the same cannot be said of many of the single age class forests currently being harvested. In these cases, the forest owner/manager is in the key position of specifying the amount and standard of pre-harvest roading and skid/landing formation but can be motivated to save costs which can contribute directly to the across-the-board performance of the harvesting crew.

- **Production Restrictions**

These remain a periodic feature of the New Zealand industry, particularly in terms of operations with a high proportion of export log production. Operational management is needed to ensure that harvesting contractors are not exposed to the operational pressures of working around a high level of in-forest log stocks as well as the financial pressures of not being paid for logs produced but not loaded out.

- **Access to Professional Advice**

Larger forest owners/managers with ongoing operations are generally well-served in terms of harvest planning, rate setting and relationship (with logging contractors) management. Smaller forest owners with a one-off harvest may be tempted to skip professional advice in an attempt to save on costs.

- **Workforce Issues**

The forest industry has struggled – especially over the last decade – to attract new workers. More support from forest owner/managers in assisting with this, even indirectly in terms of recognising recruitment and retention as a legitimate cost for harvesting contractors, is important. Māori are increasingly in a position of requiring that crews and workers engaged for forestry operations on land they own, whakapapa to that land. This can create issues for forest owners/managers and harvesting contractors that mean consultation and management across the supply chain is a "must".

- **Travel Time**

Travel time and the impact of fatigue are frequently cited as an influencing factor in health and safety incidents. Allowances for travel time need to be built into contract rates and considered alongside production pressures that may be placed on a harvesting crew.

- **Environmental Certification**

Almost every large forest owner/manager in New Zealand has environmental certification that requires certain performance standards to be met. In addition to (the expected) environmental standards, certified forests have to measure up against a number of criteria involving worker/employee/contractor rights and health and safety. Certification involves annual audits and major five yearly reviews of performance against the standard and, once obtained, forest owners/managers are highly motivated to maintain certification.

1.0 Introduction and Context

This report comprises the first two tranches of a four-part series of reports/analyses commissioned by Worksafe NZ (Worksafe).

Worksafe is seeking analysis and advice that will assist them in their intervention strategy at a level in the supply chain "upstream" of the harvesting and other related contractors (forest engineering suppliers and trucking suppliers) working on forest sites where health and safety incidents commonly occur. Whilst there are elements in this report that apply to forest silvicultural work (planting, pruning and thinning of immature trees), the focus is largely on forest harvesting as the operations where most health and safety incidents and fatalities occur.

As reported in the final report of the 2014 Independent Forestry Safety Review[1], the diverse and variable structure of the industry has resulted in challenges for the industry's ability to:

- Understand the health and safety responsibilities of all those in the supply chain
- Ensure contractual arrangements recognise and support health and safety outcomes
- Manage the supply chain in a way that enables the forest block to be managed safely
- Ensure that the safety implications of the choice and design of a forest block are managed
- Plan and organise work so it can be carried out safely
- Ensure workers and their crew bosses have the skills to work safely
- Ensure that workers' employment terms and conditions support safe workplaces.

The Review also notes: The Royal Commission on the Pike River Coal Mining Tragedy[2] noted that "in any event, accidents are rarely the result of a single action, failure or factor, but rather a combination of personal-task related, environmental and organisational factors, some long standing".

[1] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf
[2] https://pikeriver.royalcommission.govt.nz/Final-Report

This was echoed by the Independent Taskforce on Workplace Health and Safety, which found that there "is no single critical factor behind New Zealand's poor workplace health and safety record"[3].

It is widely accepted that if the forestry industry is to turn around its poor record of health and safety incidents and fatalities, then good health and safety practice needs to extend across the supply chain.

A recent NBR column (5 November 2021) written by Fiona Ewing of the Forest Industry Safety Council noted, "traditionally in forestry much of the responsibility for health and safety has been shouldered by the crews contracted in to do the planting, tree maintenance and harvesting. 'Upstream duties' refers to the responsibilities of the forest owners and managers who engage the contractors". The Health and Safety at Work Act 2015 emphasised the importance of these upstream duties and recently WorkSafe prosecuted a forest manager, along with the contractor, over a worker's death[4].

'**Higher order controls**' refers to the expectation that businesses will adopt the most effective ways to protect workers from risks – not just the easiest or cheapest ones. '**Safety in design**' is the idea that work should be designed to be safe, rather than safety being a 'clip-on' added later. It often involves adopting 'higher order controls' and is about designing out risks and designing in safety.

Both concepts feature largely, directly and indirectly, in the analysis that follows.

The remaining two tranches of work (proposed for early 2022) will comprise:

- A "Deep Dive" identifying risk hot spots that will cover off the players and the regions where a particular focus is needed; as well as the recommended nature of that focus.
- An analysis of what "good" looks like in the forestry sector in terms of the requirement for parties with overlapping duties to consult, cooperate and coordinate activities.

The intent is that the above two tranches will directly inform Worksafe's inspection activities as well as Worksafe's engagement with FISC around specific tools to help forest owners and managers in particular, meet their obligations under the Health and Safety at Work Act 2015[5].

2.0 Tranche One and Two – Broad Description/Overview

The first part of this report describes in some detail the makeup of the New Zealand forestry sector supply chain (the participants, their operations, the types of forests, and the regions they operate in) in a way that will help inform Worksafe's "upstream" intervention strategies.

It identifies and describes (at a high level) the various players in the New Zealand forestry sector (i.e. the "supply chain"). This includes:

- Forest owners (offshore, onshore, "hands-on", "hands-off", corporate, farm forestry, stumpage purchasers, etc)
- Forest managers
- Contractors.

Additionally, this report describes (at a high level) the types of forests and regions and projected woodflows in a way that will assist in determining strategic issues and health and safety risk profiles.

[3] http://hstaskforce.govt.nz/
[4] https://www.gisborneherald.co.nz/frontpage-featured/20210720/asleep-at-the-wheel-2/
[5] https://www.legislation.govt.nz/act/public/2015/0070/latest/DLM5976660.html

This analysis also covers where and how other key (non-harvesting) suppliers – forestry engineering (road and landing construction) and trucking – fit in respect of health and safety risk management within the supply chain.

The second part of the report details, in a way that will help inform intervention strategies, the key drivers sitting within the forestry supply chain that influence health and safety outcomes. This covers off a number of topics including:

- Financial drivers
- The impact of log market fluctuations
- Knowledge/experience of the various players
- Contracting models
- The positive and negative impacts of mechanisation
- Workforce issues
- Cultural issues
- Geographical issues
- Environmental Certification of Forests.

Each section of this report finishes with a summary of key points.

A complete list of all these individual "key point" summaries can be found in Appendix 1 and those with the time for only a quick read of this report can focus on the Executive Summary and Appendix 1.

3.0 Key Data Sources

The report draws heavily on information prepared and maintained by the Ministry for Primary Industries and the New Zealand Forest Owners' Association.

Key data sources for this report are:

- Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY
  https://www.nzfoa.org.nz/resources/publications/facts-and-figures

- Ministry for Primary Industries Wood Availability Forecast – New Zealand 2021 to 2060
  https://www.mpi.govt.nz/dmsdocument/47671-Wood-Availability-Forecast-New-Zealand-2021-to-2060

A further key reference is the Final Report of the 2014 Independent Forestry Safety Review:
https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

All opinions in this report are the opinions of the author drawing on a career in the New Zealand forest industry that includes 23 years' experience as Operations Manager and then General Manager of Crown Forestry and which has seen the author in various industry governance roles[6].

[6] NZ Forest Owners Association Executive Council and the Forest Industry Safety Council

4.0 The Supply Chain

4.1 The Evolution of the Forestry Supply Chain

The supply chain in the commercial production forestry sector has evolved considerably over the past 50 years and it is useful to consider this evolution.

In the early 1970s the sector was dominated by the NZ Forest Service (a multi-faceted government department which also operated sawmills, had a part share in a pulp mill and also was involved in non-commercial (native) forest management. The NZ Forest Service owned about half the planted commercial forest area in New Zealand (then about one million hectares) with two vertically integrated[7] forestry companies, NZ Forest Products and Fletcher Challenge owning, between them, the majority of the balance of planted forest area.

This simple picture of forest ownership changed dramatically from the late 1980s due to:

- The Corporatisation and subsequent sale (of standing timber[8]) previously owned by the Crown
- Private sector restructuring (mergers/sales/acquisitions) – particularly in relation to the planted forest assets owned by NZ Forest Products/Elder Resources and Fletcher Challenge Corporation
- A log price "spike" driven by high demand for New Zealand log exports in the early 1990s[9] which, in conjunction with falling prices for farming commodities at the time, lead to substantial private sector investment in planted forest as a commercial investment on the part of farm foresters, smaller corporate entities and individual investors either directly or via syndicated forestry holdings.

The use of contractors to carry out actual forestry operations (from land preparation, planting, tending, harvesting and log cartage) was in train from the late 1970s – i.e. considerably pre-dates the forest ownership changes above. This use of an "outsourced model" for forestry operations was driven by a number of factors. Amongst the most important in relation to forestry harvesting and cartage operations were:

- A disinclination on the part of forest owners to also be owners of expensive (to own and maintain) capital forestry plant and equipment.
- A realisation that individual contractors specialising in harvesting etc were better placed to innovate and respond quickly in terms of new equipment and systems; and were more easily relocated between forestry blocks as areas/forests were harvested
- Better productivity from contractors as compared to wages crews. (This factor also applied to planting and tending operations where labour productivity is critical).
- A degree of militancy on the part of the key union at the time (the Timberworkers' Union).

The point here is to understand that the disaggregation between forest owners and harvesting contractors, in particular, is far from a new phenomenon. The model has been in place since the 1970s and whist undergoing periodic changes in terms of "how" the relationship is structured and operates, the fundamentals around independence between forest owner and contractor are unchanged as is the use of piece rate form of payment for services i.e. harvesting and log cartage contractors are almost always paid on the basis of tonnes of logs produced/carted.

[7] Owned both forests and processing plants.

[8] The sale of Crown Forestry Licences with the Crown, in the first instance, retaining ownership of the land.

[9] Called the Asian Price Spike, in 1993, on the back of large areas of (natural softwood) forests in the USA's Pacific Northwest forests being made unavailable for harvesting due to the need to protect spotted owl habitat, Asian countries competed very strongly for radiata pine logs from New Zealand driving up log prices considerably

There has only been one time in the last three decades that the author is aware of, where a forest owner has attempted to reintroduce company-owned and operated harvesting crews. The company involved was Juken NZ which made a strategic decision in the late 1990s to form in-house harvesting crews due to the difficulty in attracting contractors to the Tairawhiti region to provide harvesting services at prices that the company was willing to pay. Juken NZ persisted with this change to an in-house model for a few years before going back to the (conventional) out-sourced model. It is understood that the change back was due to cost (ownership and maintenance) as well as staffing issues; along with the presence of additional contract harvesting crews in the region which led to a "more competitive market" in respect of harvesting contractors.

And in November of 2021, another Tairawhiti forest owner (Aratu Forests) reported[10]:
"Yesterday Aratu Forests went back to the future and established an in-house Silviculture (primarily waste thinning) Crew.

For the last 30 years forestry companies have been outsourcing most of their activities to contractors resulting in a very transactional relationship. Aratu feels that there may be a range of benefits in revisiting this model in some areas of our business.

With this trial we hope to achieve positive outcomes for the workers, and our company and develop a model that is sustainable for the long term that will attract more young and talented people to the sector."

4.2 The Split Between Forest Ownership and Management

4.2.1 The Impact of the State Forests Sale

Over a period from the late 1980s to 1996, the Crown progressively sold off approximately 450,000 hectares of standing forest on the open market. The purchasers were a mix of New Zealand and overseas companies[11] including:

- Fletcher Challenge [NZ]
- Carter Holt Harvey [NZ]
- Juken Nissho [Japan]
- Wenita Forest Products [China]
- Rayonier [USA]
- Winstone Pulp International [Korea]
- Weyerhaeuser [USA].

Almost all of the above were forestry companies i.e. were already in the business of owning/managing forests and/or wood processing plants and were prepared – for the most part by "acquiring" the local (Forestry Corporation) management staff already in place – to directly[12] "manage" forestry operations in respect of planning and scheduling operations, managing log sales, and general forest management. This included employing and supervising the various forestry contractors actually performing forestry operations on the ground.

[10] https://www.linkedin.com/posts/aratuforestsltd_yesterday-aratu-forests-went-back-to-the-activity-6861062202137436160-Dlxp/
[11] For the purposes of brevity, legal names are not being used.
[12] i.e. in-house, rather than by out-sourcing.

So, in summary, whilst a substantial number of new players entered the sector over the late 1980s and early 1990s, the operating models from the late 1970s did not change significantly.

However, from the late 1990s there has been a vast amount of change which has seen the rise of a new "player" in the supply chain – the forest manager.

4.2.2 The Rise (and role) of Forest Managers

From the mid-1990s standing timber and harvesting rights (sometimes including forest land) were resold – particularly to offshore pension funds and fund management companies[13]. This opened the door for companies to specialise in forest management i.e. these companies generally do not own forests – in fact this is seen as an issue because it can lead to a perception of vested interest – but instead are employed on long-run contracts to plan and manage forestry operations on behalf of the forest owner. This includes making recommendations and, in some cases (but not all), strategic and tactical decisions around harvesting that influence operations including:

- Time of harvest
- Level of harvest (i.e. volume to be harvested)
- Planning (which extends to decisions around the method of harvest, roading pattern and density of roading etc)
- The process for setting prices for service providers (including harvesting and log cartage) – described later in this report
- The process for selecting contractors to carry out forestry operations for delivered log sales
- Day-to-day oversight and management of contractors – including making payment for services (re-imbursed by the forest owner who will also pay the forest manager management fees).
- Log or stumpage sales (which can be negotiated or tendered) and log/stumpage sale management.

Forest management companies can be very large and part of multi-national corporate entities, responsible for hundreds of thousands of hectares of forest and millions of cubic metres harvested (e.g. Hancock Forest Management NZ Ltd which manages Hancock Natural Resources Group) "*the world's largest global timberland investment manager for institutional investors, with USD 10.8 billion in global assets managed from investment locations in Australia, Canada, Chile, New Zealand and the United States*[14]"; or they can be one man band operations with a small number of non-institutional forestry clients and operating in a single region. There are a number of forest management companies in New Zealand that would fall into the category of Small (to) Medium Enterprises with 5-30 employees. Note that the most profitable work stream for forest management companies is in managing harvesting operations and log sales and there are probably only a handful of management contractors in New Zealand who focus purely on forest establishment and tending[15].

Some of the more important "pure" (i.e. non forest-owning) forest management companies currently operating in the New Zealand forestry sector in terms of volume harvested and ongoing harvesting operations are, in no particular order:

- PF Olsen (throughout New Zealand)

[13] From the mid-1990s there has been sustained interest from overseas pension funds and fund management companies in investing in the New Zealand forestry sector. This is due to "timberland" being recognised as a desirable component in an investment portfolio and New Zealand forests being seen as both a safe (stable politically) and profitable investment (because of New Zealand's direct exposure to international log markets). These investors generally purchase interests in mature or near mature forests.

[14] https://hancocknaturalresourcegroup.com/about/

[15] Although, with the advent of "carbon forestry", which has seen a recent rise in area planted, this situation is changing.

- NZ Forest Managers (Central North Island)
- Farman Turkington Forestry (Lower North Island)
- IFS Growth (throughout New Zealand)
- Forest Management Group (Canterbury/West Coast, Tasman/Marlborough, Hawkes Bay/Wairarapa)
- Forest 360 (across New Zealand)
- NZ Forestry (Whangarei, Taupō /King Country & New Plymouth)
- Laurie Forestry (Canterbury)
- Ngāti Porou Forests (East Coast)
- Southern Forests (Otago/Southland).

There are other forest management companies owned by forest owner companies that, as well as manage their forest owner clients' forests, also provide forest management services (commonly harvesting and marketing) for forests they do not own. The list below list includes the two largest forestry management companies in New Zealand:

- Hancock Forest Management NZ Ltd (Northland, Auckland, Waikato, Bay of Plenty, Manawatū / Wanganui) and Hawkes Bay) – forests owned by Taumata Plantations Ltd, Tiaki Plantations Company and OTPP NZ Forest Investments Ltd
- Timberlands Ltd (CNI) – owned by Kaingaroa Timberlands which is a partnership of investors - NZ Super Fund, Canada's Public Sector Pension Investment Board, Harvard University and Kakano Investment Limited Partnership
- Northland Forest Managers (Kerikeri) – owned by Greenheart Group (offshore institutional investors)

Note that, historically anyway, there has been a relatively low barrier to entry in terms of what is needed to be a forest manager. There is no mandatory registration[16] or industry body and nil specific legislation although this is shortly to change – to a degree - with new legislation – the Forests (Regulation of Log Traders and Forestry Advisers) Amendment Bill. This was introduced as part of Budget 2020 and will require forestry advisers, log traders and exporters to register and work to nationally agreed practice standards that (is designed to) strengthen the integrity of New Zealand's forestry supply chain. Under the proposed Regulation[17]:
Forestry advisers will need to demonstrate they have the relevant skills, experience, and qualifications to advise growers, and undertake training and professional development in their specialist areas.

Log trading entities will need to pass a fit and proper person test, operate in accordance with industry standards, and meet record keeping and reporting requirements.

The Bill also allows for an arbitration and compliance system to support accountability.

It needs to be said that the "low barrier to entry" mentioned above does not apply now except possibly to a relatively small number of "one man band" operators servicing a handful of farm forestry clients. Increasingly, the RMA[18] and other legislation along with the advent of managed funds entering the market via funds managers and forestry syndicates, has seen forestry investment become more "professional" so that careful and detailed management contractor selection

[16] Although the Institute of Forestry does operate a "Registered Professional" scheme. https://www.nzif.org.nz/find-a-registered-professional/
[17] https://www.beehive.govt.nz/release/new-registration-system-forestry-advisers-and-log-traders
[18] Resource Management Act (1991)

processes are the norm. This includes a large degree of due diligence of forest managers on the part of the forest owner and associated reference checking.

As will be discussed later, non-commercial factors feature highly in these selection processes with health and safety (scrutiny of in-house processes and records) right at the top of the list.

4.2.3 Māori as Forest and Forest Land Owners

During the SOE sale process in the late 1980s the commercial forestry assets of the former NZ Forest Service having been placed into an SOE (Forestry Corporation) were progressively sold. Māori interests lobbied the government of the time and successfully ensured that all of the asset sales of forest excluded the land. Māori interests argued that the land needed to be set aside for settlement of various Treaty of Waitangi claims. The eventual outcome was that all of the 450,000 hectares of Crown Forest on Crown Land eventually came under claim from at least one interested party and since the late 1980s almost all of the claims have now been heard and settled with land returned to claimants.

The outcome of this is that Māori, through post settlement governance entities (PSGEs) have become very, very significant owners of forest land and, in some cases have gone (and are going) to the next step and are now becoming forest owners. In some cases, Māori have also taken over (directly) as the forest manager. Ngāi Tahu with their West Coast estate of 32,000 hectares is a good example.

However, at time of writing many PSGEs have long term agreements (leases or, more commonly forestry rights[19]) in place with other parties that provide for the other party, in return for rent, to establish, manage and harvest the standing forest. Many of these rights are being phased out over time so that as the standing forest is harvested, it is not uncommon for the PSGEs to either renew the arrangement under new terms or (progressively, as areas are harvested) to become forest owners in their own right.

In addition to Māori land owners becoming (part) forest owners overnight and having to come to grips quickly with an industry that is more complex than many imagine, this process can create a complex mosaic of land ownership and forest ownership and forest management over the same forest land parcel.

A good example of this can be found in Tairawhiti where the current forest owner of forest on former Crown land (previously Ernslaw One Ltd, but now Summit Forests New Zealand Limited) is handing back land within the Ruatoria Forest post-harvest with the iwi PSGE (Te Runanganui o Ngāti Porou) taking back the land and replanting.

In this case, just to demonstrate how complex the situation is currently:

- All of the land underneath Ruatoria Forest is owned by **Te Runanganui o Ngāti Porou**.
- The mature forest stands are owned by **Summit Forests New Zealand Ltd**.
- As mature stands are harvested, the bare land is returned to **Te Runanganui o Ngāti Porou**.
- Harvesting operations (but which will make use of the total forest roading network) are underway on forest owned by **Summit Forests New Zealand Ltd** (which directly manages the harvesting operations).

[19] Forestry rights established under the Forestry Rights Registration Act (1983) provide for legal separation of the ownership of the land and any tree crop growing on it. They typically convey a smaller "bundle of rights" on the tree owner than would be the case under a conventional lease.

- Replanting and silviculture operations[20] which are also happening within the forest apply to (currently) bare land or immature forest owned by **Te Runanganui o Ngāti Porou**. And these operations, and the forest management (again, making use of the entire forest roading network) are managed for **Te Runanganui o Ngāti Porou** by forest management company **Ngāti Porou Forests Ltd**. The latter company is a legally separate entity (but connected) to Te Runanganui o Ngāti Porou.

The two largest Māori forest owners currently in respect of annual harvest are Ngāi Tahu (Ngāi Tahu Forestry which is part of Ngāi Tahu Farming) with substantial operations on the West Coast; and Lake Taupō Forest Trust with substantial operations at Taupō /Tūrangi. Ngāi Tahu has their own forest management infrastructure whilst Lake Taupō Forest Trust is in the process of acquiring the presently privately owned management company, New Zealand Forest Managers Ltd.

4.2.4 Forest Sales, Mergers and Acquisitions

One of the features of the many pension/managed investment funds which presently account for a large proportion of forest ownership in New Zealand is that periodically, many seek to exit their investments (individually) to realise gain on their investment prior to reinvesting - sometimes in the same sector but often in different sectors. This leads to a degree of ongoing "churn" in respect of forest ownership and, in the event that the forest management company is directly linked with the fund, at times also with forest management.

As one example, in 2018, Sinotrans, the owner of Mosgiel-based Wenita Forests (a major forest owner in the Otago region) sold a stake of the business to Australian-based fund manager New Forests. And in October 2021, Sinotrans sold its remaining stake to two European-based pension funds, neither of whom have had prior involvement in the New Zealand forestry sector. However, the Wenita Forests staff have been retained by the new owners.

This also highlights that in many cases, there can be multiple institutional investors involved in the same forest. Another good example of this is Kaingaroa Forest where the current forest owners comprise NZ Super, Canada's Public Sector Pension Investment Board, Harvard University and Kakano Investment Limited Partnership (an iwi entity).

Some current forest owners are looking to exit from the business. A good example is Crown Forestry where long-term leases involving Māori-owned land have been and are being renegotiated to shorten the lease terms and provide for the owners to take over forest ownership.

4.2.5 Forest Growers Representation

The Forest Owners Association (FOA) and the NZ Farm Forestry Association (FFA) are the prime industry representatives in the plantation forest growing sector[21].

The FOA represents the owners of New Zealand's commercial plantation forests. It was set up in 1926. Its members own or manage around two-thirds of the country's plantation forests and are responsible for over two thirds of the annual harvest.

The NZFFA was formed in 1957. Membership is spread over 27 branches throughout New Zealand, and there are six special interest groups. NZFFA estimate their members own or manage up to 100,000 hectares of forest, and influence the management of a similar area. These forests consist of

[20] Pruning and thinning (i.e. "tending" of the young crop). Typically, operations span the first 8-10 years of the crop.

[21] https://www.nzfoa.org.nz/about

radiata pine, cypress, eucalypt, redwood, blackwood, other exotic species and managed indigenous forests.

The Forest Grower Levy Trust (FGLT) is the body responsible for collecting and administering a harvested wood products levy from forest growers which provides for collective funding of "industry good" projects. The FGLT via the FOA and the FFA manages the allocation of levy funds to industry good projects. This includes forest research, health and safety (through around 50% funding of the Forest Industry Safety Council), training and careers and forest biosecurity.

Joint committees between FOA and FFA provide opportunities for industry representation and input into the industry good work programme.

In addition to the NZFOA and FFA, in some regions there are "Wood Councils" where the forest owners/managers – generally of the "corporate" forest estates can come together with other forestry interests (log transport, wood processing) to promote the sector and work on regional sector issues. The Southern Wood Council (one of the first to be set up in 2001) states the following objectives[22]:

- *To promote, encourage and coordinate the sustainable economic development of the forest products industry in Otago and Southland.*
- *To promote cooperation within and between established national and regional forest industry bodies, local authorities and other relevant groups.*
- *To provide an independent body to bring together and improve communication between persons and groups involved with the business of forest products in the region to work collectively on issues of common interest.*
- *To promote and support regional forestry initiatives and assist in implementing national initiatives.*
- *To actively promote the benefits of forestry and related industries to the community.*

Other regions with active Wood Councils include Northland ,Tairawhiti (Eastland), Central North Island, Southern North Island and Marlborough.

These entities generally focus on regional training awards but, as can be seen from the objectives above, are ideally placed to have a regional level input into health and safety "common good" initiatives.

4.3 Stumpage Purchasers

This term refers to entities that purchase standing forest (i.e. "on stump"). Although this often comprises entities that are primarily focused on delivering logs to ports for and on behalf of export log customers, there are plenty of examples where the stumpage purchasers may be:

- A New Zealand domestic processing plant
- Another forest owner seeking to secure additional logs for their own markets. Often this occurs when there is close geographic proximity to the purchaser's own forest estate.

If it is another forest owner purchasing the stumpage, unless the block is very remote from their existing base, there is likely to be existing management capacity to manage harvesting operations – including employing and overseeing harvesting and trucking contractors. And some or all of that contractor capacity may come from the forest owner's existing operation.

[22] https://www.southernwoodcouncil.co.nz/

If it is either of the other cases (export log purchaser or domestic processing plant), then the entity involved will almost always make use of a management contractor.

Stumpage contracts are generally one of two types:

- A block sale, where a lump sum (often split timing-wise) is paid for the right to harvest all the merchantable trees or;
- A pay-as-cut sale where the purchaser pays for loads as they leave the forest via either a single aggregated price per cubic metre; or a price for each grade of logs.

Note that traditionally in New Zealand, it has been very, very easy to become a stumpage purchaser. In past years the industry has been full of tales (for the most part true) of individuals who have "some contacts" (code for "log wholesalers") offshore and who, with the help of a local harvesting contractor, source and find farm woodlots for sale; and who are ill-equipped to handle a log price decrease or sometimes lack the skills to manage the operation (and the relationships). These parties often come unstuck, either producing logs that don't meet the relevant specifications or ending up in financial distress; and in the process, can leave the harvesting contractor and the woodlot owner out of pocket.

Generally, every time there is a substantial price decrease, the number of individuals operating as sole (log) traders, decreases also.

4.4 Log Trading Entities

For the sake of completeness, it is worth describing this (downstream from the harvesting contractor) part of the supply chain.

There are two key large log trading entities in New Zealand who have as their clients, key large forest owners/managers for whom they export logs. One also provides an outlet (at wharf gate) for export logs from other forest managers/owners. Both companies consolidate client volumes to maximise efficiencies and minimise costs across port operations, shipping programmes and marketing where having a large, sustained volume helps to provide leverage in the market.

Pacific Forest Products Group (PFP)[23]

This is an employee-owned company with established offices in Auckland, Tauranga and Gisborne in New Zealand, along with Portland in Australia. Export operations are concentrated in the North Island and the company operates continuously from the North Island ports of Marsden Point, Tauranga, Gisborne and Napier. In the South Island operations are predominantly from Port Chalmers and Timaru, but the company also operates periodically from other New Zealand ports. The Group also has been operating out of Australia since January 2014. PFP will take direct ownership of wood at the wharf gate by purchasing logs.

TPT Forests (TPT)[24]

TPT was founded in 1997 and ship, market and sell logs for clients in New Zealand. Clients include many large forest managers and companies. In addition to a New Zealand head office, TPT has offices in Korea and China. TPT does not take ownership of logs, rather it acts as an agent for a fee.

[23] https://www.pfpltd.co.nz/
[24] https://www.tptforests.com/about/

4.5 Contractors

As noted earlier, the contracting (i.e. outsourcing to separate providers) of harvesting and log cartage operations has a long history in the New Zealand forestry sector. This also applies to forestry silvicultural operations.

Historically, harvesting contract crews were set up by individuals with direct experience in harvesting. As well as creating a legal entity and owning (generally leasing in the first instance) all of the plant and equipment, these individuals typically worked in the crew and were on-site managers. Crew members were employed under IECs[25] of one form or another. Most crews in the early (non-mechanised) days of the 1970s and 1980s employed between 7-15 people depending on the operation. This number has dropped significantly with the introduction of more mechanisation (excavators with felling heads replacing manual fellers; grapple skidders and haulers reducing the need for manual breaking out; harvester heads that measure log length and diameter and cross cut stems into logs replacing skid workers). Depending on the type of forest and terrain, it is now possible for a crew to operate fulltime with as few as three people – all operating out of the cabs of machines.

Whilst this "owner-operator" (owner of a single crew who is part of that crew) model is still a reasonably common arrangement within the industry, there are more and more examples of varying degrees of "corporatisation" (for want of a better word) where a contractor has multiple crews and a corporate structure to provide support. In some cases where a single contractor has multiple crews, this can extend to having in-house or dedicated (in some other way) operations and health & safety managers, crew foremen for each crew, mechanics and service staff, people to provide training and other support staff. This evolution is hardly surprising. Forest harvesting is a relatively big business in financial terms. A single crew commonly has several pieces of heavy plant, the most expensive of which can have a new value north of $750,000; several double-cab utes or similar for crew transport; various other "bits of kit" and will turn over around $40,000 plus per week. Multiply that by five or six crews and the financial outlay and management skills required to run the business become very obvious. Many contractors rely very heavily on their accountants to help them manage the financial side of the business.

At time of writing, there are no good estimates available of the number of harvesting crews (not harvesting contractors as a number of contractors have multiple crews). Figures anecdotally quoted range from 500 to more than 800.

Trucking is a little different. Whilst log cartage has some characteristics that make it different from other cartage work, it is not significantly different - apart from the need for drivers to be able to handle off-highway metal roads – such that many "general" cartage firms have logging trucks as part of their fleet and these "fleet" operators provide a good deal of the log cartage capacity throughout New Zealand. However, there is a large number of owner-operators who own a single or handful of trucks and who either sub-contract to fleet operators or contract directly with the forest owner/manager.

4.5.1 Forest Industry Contractors Association (FICA)

Forestry contractors are represented by the Forest Industry Contractors Association (FICA). In 2002 FICA was formed to give a common voice on relevant issues and to foster development and improvement in the New Zealand forestry contracting industry[26].

[25] Individual Employment Contracts
[26] https://www.fica.org.nz/

FICA currently has approximately 200 member companies made up mostly of logging contractors and a range of associate members. FICA is governed by a board of experienced contractors and a number of committees and provides industry information, feedback and ensures up to date communications. They run practical workshops, a national discount scheme, regional industry developments, and provide a national voice for the industry[27].

It is fair to say that FICA has struggled more than its "sister" industry organisations in the forest growing space (the FOA & FFA). In the FOA in particular, over its long history members have been able to agree on a programme of genuine common interest work and have "learnt" to leave the politics and issues around market competition (which can apply in a variety of situations but particularly to log sales) away from the FOA table. The forest harvesting industry is highly competitive and over time, many contractors have been (and still are) in the business of competing directly with each other for work and hence the notion of collective common good work can be perceived, by some contractors, as giving away competitive advantage.

4.6 Other Service Providers

There are a number of other parties that are involved in "work" (i.e. directly providing materials and services for harvesting contractors) who are frequently in forests and who visit the worksites of harvesting contractors. Key amongst these are:

- Service providers for equipment repair and servicing
- Fuel providers
- Drug and alcohol testing providers
- Training providers.

In addition to regular visits from forest owner/manager staff who are supervising operations, it is not uncommon for there to be several visits per week by parties not directly part of a crew to every contract harvesting site. Except for training providers, those involved mostly do not leave the skid/landing[28]. Occasionally, if a felling or extraction machine has broken down in the bush, a mechanic may need to move to the machine to effect repairs.

Apart from interactions with activity on the skid (i.e. with machines moving and stems/logs being moved), the major health and safety risks are in terms of driving on forest roads. This also applies to logging truck drivers.

4.7 "Usual"/Common Supply Chain Descriptions

As noted in the 2014 Independent Forestry Safety Review[29], the multiple layers in the forestry industry supply chain mean there are a range of contracting and sub-contracting arrangements, and in some cases a lack of direct contracting arrangements (for example, between harvesting crews and log truck companies) which can all result in challenges for managing health and safety on any forest block.

Despite all this (as the Review Report states), "there are owners, managers, forestry contractors and crews who have consistently demonstrated the ability to work safely without serious injuries or fatalities on their forest blocks. The challenge is to transfer their culture and practice to other

[27] Ibid

[28] The skid site or landing is the cleared area where stems are accumulated, processed into logs and the logs placed into stacks which are then loaded onto log trucks for delivery to customers.

[29] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

operators in the industry. The health and safety challenges in the forestry industry are not insurmountable if good contracts and good relationships are established between parties across the supply chain. Other industries with complex supply chains have also demonstrated that it is possible to operate with lower rates of serious injuries and fatalities"[30].

Four of the more "common" (in respect of volume harvested) supply chains in the New Zealand forest industry are described diagrammatically overleaf. Note that this is not (cannot ever be) a complete list as there are multiple variations that can and do occur.

Note that:

- A number of the entities can be both owners of land + forest in some instances; and only owners of forests in other instances.
- Forest management companies often work for multiple forest and forest + land clients and often, for marketing purposes, will source logs from and manage log sales over a number of forests where they are present only for the purposes of managing the harvesting and marketing and not for other management services.
- It is not uncommon for silvicultural and other general forest management tasks to be carried out by a different management contractor than the party responsible for direct management and oversight of harvesting and marketing operations.
- It is not uncommon for there to be sub-contracts in place within harvesting crews. This often relates to the ownership and operation of specific pieces of equipment as well as manual falling. In the former example, it is sometimes a stepping stone to an individual building his/her own business; something broadly equivalent to a sharemilker earning his way into owning a farm.

Example 1

Single Land and Forest Owner – owns land and forest (with in-house forest management staff)
Example: Port Blakely Ltd

➔ Forestry Contractor (owns equipment and employs staff)

Example 2

Single Forest Owner – owns land and forest
e.g. funds manager, iwi entity, farmer
example: Lake Taupō Forest Trust

➔ Forest Manager *example: NZ Forest Managers Ltd* ➔ Forestry Contractor

Example 3

Multiple Land and Forest Owners
(e.g. iwi, farmer, investor)
example: Limited Partnerships set up under registered - Managed Investment Schemes like Forest Enterprises Ltd[31]

➔ Forest Manager example: *Forest Enterprises Ltd* ➔ Forestry Contractor

[30] Ibid

[31] In this case, Forest Enterprises also markets the forest investment opportunities to individual "retail" investors.

Example 4

Land Owner (e.g. iwi, investor land owner) *example: CNI Iwi Holdings Ltd*	➔	Forest Owner *example: NZ Super, Canada's Public Sector Pension Investment Board, Harvard University, Kakano Investment Limited Partnership (iwi entity)*	➔	Forest Manager example: *Timberlands Limited*	➔	Forestry Contractor

4.8 Summary of Key Points

1. There have been major changes over time in New Zealand forest ownership and the current picture is vastly more complex and variable than was the case in the early 1980s with the rise of institutional investors and out-sourced forest management in particular being a constant theme.

2. Although there is a low barrier to entry in terms of being a forest manager, many of the larger companies have a 20 year plus history of offering these services in a competitive environment where quality of service features as a key component and, for corporate-owned[32] forests in particular, health and safety performance and records form a critical part of selection processes of management contractors and harvesting contractors.

3. Outsourcing forestry operations to independent contractors has been a long-standing (40+ years) practice and any wide-scale return to carrying out operations in-house is highly unlikely.

4. Many New Zealand commercial forests are now owned by off-shore entities (a mix forestry companies and funds managers). This ownership model sees a degree of churn in terms of ongoing sales and purchases.

5. Māori – mostly through Treaty of Waitangi settlements – are now major owners of forest lands in New Zealand and are increasingly seeking to become forest owners and, in some cases are taking on forest management as well. This can create a complex management situation with respect to the same parcel of land as areas are "surrendered" post-harvest, back to Māori owners.

6. Forest owners are represented through the NZ Forest Owners Association (FOA) – mostly for larger corporate forest owning entities; and the Farm Forestry Association which represents many farm foresters. Industry good funding is achieved via a levy of wood harvested and administered through the Forest Growers Levy Trust. This funding also underpins the Forest Industry Safety Council (FISC).

7. Wood Councils (regional entities that exist to promote and support forestry with a region) are a possible means of developing, promoting and co-ordinating regional level health and safety initiatives.

8. Harvest contracting models have evolved along with the capital investment and management skills needed to successfully run the businesses. However, many are still "owner operator" although "corporate" operations involving multiple crews are becoming more common. Harvesting contractors are represented by the Forest Industry Contractors Association.

[32] As contrasted with farm foresters whose prime business is farming and who are part-time participants in the forestry sector.

9. Whilst there are a number of other parties that directly interact with harvesting contractors at their place of work, for the most part these parties do not leave the skid/landing and the major health and safety risks are around the use of forest roads. This applies also to logging truck drivers.

10. There are multiple operating models in terms of the supply chain. Some are more complex (involve more players) than others.

5.0 Broad Categories and Profiles of Forest Owners

5.1 Funds Managers

By area, this category of forest ownership[33] accounts for most of the total New Zealand planted forest estate. Many own land and forest but the general rule is that these funds prefer to target the ownership of forests[34]. The key funds managers by size of estate currently with New Zealand forestry investments are:

Hancock Timber Resource Group (HTRG)[35]

- HTRG is the world's largest global timberland investment manager for institutional investors, with USD 10.8 billion in global assets managed from investment locations in Australia, Canada, Chile, New Zealand and the United States and it and its sister company Hancock Agricultural Investment Group (HAIG) offer farmland and timberland portfolios through several investment structures to institutional investors, including public and private pension funds, foundations and endowments, high net-worth individuals, and Taft-Hartley plans[36]. HTRG is a wholly owned subsidiary of Manulife Financial Corporation.
- In New Zealand the institutional Investors are represented by Taumata Plantations Ltd, Tiaki Plantations Company and OTPP NZ Forest Investments Ltd.
- Hancock Forest Management NZ Ltd[37] (HFM NZ) is the management company and manages approximately 235,000 hectares in Northland, Auckland, Waikato, Bay of Plenty, Manawatū - Wanganui and Hawkes Bay regions.

Kaingaroa Timberlands[38]

- Kaingaroa Timberlands is jointly owned by NZ Super, Canada's Public Sector Pension Investment Board, Harvard University and Kakano Investment Limited Partnership.
- Timberlands Ltd is the management company and manages 190,000 ha of plantable land which is now growing its third crop of trees.

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[33] Note that because some funds managers not only own the forests but own/100%-control the forest manager that is responsible for day-to-day management, there will be a degree of overlap between this section and the one that covers off forest managers.

[34] This is particularly the case in New Zealand where the Overseas Investment Act places restrictions on land sales.

[35] https://hancocknaturalresourcegroup.com/about/ and https://hfm.nz/

[36] Collectively bargained pension plans maintained by more than one employer, usually within the same or related industries, and a labor union (USA).

[37] At time of writing Hancock Forest Management NZ is changing its name to Manulife Investment Management Forest Management Ltd NZ (MFM NZ), or Manulife. The change represents a visual transition to align with their parent company Manulife Investment Management (MFM).

[38] https://www.kaingaroatimberlands.co.nz/kaingaroa_forest

- The majority of the forest is planted on land leased from local iwi as (ultimately) represented by CNI Holdings Ltd.

OneFortyOne (owned by the Campbell Group)[39]

- The Campbell Group, LLC is a full-service timberland investment advisory firm founded in 1981, to acquire and manage timberland for investors. Their stated focus is "exclusively on creating acquisition opportunities and managing them to produce superior risk-adjusted returns".
- The Campbell Group manages over 2,350,000 acres representing over $4 billion in timberland assets and is one of the largest timber investment managers in the world.
- OneFortyOne was formed in 2012 following the acquisition of a 105-year lease of 80,000 hectares of plantation assets from the South Australian Government. Later in 2018, following other Australian investments, OneFortyOne acquired Nelson Forests Limited and Kaituna Mill in New Zealand.
- New Zealand forests cover around 80,000 hectares and are in their fourth rotation.

New Forests[40]

- Founded in 2005, New Forests is an Australian-based company that offers institutional investors targeted investment opportunities in the Asia-Pacific region and the United States and has more than AUD 7.7 billion in assets under management globally. Assets include sustainable timber plantations, rural land, and conservation investments related to ecosystem restoration and protection.
- Key New Zealand assets include Wenita Forests in Otago (New Forests is the majority owner in a partnership of three investors – 30,000 hectares); and Aratu Forests (formerly Hikurangi Forest Farms - 27,000 hectares) on the East Coast.

Global Forest Partners LP (GFP)[41]

- GFP has managed timberland investments for institutional investors for over 30 years. Founded in 1982 as Resource Investments, Inc., the company raised its first pool of capital in 1985. The company was acquired by UBS in 1995 and operated as UBS Timber Investors. In 2003 there was a management buyout by UBS with the company renamed Global Forest Partners LP.
- The company has been investing in New Zealand since 1992 and now has 33,500 hectares of forest spread over Waikato the Central North Island and the Bay of Plenty. Management is out-sourced to forest management company NZ Forest Managers Ltd.

5.1.1 The Way Institutional Investors Treat Compliance

As can be seen from the above, institutional investors, as represented by their funds managers, constitute a very large proportion of the forest ownership in New Zealand. These are often very large pension funds, in some cases private sector – such as Harvard University. And other cases such as the Ontario Teachers' Pension Plan (OTPP) or the NZ Super Fund, are public or governmental funds. The funds managers are careful about the investments they are making and have well-developed, careful and robust process to ensure investments not just perform financially, but also meet a far wider set of objectives. These (objectives) are always publicly prominent and easily found.

To use the OTPP as an example (key parts of the text are highlighted):

[39] https://www.milieuzaken.org/CampbellGroup.php and https://onefortyone.com/about-us/our-history/
[40] https://newforests.com.au/#aboutTarget and https://www.wenita.co.nz/ and https://aratuforests.co.nz/about/about-aratu/
[41] https://www.gfplp.com/our-experience

Ontario Teachers' Pension Plan Responsible Investing Guidelines[42]
*Ontario Teachers' **considers environmental, social and governance (ESG) factors when making investment decision**s. ESG factors may impact the financial return and risk profile of an investment, as well as Ontario Teachers' **brand and reputation**.*
Ontario Teachers' believes that integrating and managing ESG considerations throughout the investment process supports the creation of long-term, sustainable growth and helps achieve higher risk-adjusted returns to help pay pensions.

ESG factors are business risks as well as opportunities that can materially impact the value of an investment…….
*Social factors arise from the relationship between a company and its employees, consumers, suppliers and communities**. Social factors include, but are not limited to: labour rights, health and safety, diversity and inclusion, and product safety**……*
*Ontario Teachers' believes that good governance is good business and is a key lever in creating long-term sustainable value and reducing risk. Furthermore, **good governance is fundamental to the effective oversight and management of environmental and social factors**.*

In simple terms, this means that the funds managers care intensely (because they can impact on financial return and risk profile of an investment and brand and reputation) about a range of factors outside of pure commercial return. Almost at the top of the list are labour rights and health and safety.

A recent job advertisement[43] from a funds manager with forestry interests in New Zealand for a Manager, Operations/Investment Analytics based in New Zealand, highlights the degree of scrutiny that funds managers place on wider (than financial) outcomes including ensuring compliance with legal obligations. Included in the job responsibilities are:

- *Ensuring overall performance of the Assets, including financial, environment, social and governance outcomes.*
- *Ensuring Asset level compliance with Fund constituent documents, internal policies and legal obligations in collaboration with internal and external company staff.*

The thought that a fund might be associated with an operation that is "dodgy", is unfathomable and that a funds manager might find themselves named as a forest owner where compliance is poor in terms of community, worker or environmental issues is a real motivation to ensure this risk is well managed. The presence of "corporate" reporting and governance including the use of internal and external audit is a relative strength in terms of keeping "forest managers on their toes".

Arguably, the presence of eagle-eyed representatives of funds managers in the supply chain provides another set of (independent) eyes to help ensure that problems are surfaced and management processes (from contractor pre-qualification, through day-to-day management and reporting) are robust.

5.2 Forestry Companies That Own Forest and Manage Forests Directly

Examples and the key regions where these companies operate) are:

- **Rayonier New Zealand Ltd[44] (also known as Rayonier Matariki Forests)**

[42] https://www.otpp.com/documents/10179/1077156/Responsible+Investing+Guidelines/a5c68da4-6664-4c87-97fe-2a08f40d66fc
[43] https://fridayoffcuts.com/dsp_ads.cfm?type=Jobs#18
[44] https://www.matarikiforests.co.nz/

- Owns a mix of forest on land owned by the company as well as land owned by other parties. The parent company is based in the USA (long-standing).
- Owns and manages 120,000 hectares (forests located throughout New Zealand, Northland to Southland).
- Entered New Zealand as part of the State Forests sale process in the early 1990s.

- **Ernslaw One**[45]
  - Owns a mix of forest on land owned by them as well as land owned by other parties. The company is part of the Oregon Group owned by the Malaysian based Tiong family headed by Tan Sri Datuk Sir Tiong Hiew King. The New Zealand-based Oregon Group manages a diverse range of businesses across New Zealand.
  - Owns wood processing plants.
  - Owns and manages in-house 110,000 hectares (forests located in a number of regions, including the Coromandel, Gisborne, Ruapehu and Manawatū/Rangitikei regions, Otago and Southland).
  - Entered New Zealand as part of the State Forests sale process in the early 1990s.

- **Tasman Pine Forests**[46]
  - Tasman Pine Forests Limited (TPFL), is a subsidiary of Sumitomo Forestry NZ Limited with a forest estate of some 36,200 ha of exotic plantations in the top of New Zealand's South Island. The majority (97%) of the planted forest area is established in radiata pine, with the balance in Douglas Fir and some small areas of other exotic species including eucalyptus.
  - The estate is managed in-house.

- **Summit Forests NZ Limited**[47] **(Northland/East Coast)**
  - Summit Forests New Zealand Limited (Summit Forests) is a New Zealand registered subsidiary company of Sumitomo Corporation Japan. In March 2013 Summit purchased the former Juken New Zealand Limited Forest Estate (36,000 hectares) within Northland. All local staff and contracts transferred across to the new company. In 2021 the company purchased Whangapoua (Coromandel) and Ruatoria (East Coast) forests with a combined area of 15,100 productive hectares from Ernslaw One Ltd[48]. All management is in-house.
  - Note that Sumitomo Corporation (which is a completely different entity to Sumitomo Forestry – the owner of Tasman Pine Forests) has had long involvement in trading in New Zealand radiata pine logs.

- **Pan Pac Forest Products**[49]
  - Now 100% owned by Oji Paper Company, Pan Pac was initially established as an international joint venture between Carter Consolidated (holding 60%) and two Japanese partners (holding 40%). During the 1990s Carter Holt Harvey sold their share and Pan Pac became wholly Japanese owned, with 87% held by Oji Paper Company and 13% by Nippon Paper Industries Company Ltd.
  - Owns and manages 35,000 hectares of forest on a mix of freehold and other land.
  - Forests and processing plants (sawmill and pulp mill) are in Hawkes Bay.

[45] https://www.ernslaw.co.nz/company-structure/
[46] https://www.tasmanpine.co.nz/about
[47] https://www.summitforests.co.nz/
[48] https://www.fridayoffcuts.com/#6
[49] https://www.panpac.co.nz/ and https://en.wikipedia.org/wiki/Pan_Pac_Forest_Products_Ltd

- **Juken New Zealand**[50]
  - Originally Juken Nissho Ltd, the company was formed for the 1990 purchase of Crown Forestry Licences in Northland, the Wairarapa and the East Coast. It operates processing plants at Kaitaia, Masterton and Gisborne.
  - Owns and manages 32,000 hectares of predominantly radiata pine plantation forest, across two North Island regional locations – Wairarapa and East Coast - on a mix of freehold and other land.
  - Entered New Zealand as part of the State Forests sale process in the early 1990s.

- **Crown Forestry (MPI)**[51]
  - Crown Forestry is part of the Ministry for Primary Industries and it was originally established to manage 20 Crown forestry leases of Māori land that were excluded from the Crown's asset sales process over the late 1980s and early 1990s. Over time many of the leases have been surrendered – most progressively with forest handed back to the various Māori Trusts and Incorporations that own the land.
  - Over 2018 to 2020 new commercial forestry rights have been agreed with a variety of landowners as part of the Crown's One Billion Trees Programme.
  - Crown Forestry has forests across New Zealand but almost all of the area (29,000 hectares) is in the North Island (Northland, Bay of Plenty, Central North Island and Wairarapa).
  - The Crown Forestry team is based in Wellington, Rotorua, Wairarapa and Northland. Staff carry out strategic, business, and financial planning, and modelling and auditing of the forestry assets with the day-to-day operational management of most of the forest estate outsourced to various forest management companies.

- **Port Blakely Ltd**[52]
  - Port Blakely Ltd, NZ Forestry, is a division of Port Blakely a Seattle-based company that has been in the forestry and timber processing business since the mid-1800s.
  - The company came to New Zealand in 1993, purchasing forest and forest land.
  - Owns and manages 29,000 hectares of forest – most of it on freehold land in the South Island (South Canterbury and North Otago) - with other areas in the North Island.

- **Lake Taupō Forest Trust**[53]
  - One of the original 20 Crown leases of Māori Land, the Trust now owns and operates this second rotation forest and is in the process of purchasing the management company NZ Forest Managers Ltd which manage this and a number of other forests in the Central North Island/Taupō region for a variety of other clients.
  - The Trust-owned land (33,000 hectares) at Lake Taupō Forest which is the major forest block comprises 68 Māori land blocks and 15 blocks owned freehold by the Trust. Of this area, 24,207 hectares (71 per cent) are planted in forest.
  - Total planted forest area is 27,000 hectares - most on land owned by the Trust.

- **Ngāi Tahu Forestry**[54]
  - Ngāi Tahu Forestry is part of Ngāi Tahu Farming (ultimately owned by Te Rūnanga o Ngāi Tahu the PSGE) which manages more than 100,000 ha of farm and forestry land in the South Island.

[50] https://www.jnl.co.nz/about-us/ and https://en.wikipedia.org/wiki/Juken_New_Zealand
[51] https://www.mpi.govt.nz/forestry/about-te-uru-rakau/crown-forestry/
[52] https://portblakely.com/port-blakely/our-story
[53] https://www.ltft.co.nz/land-forest/
[54] https://ngaitahu.iwi.nz/te-runanga-o-ngai-tahu/ngai-tahu-governance/ and https://ngaitahufarming.co.nz/

- All of the forestry estate (26,000 hectares) is located on the West Coast and the forest has been managed in-house since 2013 when the Crown sold its interest in the forest crop back to the iwi.

- **City Forests**[55]
  - In 1990 City Forests was formed from the Dunedin City Council Forestry Department and operated independently as a subsidiary of Dunedin City Holdings Limited (a Local Authority Trading Enterprise). Council plantings commenced in 1906.
  - All of the forestry estate (24,000 hectares mostly of freehold land) is located in Otago and is managed in-house.

- **China Forestry Group NZ**[56]
  - The New Zealand operation is a subsidiary of China National Forest Products Corporation, itself a subsidiary of the ultimate parent company China Forestry Group Corporation. China Forestry Group is the biggest forestry company in China, established directly under the State Forestry Administration in 1996.
  - China Forestry Group New Zealand owns a total of 24 forests across New Zealand (spread from Northland to the Central North Island), amounting to 22,000 hectares of plantation on around 29,000 hectares of land around half of which is freehold, with management outsourced to various management contract companies.

- **Southland Plantation Forest Company of New Zealand Limited (SPFL)**
  - SPFL was established in 1992 to develop an export hardwood chip/fibre resource in southern New Zealand. The company's shareholders are Japanese companies Oji Holdings Corporation and Itochu Pulp and Paper Corporation.
  - The SPFL estate is comprised of 42 individual forests totalling approximately 10,670 hectares which are located within Southland/Otago and mostly (99%) comprise short-rotation eucalyptus; the remaining crop is made up of mixed conifers.
  - Related company Southwood Export Limited (SWEL) manages the forests with all the harvest chipped at the company's Awarua plant with the chips exported through the Port of Bluff.
  - The land is mostly owned by SPFL but some properties are under lease or joint venture agreement. Prior to planting, the majority of properties were farmland, with minor areas of exotic plantation cutover.

5.2.1. Key Features of this Group

Key features of this group are:

a. With the exception of Ngāi Tahu, Lake Taupō Forest Trust, Crown Forestry and City Forests (ultimately owned by the Dunedin City Council ratepayers), all of the above have their financial origins offshore. A number (Rayonier NZ, Ernslaw One, Pan Pac and Juken NZ) have been operating the majority of their forest estate subsequent to the sale of forestry assets by the Crown in the late 1980s and early 1990s and, of the newcomers (Summit and Tasman) have long links with the New Zealand forestry sector.
b. A number have their own processing plants which take wood from their forests.
c. Estates are largely built on long-standing forest assets which in almost all cases are well into second rotations (crops) or at the very end of the first rotation. Some are even older. This is a critical point because:
   - By this time all forest infrastructure (roads and other engineering assets) is in place and experience has been gained from harvesting the initial crop.

[55] https://www.cityforests.co.nz/about/history
[56] https://www.cfgcnz.co.nz/our-story/

- Most of the estates are, by now, "normal" estates which means that they are at or transitioning to a steady state in terms of harvest. A "normal" forest is one where the area harvested annually broadly equates to the area replanted. For long-term forestry businesses, a steady harvest can be important because it enables long-term log supply arrangements with customers as well as long-term arrangements with key service providers such as harvesting contractors which can benefit both parties immensely.

d. All of the above companies, because of their "normal" forest profile, have learnt, over time, the dangers of being 100% exposed to fickle log export markets (see later in the report) and have, in every case, developed relationships with domestic log processors and have formal or de-facto long term supply agreements in place with domestic log customers.
e. Across all companies there is a cadre of staff who (collectively) have enormous experience. However, this does not necessarily mean good health and safety management is a given as was demonstrated in the September 2018 fatality involving forest owner/manager Ernslaw One and harvesting contractor Pakiri Logging where Ernslaw One failed to act on earlier audit reports which had highlighted poor performance[57]. Additionally, there are anecdotal reports in some regions of high turnover of staff with specific health and safety responsibilities.
f. Only two (Crown Forestry and China Forestry Group NZ) have out-sourced day-to-day forest management. However, both of the above do have in-house staff who carry out strategic, business, and financial planning, and modelling and auditing of the forestry assets and direct the day-to-day management.
g. All are actively involved in industry good programmes – including FISC.
h. With the exception of Crown Forestry and China Forestry Group, the supply chain, in comparison to some of the other examples, is relatively uncomplicated.
i. Members of the Forest Owners Association, are "encouraged" to implement a drug and alcohol testing policy[58] for operations under their control. In practice, this means pre-employment testing, random testing; reasonable cause testing; and post-incident testing. Note that this testing regime extends to forest management staff.
j. The forest owning/managing companies described above account for approximately 1.1M hectares of the New Zealand estimated total estate of 1.66M hectares of planted forest[59].

5.3 Forest Managers who manage on behalf of Institutional Investors (some of the more significant in terms of estate size and harvest volume)

- **Timberlands Limited**
  - As noted earlier, Timberlands Ltd manages forests on behalf of Kaingaroa Timberlands, a partnership of forest owner investors: NZ Super, Canada's Public Sector Pension Investment Board, Harvard University and Kakano Investment Limited Partnership (an iwi entity).
  - CNI Iwi Holdings Ltd is the land owner subsequent to the Treaty of Waitangi Settlement.
  - Comprises Kaingaroa Forest, spanning 190,000 ha of plantable land.

- **Hancock Forest Management (NZ) Ltd (HFM)[60]**
  - HFM manages forests on behalf of Hancock Natural Resource Group's clients.

[57] https://www.gisborneherald.co.nz/local-news/20210720/asleep-at-the-wheel/
[58] https://www.nzfoa.org.nz/resources/file-libraries-resources/codes-of-practice/drugs-alcohol/560-code-of-practise-eliminating-alochol-and-other-drugs-from-the-workplace-2015/file
[59] https://www.mpi.govt.nz/forestry/new-zealand-forests-forest-industry/forestry/new-zealands-forests-statistics/ estimates New Zealand's net stocked planted production forest covered an estimated 1.66 million hectares as at 1 April 2020.
[60] Shortly to become Management Forest Management Ltd NZ (MFM NZ), or Manulife.

- The company currently manages approximately 235,000 hectares of plantation forests on behalf of three clients—Taumata Plantations Ltd, Tiaki Plantations Company and OTPP NZ Forest Investments Ltd.
- Forests are located in Northland, Auckland, Waikato, Bay of Plenty, Horizons (Manawatū - Wanganui) and Hawkes Bay regions[61].

- **Wenita**
  - Wenita is a private New Zealand-registered and operated company owned by Taieri Forests Ltd, which has three shareholders: New Forests (ANZFF2), Stichting Pensioenfonds ABP (APG) and Pension Protection Fund (PPF) Investment Holdings 1 Limited.
  - Wenita manages a forest area of 30,000 hectares with three main forests in Otago-Mt Allan, Berwick and Otago Coast-mainly growing radiata pine[62]. Note that in this case the three shareholders also are the land owners.

5.4 Forest Owners Who Use Multiple Management Contractors

This is an unusual category but it is worth stating that both Crown Forestry and China Forestry Group NZ, each of which manages around 30,000 hectares of forest, use a variety of management contract companies to manage operations. In part this is due to the forests being located across a spread of regions and a desire to have locally-based management contractors who can build and maintain a relationship with landowners.

5.5 Forest Managers who Manage Operations on Behalf of Multiple Forest Owners

Main players in this category as noted earlier include:

- PF Olsen (throughout New Zealand – manage more than 100,000 ha)
- NZ Forest Managers (Central North Island)
- Farman Turkington Forestry (Lower North Island)
- IFS Growth
- Northland Forest Managers Ltd (Northland)
- Forest Management Group (Canterbury/West Coast, Tasman/Marlborough, Hawkes Bay/Wairarapa)
- Forest 360 (across New Zealand)
- NZ Forestry (Whangarei, Taupō /King Country & New Plymouth)
- Laurie Forestry (Canterbury)
- Southern Forests (Otago/Southland).

However, there are smaller operators which manage single or only a handful of harvesting crews. For the most part, these companies specialise in woodlot harvesting on farms and smaller (forestry investment) blocks. They are less likely to have specialist staff on hand to cover specific areas of operations (e.g. harvest planning, health and safety, environmental). Instead, the staff will be "generalists" who will cover everything off. Often, harvesting crews who are tied to a smaller operator are completely reliant on the management contractor to "find" blocks to harvest. Sometimes the owner of the harvesting crew will assist in this process in what can be described as a symbiotic relationship.

[61] https://hfm.nz/about-us/
[62] https://www.wenita.co.nz/about-us/

Generally, there will be a very close relationship between both parties as each is absolutely dependent on the other.

5.6 Forestry Management Companies Managing Forestry Syndicates

In the 1990s there was a wave of planting (forests are now being harvested) under various models[63] with the common feature that all were based on attracting New Zealand domestic investors who, bundled together, became owners in a commercial forestry development. Syndicated investment gave individual investors who didn't own land the opportunity to participate in a forest growing investment.

There were/are many of these syndicates set up around New Zealand but two stand out in terms of scale with each having a total area forested equivalent to a medium-sized forest owner:

- **Forest Enterprises[64]**
  - The company was established in 1972 in Masterton, New Zealand with the aim to maximise returns to their investors by prudently managing their radiata pine forest and their investment.
  - Investors' forests are located in the Wairarapa, Gisborne and Hawkes Bay regions and currently total 31,000 hectares.
  - The company manages operations in-house with offices in Masterton and Gisborne.

- **Roger Dickie (NZ) Ltd[65]**
  - Formed in 1971, the company has established over 93 forests and farms for investors and present has 29,000 hectares of forests, a number of which are currently being harvested.
  - Since 1990 Roger Dickie (NZ) Ltd has deliberately concentrated their activities in the northern Hawke's Bay, Wairoa and Gisborne regions.
  - Forests are (effectively) managed in-house by related management company FMNZ.

5.7 Farm Forestry and Private (non-syndicated) forestry investors

There is not good information on this part of the sector which is dominated by farmers who have planted forests on their farms, as well as the occasional (sole or joint) investor who may have entered into a forestry right with a landowner.

However, by a process of subtraction, a figure of about 0.5M hectares spread across New Zealand is a reasonable estimate. Note that this will includes areas that will never be harvested, including forest planted recently purely for carbon sequestration purposes (permanent forest).

As noted earlier in the description of the industry there is a Farm Forestry Association which "represents" a portion of these forest owners although, for the most part, the Association is more about information sharing although the log levy and associated "industry good" work programme is seeing a greater degree of "formal" involvement in the sector than existed in the past. The NZFFA was formed in 1957. Membership is spread over 25 branches throughout New Zealand, and there are eight special interest groups. They estimate members own or manage up to 100,000 hectares of forest, and influence the management of a similar area. These forests consist of a mix of species

[63] Some involving land purchase and ownership, others just based on forest ownership. And in some cases investors took a share of the forestry project whilst in others, individual forest holdings were delineated.
[64] https://www.forestenterprises.co.nz/
[65] https://www.rogerdickie.co.nz and https://fmnz.co.nz/

radiata pine; cypress; eucalypt; redwood; blackwood; other exotic species and managed indigenous forests[66].

5.8 Summary of Key Points

1. The commercial forestry (owning) sector in New Zealand is hugely varied from very large international funds where the New Zealand investment represents a small but important portion of their total investment; to long-standing forestry companies – many with their origins offshore; to syndicated investments and individual farm foresters.

2. Estates owned by the very large investment funds and forestry companies are generally large in size and are now mostly into second and subsequent rotations (i.e. have infrastructure in place).

3. The rise of investment funds and syndicated investments has led to the rise of specialist forest management companies thus adding another party in the supply chain.

4. The larger forest owners/managers tend to have well-experienced forest management staff and the use of specialist health and safety managers is common.

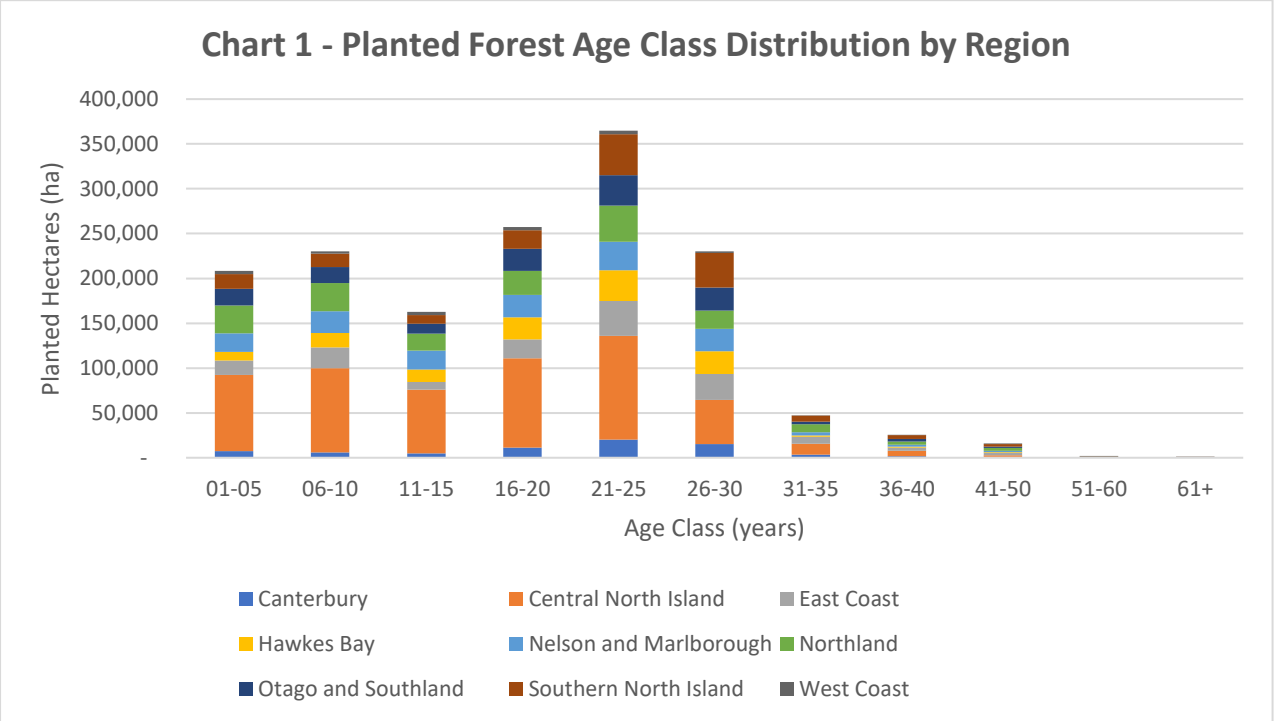
5. Forest growers are well represented in New Zealand and through the use of a levy on logs sold, collectively fund "industry good" projects that includes the Forest Industry Safety Council.

6. There is not good information on the large number of smaller forest owners which includes farmers both and investors and most are not linked into industry organisations.

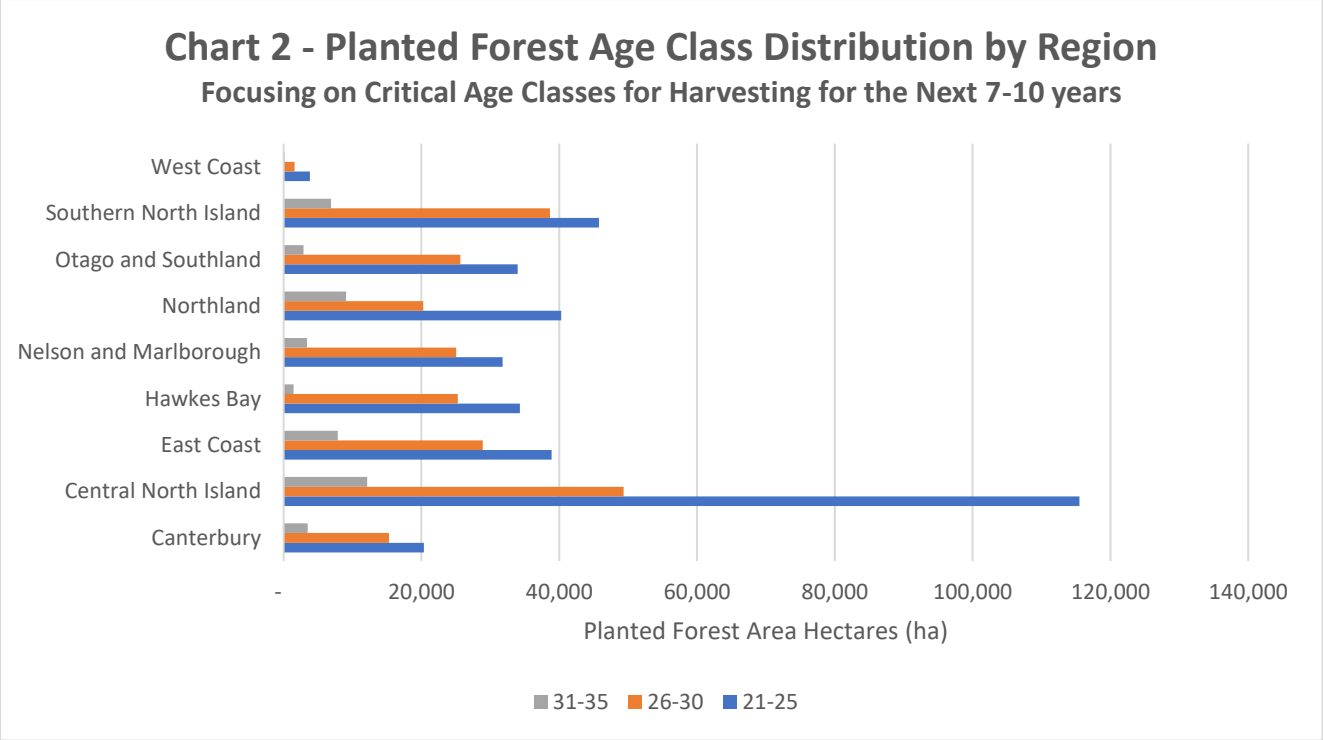
[66] https://www.nzffa.org.nz/

6.0 Where are the Forests Located and Who Owns Them?

6.1 Planted Forest Age Class Distribution by Region



Source: Ministry for Primary Industries 2021
https://www.canopy.govt.nz/forestry-data-research/age-class-distribution/



Source: Ministry for Primary Industries 2021
https://www.canopy.govt.nz/forestry-data-research/age-class-distribution/

Charts 1 and 2 show the planted forest distribution by age class and by region across New Zealand. Whilst this is not a forecast of harvest volume (which will be in the next section), the data is a useful high-level proxy to sense-check the wood availability forecasts.

The key age class for harvesting radiata pine in New Zealand is in the 25-30 year age class with 29.3 being the average age of the radiata pine harvest over the last five years[67]. Although some forests are harvested at an earlier age, reasonable wood quality parameters (density and stiffness) tend to be below par at anything much less than 27 years for much of New Zealand except Northland. Early felling can also compromise the log sale value in pruned log stands with small diameter logs compromising the recovery of (high value) clearwood from the pruned log component of the harvest.

What can be seen is that in the age range 21-35[68] years, which is the key age range for harvesting radiata pine in New Zealand, the key regions making up more than 50% of the total age class area are the Central North Island, the Southern North Island and the East Coast.

	Table 1 - % of Total NZ Age Class Area			
Age Class	**Central North Island**	**Southern North Island**	**East Coast**	**TOTAL (of the 3 regions)**
21-25	32%	13%	11%	55%
26-30	21%	17%	13%	51%
31-35	26%	15%	17%	57%

Other regions that figure prominently in the planted area in the key (26-30) age class are Hawkes Bay, Otago/Southland Nelson/Marlborough – all about 11% of the total area for the age class; and Northland on 9%.

For the most part, this "order of importance – area-wise" as outlined in Chart 1 will continue to play out for the next 25-30 years as the forests that will be harvested over this period are already planted.

6.2 Summary of Key Points

1. In the age range 21-35 years, which is the age range for harvesting radiata pine in New Zealand, the key regions for commercial planted forest, collectively making up more than 50% of the total age class area, are the Central North Island, the Southern North Island and the East Coast.

2. Other regions that figure prominently in the planted area in the key (26-30) age class are Hawkes Bay, Otago/Southland Nelson/Marlborough – all about 11% of the total area for the age class; and Northland on 9%.

3. This "order of importance – area-wise" will continue to play out for the next 25-30 years as the forests that will be harvested over this period are already planted.

[67] Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY https://www.nzfoa.org.nz/resources/publications/facts-and-figures

[68] Note that the 30+ years age class data will include areas of species apart from radiata pine that typically have a much longer growing cycle. Radiata pine accounts for approximately 87% of the planted forest area in New Zealand.

7.0 Wood Availability Forecasts

This section looks at the forecast /estimated future harvest[69] on both an across-New Zealand basis; and by region.

The base data is drawn from the Ministry for Primary Industries (MPI) with the report compiled by consultancy company Margules Groome for MPI. As with all forecasts it is based on a number of key assumptions. It is not necessary for the purposes of this report to dig down into the detail of these forecasts except to note that the forecasts use "stated harvesting intentions (by key individual players) for up to 20 years" and then model the period beyond this using an approach called a "non-declining yield[70]". Scenario Three data (four scenarios are provided in the MPI data) is the scenario chosen for the purposes of this report. This scenario is "designed to keep the average rotation age close to the target rotation age while maintaining a more realistic flow of wood".

Note that:
A fundamental property of almost all regions within the New Zealand forest estate is the large area of forests established during the early 1990s, followed by very little new planting after that period. **The remaining forest area planted during the 1990s has now either been harvested or will be harvested in the next five to seven years. This is leading to record harvest levels in most regions[71]**.

Margules Groome (usefully) note in the report[72]:

a. These forecasts are intended as a planning tool for the forest industry, councils, and infrastructure and service providers.
b. The forecasts are supply-based but do incorporate harvesting intentions of the larger-scale owners for up to 20 years. In utilising these forecasts, users need to recognise that market conditions will be the ultimate determinant of harvesting levels at any point in time.
c. Forecasts have been produced separating large-scale forest owners (owning 3,000 ha or more) and small-scale owners. Generally, forecasts are less certain and resource description data less accurate for small-scale forest owners than for large-scale forest owners.
d. The peak in wood availability in the next five years is largely driven by the small-scale owner forests which are geographically dispersed. These blocks are likely to be more expensive to harvest than the existing large contiguous forests that have both scale and existing roading and other infrastructure already in place.
e. Forests that realise lower delivered log costs are likely to be harvested in preference to forests which are more expensive to harvest.
f. Some forests may not be harvested. For instance, forests on steep terrain, distant from processing plants/ports, small in size, or without existing roads may be uneconomic to harvest if logging and transport costs are higher than the market value of the forests' recoverable log volume.

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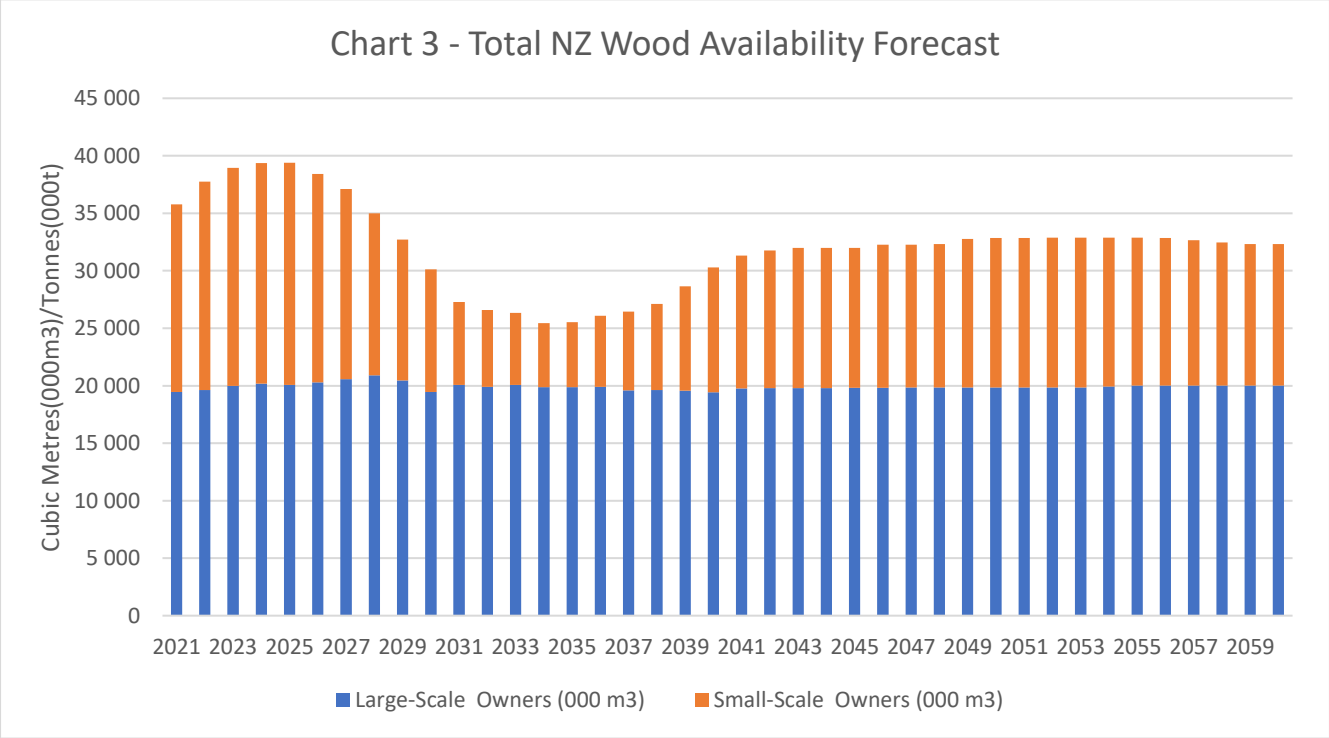
[69] Note that when estimating volume of harvest the unit used is cubic metres because this is the unit of measurement. When selling logs, tonnes is used as the measure as this is this tree/stem volume unit most easily captured for contractor payment and customer invoicing. The exception is for log exporting where a different unit of volume measurement (JASm^3) is used. Although the m^3 to tonnes varies, it is safe enough for high level management purposes to use a 1:1 conversion.

[70] When modelling for a non-declining yield, the intent is to ensure that where this is possible, the yield over time should not "decrease" unduly on a year to year basis; and when harvest volumes have to decrease because of reduced planting in the past, the decreases should be "smoothed".

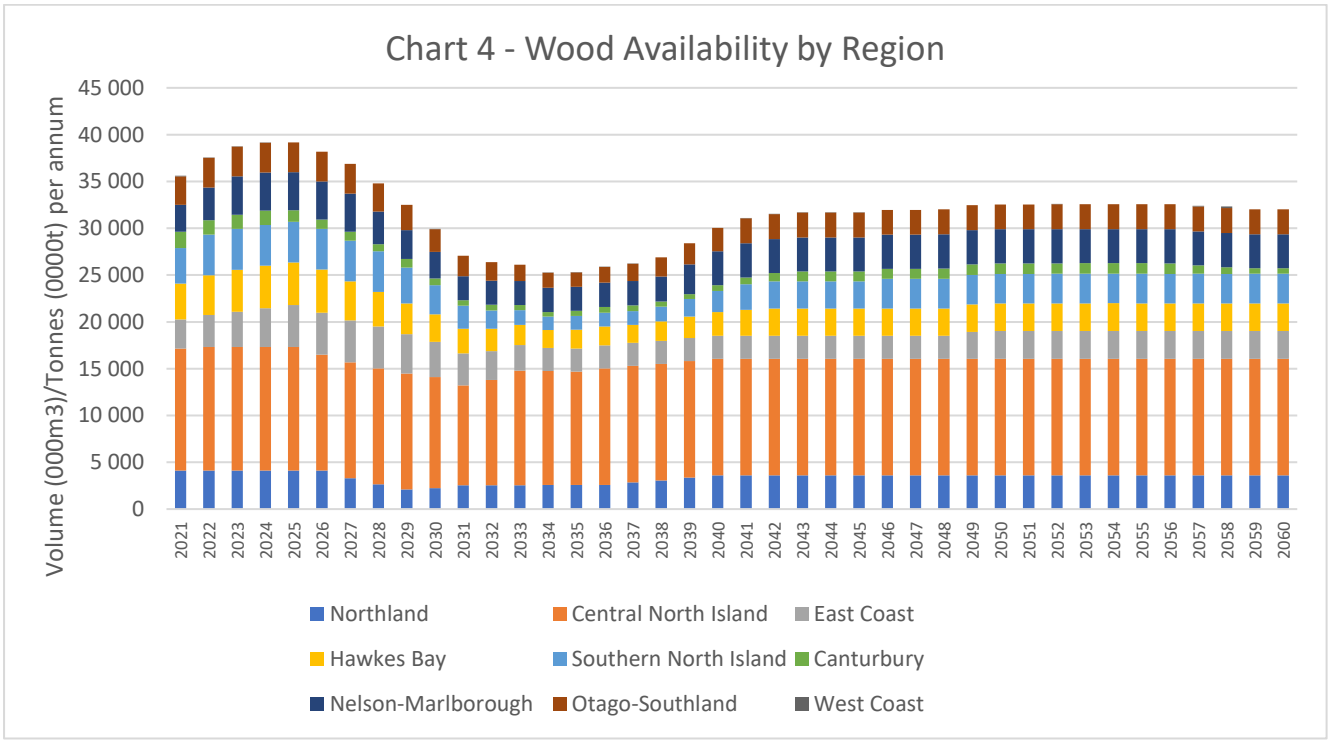
[71] Ministry for Primary Industries Wood Availability Forecast – New Zealand 2021 to 2060 https://www.mpi.govt.nz/dmsdocument/47671-Wood-Availability-Forecast-New-Zealand-2021-to-2060

[72] Ibid.

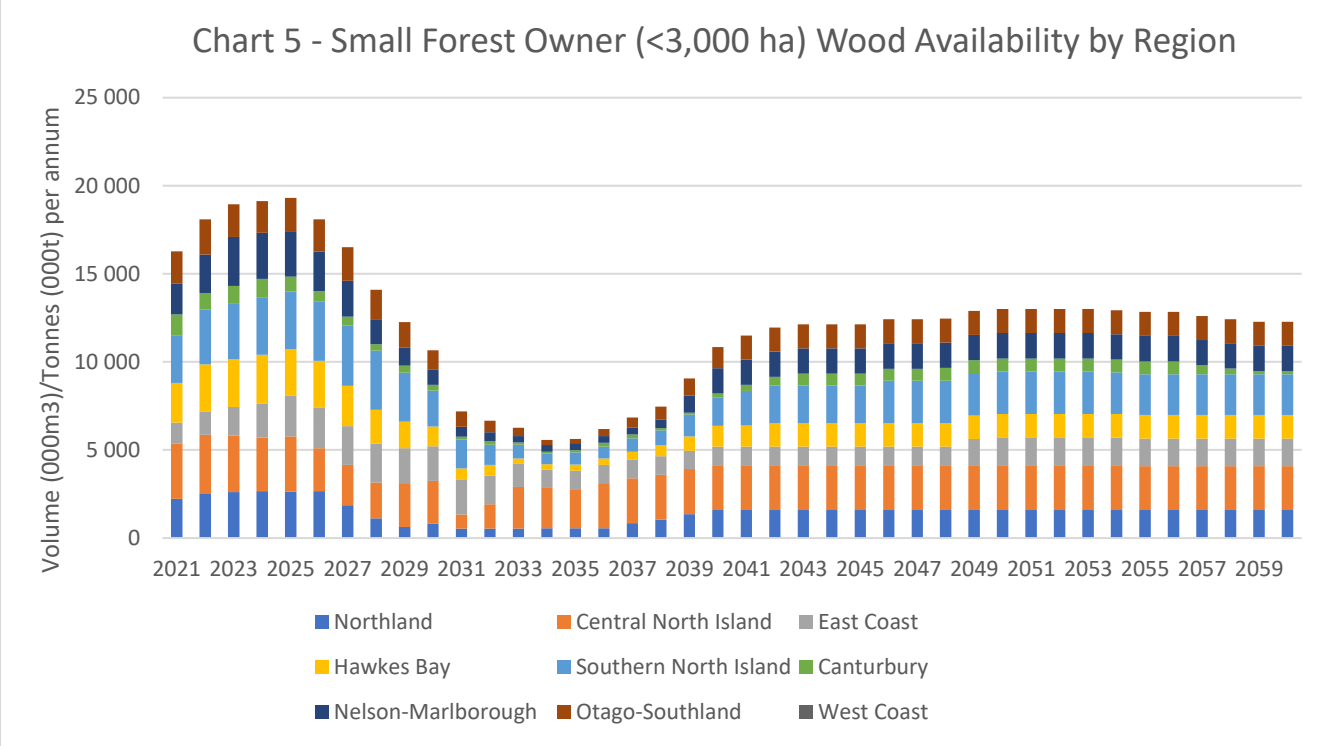
g. A further unknown is the extent to which the New Zealand Emissions Trading Scheme (ETS) could impact future harvesting decisions.



Source: Ministry for Primary Industries Wood Availability Forecast – New Zealand 2021 to 2060
https://www.mpi.govt.nz/dmsdocument/47671-Wood-Availability-Forecast-New-Zealand-2021-to-2060



Source: Ministry for Primary Industries Wood Availability Forecast – New Zealand 2021 to 2060
https://www.mpi.govt.nz/dmsdocument/47671-Wood-Availability-Forecast-New-Zealand-2021-to-2060



Source: Ministry for Primary Industries Wood Availability Forecast – New Zealand 2021 to 2060
https://www.mpi.govt.nz/dmsdocument/47671-Wood-Availability-Forecast-New-Zealand-2021-to-2060

7.1 Summary of Key Points

1. Annual harvest volume is predicted to rise steadily from a current 35.7Mm^3 to a peak of just under 40Mm^3 in 2025, before the decreasing to a "low" of 25.5Mm^3 in 2034; from which point it will grow to a "steady" yield of around 32Mm^3 per annum thereafter.

2. This rise, followed by a fall, will have a significant impact on the industry as after 2025 there is likely to be surplus capacity in respect of harvesting before harvesting levels rise again. If an annual average production rate of 150,000 tonnes per year (24 loads per day) is assumed – and this might be on the high side – the 14Mm^3 reduction over the nine-year period of decreasing harvest period from 2025 to 2034 will equate to around 93 harvesting crews[73].

3. The steady rise in harvest volume over the next 4-5 years is driven largely by "small forest" (i.e. forest owners with less than 3,000 hectares of forest) harvesting – reflecting the boom of planting that happened in the mid-1990s by small-scale investors (see section 4.1). This rise is most pronounced in the Southern North Island.

4. Small forest owner harvesting is likely to account for almost all of the variability in wood availability for the next 40 years. Over the period of these forecasts, the harvest from the forests of larger forest owners (i.e. owners with more than 30,000 hectares of forest) stays remarkably constant at around 20Mm^3 per annum.

5. The regional breakdown of total wood availability (Chart 4) points to the dominance of the same key regions in volume terms as the forest ownership area data in the previous section. The

[73] Assumes annual production of 150,000 tonnes per annum, 220 working days in the year and 28t per load.

Central North Island is dominant in volume terms (around 13Mm^3 per annum over the next five years). Northland, Hawkes Bay, East Coast, Southern North Island, Nelson-Marlborough and Otago-Southland are all similar (in the range 3.0 - 4.5Mm^3 per annum). Canterbury harvest will decrease – from what is already a fairly low base due to forest areas being converted to farmland post-harvest. There is relatively little harvest volume on the West Coast reflecting a small planted forest base (low land availability and difficult commercially in terms of distance from market).

8.0 The New Zealand Forestry Sector - Key Drivers Sitting Within the Forestry Supply Chain and how they Influence Health and Safety Outcomes

8.1 A Non-technical Explanation of Log Markets in New Zealand

At this stage, a short non-technical diversion into log markets, including how log export markets work, and forestry "financials" is warranted to provide context for later sections. Market price-driven financial factors and considerations are critically important for forest owners and drive many decisions that influence, sometimes very strongly, how the supply chain functions.

8.2 Not All Logs are Created Equal

The best quality wood fibre in a radiata pine is produced in the bottom half to two thirds of the tree. Logs from this part of the stem:

- Have fibre qualities (stiffness/strength) and density that allow timber to be used for structural use (e.g. 4 x 2 timber for framing) and appearance grade wood products
- Are larger than the logs produced in the upper half of the stem and hence can be processed for a greater range of uses e.g. veneer, wider boards etc – and achieve better recovery[74], than is the case for small logs
- Have few (or on the case of pruned logs, nil) branches; and few large "green[75]" branches.

These are the logs (pruned logs, structural grade sawlogs, veneer logs) that are actively sought by domestic processing plants. There are only a handful of sawmills in New Zealand, and none of any significant scale operating at present that rely exclusively on a diet of logs from the upper part of the stem processing what the industry calls "industrial grade" sawlogs. The only domestic uses of any significant scale at present for logs from the top third to half of the stem is:

- A small volume of industrial grade sawn timber (suitable for low value uses such as concrete formwork, packaging etc) – which are produced as a by-product by most structural grade mills from higher quality logs.
- Manufacture of chip for MDF, OSB or Triboard[76] or similar plants; or wood fibre pulp for pulp and paper plants.

[74] Recovery from the round log into processed product. Typically, recovery of sawn timber from logs is in the range 50-60%.

[75] Actively growing branches which are generally large(r) than branches lower in the stem and which produce large knots in sawn timber that preclude this timber from being used for structural purposes.

[76] MDF = Medium Density Fibreboard; OSB = Oriented Strandboard, Tri-Board = 3-layered panel with a wood strand core sandwiched between an MDF outer "skin"

This latter category (logs that are only suitable for chipping or pulping) is commonly termed "arisings[77]". In effect, the economics of the plants involved means that the price paid at mill door for this grade of logs is low (see Table 2 overleaf). In many regions of the country, it is simply uneconomic (i.e. would result in a loss of money) to supply pulp grade logs to the few customers who want them and there is no economic imperative that would lead to the existing suite of fibre/chip board mills and pulp mills to pay any more than they are presently.

The only factor that might change this situation is if a new processing plant, operating at a larger scale, set up in the Central North Island and required a greater level of supply of logs. The issue here is that, for this to happen, a good number of existing processing plants would have to close in order for there to be sufficient log supply. In regions other than the Central North Island, there simply isn't sufficient woodflow in a sufficiently concentrated area to provide for a new, world-scale, plant that would use arisings.

8.3 Current New Zealand Log Prices

Table 2 - Current Indicative Log Prices (September 2021)

Log Grade	$/tonne at mill	$/JAS m³ at wharf
Pruned (P40)	180-200	194-200
Structural (S30)	120-155	N/A
Structural (S20)	100-105	N/A
Export A	N/A	126
Export K	N/A	118
Export KI	N/A	114
Export KIS	N/A	105
Pulp	46	N/A

Source: PF Olsen Woodmatters *https://nz.pfolsen.com/market-info-news/wood-matters/2021/october/log-market-october/*

The chart above demonstrates the relative values of the different log grades. Note the pulp price of $46 per tonne delivered. For many forest owners, even those with forests within 80km of a pulp mill, this price provides a negative return to the forest owner for this log grade. Often forest owners/managers will negotiate a differential harvesting rate with the harvesting contractor for this log grade which allows for the profitable extraction of those portions of the stem extracted to skids that are only suitable for pulp logs. This disincentivises harvesting contractors to pull to the skid/landing any broken tops of trees (the tops of which often break off when the tree is felled), but pays them for the pulp log components within the parts of stems that are pulled to the skid/landing.

8.4 Why do we Export Logs Anyway?

The fact that lower grade logs always form part of the stem of every tree means there are logs produced for which there is (presently) no domestic market. However, there is a strong log export market that has operated in New Zealand for some 60 years. This market had its origins in the 1960s with log exports to Japan where radiata logs were (and still are) mostly sawn by Japanese sawmills for the manufacture of packaging timber and cable drums.

In the 1980s as Korea industrialised, log exports from New Zealand were sourced; and from the early 2000s, demand from China for logs to supply timber for multiple uses – of which concrete formwork for construction was the most prominent – soared. Over the past decade Chinese demand has grown to the extent where Japan and Korea (and, latterly India), are almost "niche" markets by comparison.

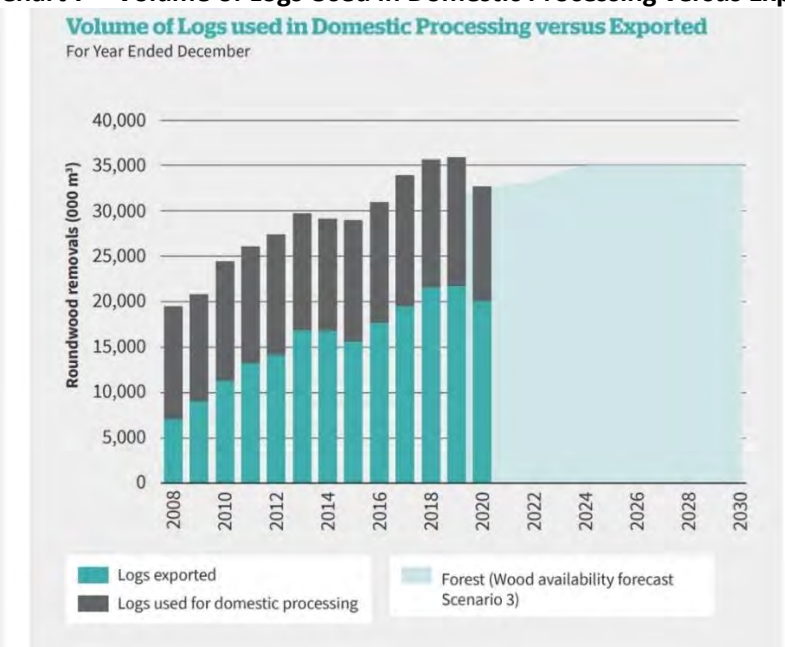
[77] i.e. they "arise" from the (traditional) harvesting of logs for sawn timber use.

The following charts, both extracted from Forest Owners Association Facts & Figures 2020/21 provide a useful snapshot of current log flow and, in the second chart, the volume of logs used for domestic processing versus export annually since 2008 is illustrated.

Chart 6 – Log Flow in the NZ Forestry Industry for the year ended December 2020

Source: Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY
https://www.nzfoa.org.nz/resources/publications/facts-and-figures

Chart 7 – Volume of Logs Used in Domestic Processing versus Exported since 2008



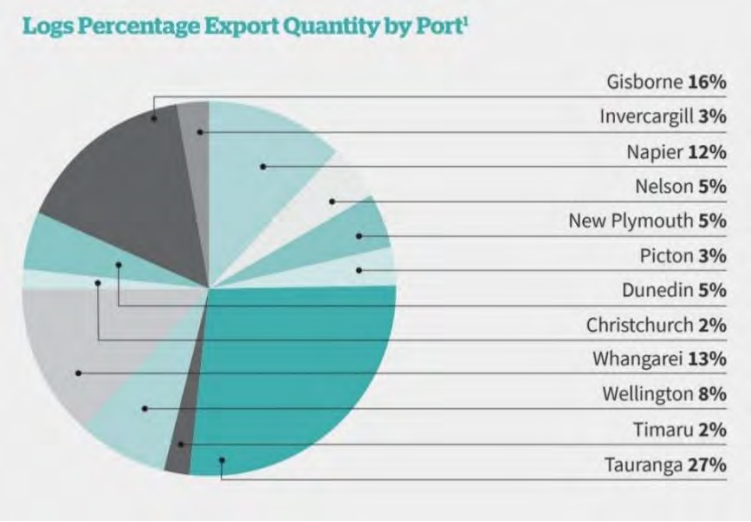
Source: Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY
https://www.nzfoa.org.nz/resources/publications/facts-and-figures

The lack of a domestic market for industrial logs along with good demand (albeit prone to fluctuation) for export logs means that for almost every forest owner – including those at some distance from an export port (e.g. Ngāi Tahu on the West Coast), export markets are critical in terms of profitability.

8.4.1 Export Logs are More Important in Some Regions

There are logs exported from many New Zealand ports as shown in the chart below which provides a 2020 snapshot.

Chart 8 – Logs Percentage Export Quantity by Port for the Year Ended March 2020



Source: Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY
https://www.nzfoa.org.nz/resources/publications/facts-and-figures

Tauranga (Mount Maunganui) is important because it is the closest port to the very large planted forest resources in the Bay of Plenty, Central North Island and Waikato regions.

Whangarei (Northport) is also critical. Most vessels loading logs in New Zealand finish their loading in Whangarei as it is one of the few ports where log fumigation is relatively straightforward and it is often the last port before loaded ships head north for Asia.

Gisborne deserves a special mention because:

- Port space is restricted; but more importantly,
- There are no processing plants of any consequence on the East Coast making it the exception to the (generally quoted by the forest industry) rule that "all logs that are suitable for the domestic log processing market are processed in New Zealand". Even for the valuable structural and pruned log grades, the cost of cartage from the East Coast - particularly the forests north of Gisborne - to the closest available mills of consequence in Hawkes Bay or the Bay of Plenty is prohibitively expensive.

What this means, in practice, is that when there is either an export log price crash; or there is simply no export log demand; or log stocks build up more quickly than vessels are loaded, Gisborne is almost invariably the most impacted region in respect of harvesting contractors being placed on quota or laid off and those working in forests north of Gisborne are at most risk

8.4.2 Export Log Sales – an Explainer

Log prices are a strong driver of the level of harvesting activity in New Zealand and heavily influence forest owner or stumpage purchaser behaviour which then flows through directly in the demand for harvesting contractors and pressures that may be placed upon them. For this reason, it is important to understand what drives log prices.

Log price in New Zealand is heavily influenced by export log price. This is very different to most countries where it is more common for the government to be the owner of large estates which are predominantly "allocated" to supply domestic processing plants. Also, almost all of New Zealand – a long, skinny country with many ports in both islands, is sufficiently close to the coast to allow export log production and sale to be economically viable. Finally, radiata pine has proven to be a hugely versatile species in terms of end uses and is well known in offshore markets.

Given all of this it is no surprise that when Asian countries such as Japan began finding it difficult to acquire tropical hardwood logs or softwood logs from North America, radiata pine from New Zealand would largely fill this hole. All of the above has led to the development of, what is by international standards, a hugely efficient supply chain from forest in New Zealand to the markets of Japan and Korea, and (more recently) China and India. The efficiency applies to time and cost. In addition to transport distance, one of the key differences between Australia and New Zealand in this regard is in the area of port and stevedoring costs. In effect, the key strategic competitive advantage that New Zealand forest owners enjoy, is the efficiency of the New Zealand supply chain.

As noted in a footnote earlier in this report (worth repeating); from the mid-1990s the sustained interest from overseas pension funds and fund management companies (and, in fact domestic investors) in investing in the New Zealand forestry sector is due in no small part to the relative ease in which New Zealand forest owners can participate in international log markets. And this "ease of participation" is directly related to supply chain efficiency.

As could be expected, with so much "exposure" to international log markets it should be no surprise that most domestic log prices are benchmarked – formally or informally via regular price re-negotiations between seller and buyer - against the prevailing export log price. Of course, it is not always apples versus apples in terms of log type/grade match-ups but there is no doubt that any forest owner/manager has the ability to tension the domestic market and hence influence prices, by increasing their export volume at the expense of domestic volume. Structural sawlogs can be exported as "industrial" grade sawlogs if the prices are high enough or if there is a lack of domestic demand for these logs. However, a structural sawmill in New Zealand will not be interested in purchasing industrial grade logs <u>whatever the price</u> as the recovery of structural grade lumber from these logs is simply not high enough and the market for industrial grade lumber is not profitable.

Countering this, is the fact that anyone who has been around the New Zealand forestry scene for any time knows that export log price can and does move significantly and at times, precipitously. Forest owners/managers who have completely turned away from domestic supply in favour of chasing export prices, have in the past, been left in the difficult situation of having no backup option when export prices go south. What this means is that most forest owners/managers who have ongoing harvest and log sales to manage, will have a <u>base</u> supply to domestic mills for which they may be prepared to accept a slightly lower than par price, on the basis that <u>additional</u> volume is sold at an export parity price.

All export log sales are negotiated in-market in USD, at one of two points of sale within the delivery chain:

- Free On Board (FOB) where the buyer is arranging and paying the shipping but the log supplier is responsible for marshalling[78] and stevedoring[79]; or
- CIF (cost, insurance and freight price) which, in addition to the New Zealand port costs, includes the actual cost of sea freight (shipping) and insurance.

When NZ dollars are being used to denominate sales for export logs, almost invariably these suggest the point of sale is at the New Zealand port ("wharf gate"). These are termed wharf gate prices and exclude marshalling and stevedoring. Many parties including export log trading companies such as Pacific Forest Products (PFP) purchase logs at wharf gate. A number of the top and second tier log traders (in terms of volume exported) have commercial links with major forest owners and, depending on the market, are also an option for smaller forest owners/managers to participate in the log export market.

Depending on the state of the market, (boom times = lots of activity; depressed prices = not so many active in the market) there are any number of smaller log trader operators most from offshore or with strong offshore links back to Asian or Indian customers. In boom times, as well as smaller forest owners with a single age-class forest looking to harvest the forest and capture the good prices on offer, each port can have a number of potential buyers (almost literally) standing at the New Zealand port gate to attract log suppliers or, in some cases, purchasing standing blocks of timber for export.

Note that it is not always market demand that is the critical component in a log price fall. The current spectacular drop in log price index noted in Chart 9 overleaf for September 2021, although exacerbated by the slow-down in the Chinese building market, is driven in large part by increased shipping cost. Pre-Covid, shipping prices had remained relatively steady for a number of years in the USD$/20-30 per tonne range. Currently, they are north of USD$80 per tonne.

8.4.3 What Happens When Export Price Drops and Return is Negative?

Forest owners heavily exposed to export markets will seek to stop or reduce harvesting when the export price drops significantly over a short period of time. For those who have ongoing domestic log supply arrangements, there will be a need to keep harvesting to produce logs for these customers. But the intent will be to slow the production of the export log component as much as possible. Note that logs have a "shelf life". Unless they are stored (expensively, given the quantity involved) under water, they will deteriorate in respect of fungal infection and, in some regions at given times of the year, will "go off[80]" in as little as one month.

Additionally, in almost all marketing respects, overseas customers be they log traders (wholesalers) or processing plants in Asia, are exactly the same as domestic customers. Unless their markets have completely come to a halt, they still want logs – it's just that the market price may have dropped. Or, it may be that the market prices in that market haven't changed (i.e. price at port of delivery may be the same). As noted above, the drop in wharf gate price, and hence returns to New Zealand forest owners, may be entirely due to more expensive sea freight; or an (adverse) change in exchange rate[81].

[78] Marshalling is the work at the port carried out by companies to record and document logs as they arrive at an export port and aggregate logs in parcels.
[79] Stevedoring in the loading of logs from the side of the ship at port of export onto the ship.
[80] Through fungal infection which initially changes the appearance ("blue stain"), but then causes fundamental deterioration in fibre quality.
[81] All export log sales, even if they are converted back to NZD at wharf for some log suppliers, are set using an in-market USD price.

So, unless there has been a catastrophic market crash in an overseas market[82] leading to period of nil demand, forest owners with long-standing export log customers will need to keep at least some of these markets supplied most of the time. But they will:

- Apply the production "brakes" where they can; and/or
- Switch to producing logs from parts of their estate where returns are still cash-positive; and/or
- Seek to procure another party's logs to export instead of their own.

This is also why some forest owners purchase forests/standing timber. If prices are down but you still have overseas customers who want logs, it may be advantageous to export another party's wood rather than your own.

In the event that the situation is really financially dire for the forest owner (as explained in the next section) and there are no alternatives, a harvesting contractor can be told:

- "Sorry, but all crews will be stood down as of the end of the month"; or
- "Sorry, but we're losing money so we need you to help share the pain and reduce your harvesting price"; or
- "Sorry, but we're putting (your/all) crews on a quota".

Clearly, all of the above scenarios have the potential to create unsafe working environments.

8.4.4 Summary of Key Points

1. Production forestry in New Zealand is a commercial business and log price is a critical consideration for every forest owner.

2. Access to log export markets is vitally important for New Zealand forest owners, most of whom have no other alternative for a reasonable proportion of their harvest.

3. Because of the strong export market for radiata pine logs from New Zealand and the fact that most forests in New Zealand are reasonably close to an export port, export log prices effectively set a benchmark for domestic log sales.

4. Most large forest owners/managers have ongoing harvest and long-standing formal and informal supply arrangements in place with domestic mills and, regardless of log price, take a strategic approach to ongoing supply to these mills. This is not always the case for smaller forest owners with a single age class who will be heavily motivated to harvest only when prices are good.

5. When export log price reduces suddenly, harvesting operations that are heavily exposed to log export markets are impacted and it is not uncommon for contractors to be laid off, or put on quotas, or asked to take a harvesting price decrease.

8.5 Understanding the Forest Owner Profit and Loss Equation

Planted production forestry in New Zealand is a commercial business but one which, apart from logging trucks on the road and stacks of logs at ports, is often little considered by most New Zealanders. However, the presence of international fund managers and some very large businesses which dominate the sector should be ample evidence of the importance of commercial drivers in the industry.

[82] As an aside, this is why many forest owners look towards China with some trepidation. There is no doubt that the China market "saved" New Zealand forest owners post the GFC crash in 2008. The downside, is that since this time China has come to dominate our log export market. This explains why a number of companies persist in developing a "difficult", in marketing terms, Indian market.

Owning a commercial planted forest is very like owning a farm in one key respect. Both are "residual" businesses in that the owner (farmer or forester) sells a commodity (animals, crops, forest, logs) at a market price and receives **net** revenue that equates to what is left over after all the costs of production have been taken out. Note that this is a simplistic cashflow-at-time-of-harvest example that excludes all considerations of the cost of getting a forest crop from age 0 and the planting of a seedling, to harvest at, say, age 27 or so.

The following highly simplified worked examples[83] set out how this analysis at time of harvest looks using rough 2021 revenues and costs and will explain why some blocks are not harvested; or, if they are harvested, are only harvested under specific conditions. And it will also show how quickly a drop in log prices can turn a forest that is earning its way in cashflow terms, to one that is "bleeding red ink" and which can lead to some contractors finding themselves out of work at very short notice.

Table 3 – Illustrative Examples of Forestry Financials at Time of Harvest

	CNI				**Northland**				**East Cape**			
	$/tonne				$/tonne				$/tonne			
Log Sale Revenue		**130**				**130**				**130**		
less												
Costs of Production												
Harvest Planning	1				1				2			
Roads/Skids construction	2				2				10			
Log and Load (harvesting)	25				27				50			
Log Cartage	12				50				50			
Other (environmental etc)	2				2				5			
Management	3				3				4			
Total Costs of Production		**45**				**85**				**121**		
Net Revenue (log sale rev less costs)		**85**				**45**				**9**		
If log price drops to **$115** per tonne		70	18%	↓		30	33%	↓		- 6	167%	↓
If log price drops to **$100** per tonne		55	35%	↓		15	67%	↓		- 21	333%	↓

Note: The Revenue per tonne is a weighted average. Each log grade produced attracts a different market price.

To provide some additional context for the table above:

- CNI (Central North Island) refers to a block within a large forest on the volcanic plateau. It is an established forest with roads and other infrastructure in place sited on flat pumice soils (allowing for mechanised harvesting) and there are a variety of close markets which reduces log transport cost. There are also economies of scale that apply (positively) across the range of production costs.
- Northland refers to a sand forest in the upper part of Northland (north of Kaitaia). Production issues are simple (mechanised harvesting) but distance from market is an issue.
- East Coast refers to a forest block north of Ruatoria which is first rotation (hence the high cost for roads and skids); and on challenging terrain requiring an (expensive compared to the other examples) cable logging system and manual falling. The distance to market is also a huge issue cost-wise for this forest.
- In fact, there will be differences between the forests in terms of the value per tonne because of the quality of the trees in the different forest blocks but in reality these are small and there is an element of "roundabouts and swings" in terms of log grade/quality out-turn. (e.g. the Northland

[83] For illustrative purposes only.

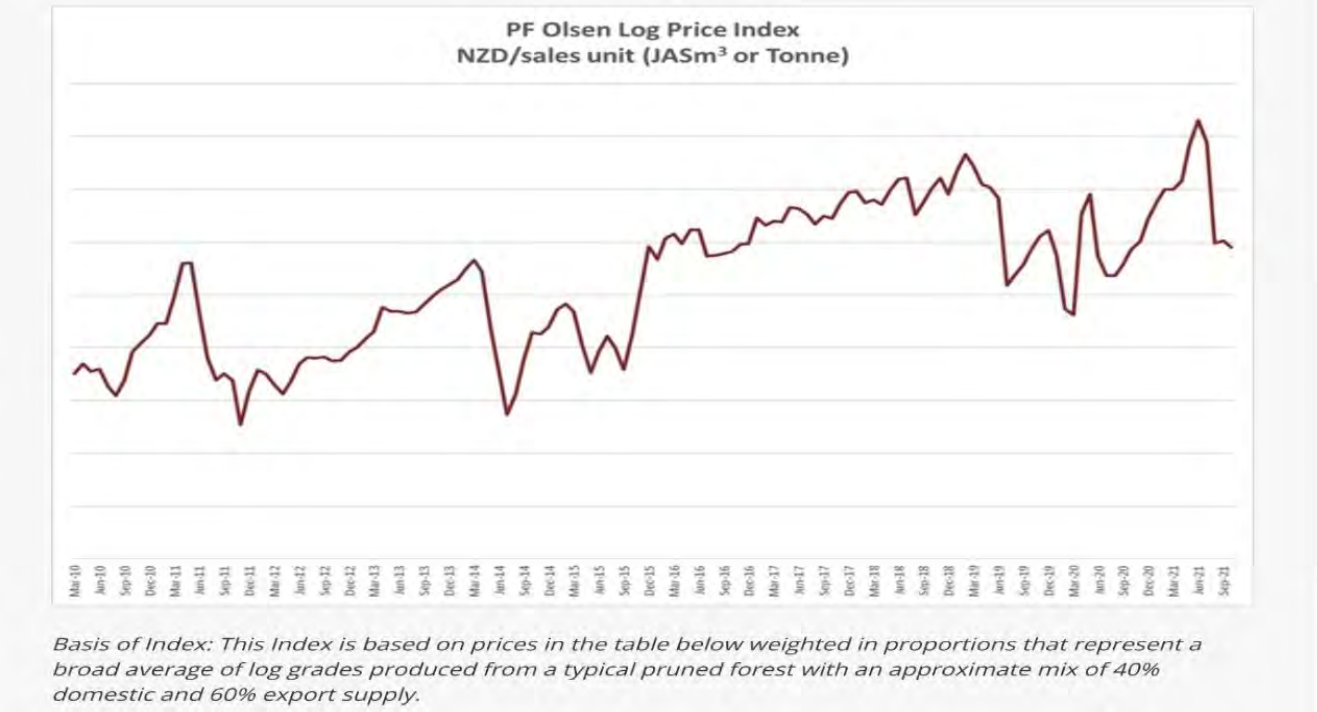
forest will produce the lowest volume per hectare, but because of the timber characteristics will have a better output of the high value structural sawlog grades.)

The impact of the various factors – topography, soil conditions, first versus second rotation, distance from market are well illustrated. But for the purposes of this exercise, it is more important to focus on the "what if" around log price change.

8.5.1 Log Price Volatility

The graph below (an index series which shows the movement over the last 10 years) sourced from forest manager PF Olsen Ltd shows the degree of change over time.

Chart 9 – PF Olsen Log Price Index



Basis of Index: This Index is based on prices in the table below weighted in proportions that represent a broad average of log grades produced from a typical pruned forest with an approximate mix of 40% domestic and 60% export supply.

Source: *https://nz.pfolsen.com/market-info-news/wood-matters/2021/october/log-market-october/*

What should be noted is the way price can drop spectacularly suddenly by anything up to 30% over a single month. Price drops (in terms of New Zealand returns) are not necessarily just a straight market price issue. As noted earlier, two other factors can have significant influence – the cost of overseas freight (always paid for in USD); and the USD:NZD exchange rate. Note that this propensity for sudden change is a long-term characteristic of the industry.

This index shows that the "what if" scenarios posited in Table 3 are very real. In the case of a productive Central North Island forest, net revenues can fall 35%, in the space of a month if there is a $30 per tonne price drop. However, this still leaves the Central North Island forest as an "earner" as the profit (known as "stumpage" [84]) is still a healthy $55 per tonne. Compare this to the East Coast example where the forest was making a small profit at a log price of $130 per tonne, but when price drops to $100 per tonne, this turns into a $21 per tonne loss. In daily revenue terms, this would equate to around a loss of $4,200 per day per crew for every day that harvesting continues.

[84] i.e. the Value of the wood "on the stump"

8.5.2 Other Operational Impacts of Price Decreases

One of the key issues with laying off or standing harvesting contractors down is that each and every contractor impacted is extremely heavily motivated during any notice period to produce to the absolute maximum. This leads to a short-term surge in log production which can be an issue in terms of longer work hours, stressed employees, as well as work "shortcuts" that may have health and safety consequences. It also almost always leads to congested and overloaded skids/landings in terms of log stacks and more frequent truck movements which also have the potential to create health and safety issues.

8.5.3 The Balancing Effect of Domestic Log Sales (and a non-technical explanation of log types)

The crews most heavily exposed to these risks of substantial and sudden change in export log price are those crews working for forest owners/managers (including stumpage purchasers) who are 100% exposed to the log export market.

As discussed earlier, forest owners/managers with supply arrangements to domestic markets (including, for some, their own processing plants) have a requirement to keep supplying these customers and, in fact, if a forest owner/manager has long term supply agreements for export logs, it is unlikely to completely cease supplies altogether but it will seek to reduce production of export logs in order to "tension" the market by reducing supply.

8.5.4 Summary of Key Points

1. Costs are critically important to the forest owner/manager and are especially so in a situation when log prices have dropped suddenly and forestry harvesting operations which previously, were profitable, are suddenly losing large sums of money on a daily basis. The impact of this will invariably be greater for a forest owner who:
   - Doesn't have a "portfolio" of forests where losses from one operation can be offset by other more profitable forests. (Larger forest owners generally take this approach and accept that amongst the forests they own/manage, the (financially) "good" performers offset the "bad"
   - Is completely exposed to the log export market.

2. It is not uncommon for contractors to be laid off or put on a quota with a month's notice – or in worse cases, a week's notice. Unless there are other options (like another forest block to move to), this creates huge financial pressure on contractors who have fixed costs to meet and their own staff to look after.

3. The other option of having harvesting contractors reduce price in order to stay in business can be as bad or worse for the contractor as a complete shut-down. (Slow financial death is every bit as final as when it happens quickly but is arguably worse for the contractor as the level of indebtedness can be greater).

4. When contractors are laid off (or in the lead-up to a quota being imposed) there is a strong incentive to "make hay whilst the sun is (still) shining" and to produce at a very high rate. This can lead to stress and shortcuts on the job as well as high log stocks (and associated congestion with trucking activity) on roads and skids.

5. In addition to being focused on harvesting costs, forest owners/managers who are working on slim margins are incentivised to watch every dollar of spend closely. Road/skid construction (as one of the other key cost components particularly on first rotation forests) can often be the next port of call for shaving costs – particularly in situations like woodlots and small investment forest

blocks where the forest area is small and there is limited harvest volume over which expenditure can be spread.

9.0 Rate/Price Setting (Determining the Harvesting Rate/Price)

As noted at the start of this report, in New Zealand, payment for contract harvesting (log & load[85] as it is often called in the industry) is based on an agreed piece rate – almost always dollars per tonne ($/t) of logs produced. Note that this is also the overwhelmingly predominant method of payment worldwide. This applies to log cartage as well. Additionally, in almost all instances where forest management companies are contracted to manage harvesting operations, they too will be paid on a piece rate basis.

In a "true" market economy, every piece of work would be tendered and harvesting contractors would compete for blocks of forest. This does happen – especially for one-off jobs or when a contractor initially responds to a tender for long-term work.

However, for those contractors who are in the situation of having ongoing work for a forest/owner or manager, prices per block are generally negotiated with the negotiations based on a shadow price (or price range) set by the forest owner/manager using a pricing model.

These pricing models were developed in-house by the New Zealand Forest Service (and the two large forestry corporates in the 1970s and 1980s) as contract harvesting replaced in-house (wages) crews. In essence, a daily crew cost is calculated based on an estimate of the total of the fixed and operating costs that the contractor will be incurring in doing the work. Then, an estimate of the daily production (tonnes produced) is made. And when the total daily cost is divided by the daily production, a "rate" per tonne is calculated.

Clearly both the estimate of total daily cost and the production per day are based on a number of assumptions. Of these, the cost is more easily calculated as there is a reasonably good database of costs to draw from – whether it be the ownership cost and running (operating costs) of various items of equipment; or the labour cost of crew members; and the ancillary costs of ownership (management, administration etc).

Forest owners/managers either maintain these costing models or, more frequently, subscribe to a national database maintained by forestry consultancy FORME Group[86].

Production per day is a more difficult matter. The models used in the 1980s were developed from lengthy work/production studies of contractors in the field and used algorithms based on a number of factors including: the nature of the terrain, the size of the trees (piece size), type of machine used to extract the stems to the landing, number of stems extracted per drag; the average haul distance (to the skid/landing which depends on the density and placement of skids/landings); the number of log grades produced and (very importantly) the hours worked per day.

[85] Almost all harvesting contracts are based on a price, per tonne, for the harvesting and loading of logs. i.e. the work done by the contractor generally involves felling trees; moving the stems to a landing and, if the stems have not been delimbed mechanically in the bush, delimbing on the skid/landing; cutting the stem into various log grades; stacking these logs (on the skid/landing); and loading the logs onto trucks.

[86] FORME Group - https://forme.co.nz/services/informe/ - annually publishes data monitors and tracks the escalation of costs for typical forestry equipment within the sector and is used by both contractors and managers to provide a benchmark for calculating the daily cost of multiple pieces of forestry equipment with the aim of determining a daily cost to run a forestry operation.

This sounds all very scientific but, as any contractor or harvesting manager will attest, there is more than a small element of "art" in using the algorithms to provide an exact number. However, balancing this is 40 plus years of collective (forest owner/manager and contractor) knowledge, across many forests in New Zealand, around what constitutes a reasonable estimate of production for a given block of forest using a particular harvesting system.

However, mistakes (over and under estimates) are not uncommon. Generally, the rule of "swings and balances" apply and; if a contractor feels hard done by on one block, he may well "have a win" on the next. All of which is fine when there is ongoing work and genuine negotiation. But when a contractor is under pressure to find (scarce) work and, in a tender situation, pares his daily cost estimate to the bone and is optimistic around his estimate of production, financial pressure for a one-off job can result and a contractor may look for ways to trim costs and increase production. Both (trimming costs or increasing production) can create downstream health and safety issues.

In a situation where there is a longer-term relationship between the contractor and the forest owner/manager, best practice in the case of production not matching expectations, is that a production study is completed (sometimes by an independent entity) which will record all the work elements and look for the deviations from what is expected. This can, generally, lead to an adjustment. Note that it is as common as finding a hen's tooth to find a contractor complaining that the harvesting rate proffered by the forest owner/manager is too high.

All in all, as with any "negotiated rate", the intent is to find a number that both parties in the equation are happy to live with. All the modelling, forecasting and estimating in the world is merely an aid to arrive at a number that works for both. The real problem, as noted earlier, is when contractors have got their numbers wrong in a tender situation and are not given a reasonable chance to address this.

What needs to be said in this situation is that there is a good deal of responsibility on the part of the forest owner/manager to be prepared to re-look at a price if they are well aware that it is unreasonably low. This works when both the contractor and the forest owner/manager are knowledgeable. This may not apply in all situations e.g. the woodlot owner with a single (once in a lifetime) block to harvest and who may be saving money by cutting out the (forest manager) middleman.

Whilst the point is made earlier that costs are reasonably easily defined; it is clearly important that the rate setting process makes working day time allowances for activities directly linked to health and safety. Some of the more important for the sake of this particular discussion are:

- Time allowed during the working day for daily tailgate meetings.
- Allowances for training (a cost and a time issue).
- (Where appropriate) time allowances for the crew to attend wider health and safety events (e.g. within-forest/forestry company events where learning is shared).

9.1 Summary of Key Points

1. Almost every harvesting operation in New Zealand uses a piece rate payment system based on cost per tonne ($/tonne). This approach is common world-wide.

2. Price setting (determining a rate per tonne) is generally done block-by-block as key inputs will change. The process involves determining the (daily) costs of an operation and dividing this by an estimate of daily production.

3. Costs (i.e. calculating a daily crew cost) are more easily calculated than is production. But balancing this is a "library of knowledge" in the industry on the part of harvesting managers and harvesting contractors on what constitutes a reasonable production range if not a specific number.

4. In the event that the derived rate does not work for a harvesting contractor, what commonly happens in larger, "corporate" forests where long-term relationships are important and a contractor has ongoing work and is shifted between blocks and/or forests, is that data is collected in the field by work/production study and the rate reviewed and re-negotiated.

5. In smaller (woodlot or investment single age class block) operations or where a contractor has bid for work via a tender system, there is a risk that the contractor will be held to the rate he/she has bid. This potentially puts pressure on the contractor to reduce costs and/or lift production – with attendant health and safety implications – or cease work and perhaps incur additional financial penalties.

6. The rate setting process needs to make allowance for the health and safety management and training time requirements of the crew's working day/week/year.

10.0 Owners' Decisions on Time of Harvest - Woodlot/Investment Block Versus an Annual Harvest

A set of forest owners (and their respective managers when decisions on time and rate of harvesting is out-sourced) can have a quite different perspectives on marketing in respect of the "when do I harvest?" question. A forest owner in a situation where there is ongoing forest harvesting that spans a number of years will accept that market conditions fluctuate and will, by and large, be prepared to accept (as farmers do in fact) that there will be times of ups and times of downs and that "the market price of logs is the market price".

Whilst it is absolutely true that forest owners have a degree of flexibility in that the crop can sit on the stump for years longer than the target rotation age, the time value of money is such that unless there is absolutely no demand from customers of any sort; or harvesting at a particular time will yield a negative return, financial models invariably say that it is only worth delaying harvest (once logs reach a marketable age) if a price bounce-back of truly heroic proportions is predicted. Otherwise, it's a case of taking the rough with the smooth market-wise, albeit that, as indicated earlier, a large estate owner/manager may attempt to slow harvesting a little if log price plummets.

This is completely in contrast to the owner of a single age-class estate – such as is common with almost all investment blocks or farm blocks. In these cases, the forest owner only has one shot to maximise the return from their investment which is often funding retirement or a significant investment elsewhere. Naturally, these owners are likely to be heavily fixated on the market price for logs. Inevitably, this contributes hugely to the "boom-bust" nature of the industry. When log prices are high, everyone want a logging contractor to start – and to start immediately. When prices fall, these are the first owners to make a decision not to start (if this has been planned); or to stop harvesting (if this has already commenced).

This can create issues in terms of sourcing contractors when log prices are high i.e. there are few contractors to choose from; or the owner/manager can't be picky; or there's no time for any robust pre-qualification or due diligence to be completed on the contractor).

Further, as noted in the 2014 Independent Forestry Safety Review, "research shows that where a culture involves management complacency, role ambiguity, poor communications and low prioritisation of safety in an environment of production pressure then there is usually a greater likelihood of serious injury and fatalities"[87].

Also, if the pre-harvest engineering (roads and skids) hasn't been put in ahead of time, there can be pressure to shortcut the amount and quality of infrastructure again potentially creating issues for the contractor and other forest users. This also applies to stumpage purchasers who, having paid for the right to harvest a block are highly motivated to get logs moving as soon as possible and before the market price drops back and to spend only what they absolutely need to get the logs out

10.1 Summary of Key Points

1. Time of harvest for the owners of large forest estates with ongoing harvest is generally based on tree age and size and whilst market process does influence the volume harvested, these owners are unlikely to cease harvesting altogether if price drops. But they may seek to increase harvest to capture the benefits of a very high market price.

2. This is contrasted with the owners of small, single age class estates who are highly motivated by spot log price given the nature of their investment i.e. one chance in 25-30 years to get the maximum return. This contributes highly to the "boom – bust" nature of the industry. When prices are strong, finding a contractor is difficult and shortcuts are common in terms of pre-qualification and/or due diligence. When prices go in the other direction, these owners are the first to stop harvesting with very short notice given to the harvesting contractor.

3. Production pressure is an environmental factor that, in combination with other management and harvest crew culture failings (management complacency, role ambiguity, poor communications and low prioritisation of safety), will lead to poor health and safety outcomes.

11.0 Within Forest Access as a Potential Issue for Forestry Syndicates and Farm Forestry Blocks

As noted in the 2014 Independent Forestry Safety Review, "for the forest block to be a safe workplace, road, bridge and skid site selection, design and construction needs to be of a high quality and to be considered as part of pre-operation planning"[88].

One of the features of syndicated and other investment driven forest development on "new" (i.e. previously unplanted) land that occurred from the 1990s onwards was that the financial model for these developments was and is based on minimum upfront expenditure on forest infrastructure.

This is quite different from the days of the NZ Forest Service and the two large vertically integrated corporate forestry companies pre the mid-1980s when it was common practice to put in major arterial roads in new planting blocks at time of establishment. The intent was to have major arterial accesses completed in locations and at a grade that not only provided good access for the first portion of the crop's life (access for planting, pruning and thinning); but also to provide "base

[87] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf
[88] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

access" for harvesting operations which require an increase in roading over that needed during the earlier life of the crop

Of course these costs which can be substantial (currently in difficult areas like the East Coast it can cost the best part of $100,000 per kilometre to establish arterial access roads that are suitable for use at time of harvest) need to be carried for the 27 year lifetime of the crop and this impacts significantly on the cashflow of investors.

As a result, common practice has seen many ex-farm blocks planted from the early to mid-1990s developed into forests with little to no investment in roading infrastructure. (One reason given by developers/promotors is that "harvesting technology may change and so early investment may be wasted". But make no mistake, the real driver is the cost of money and the need, for investment blocks, to make a large call on the pockets of the investors early on in the investment).

The potential issues with this approach are that:

- Firstly, the costs of road building are as (relatively large) as ever they were and high costs detract significantly from the net financial return from the operation. This is particularly important when blocks are relatively small and the roading network may have to cover some distance. Put simply, the cost of roading per cubic metre of logs being harvested decreases as the cost is spread over more cubic metres. Note that this isn't just an issue in terms of how much road (roading density in kilometres per hectare), but also road quality.
- Secondly, if roads (and skids/landings) are built immediately prior to harvesting they have little time to "settle" and, in worse cases involving inherently unstable land, steep slopes and high-intensity rainfall events, there can be a propensity for roads to fail. As well as the obvious health and safety risks this poses, there is the less obvious issue of contractors being unable to access blocks (and hence produce logs and associated cashflow).
- Thirdly, a "just-in-time" approach to harvest road access with the harvesting crew hot on the heels of the road builders can create havoc during winter when road-building activity can be heavily constrained by weather conditions, thus forcing the harvesting crew to either stop harvesting completely, or move blocks – which is can be a cashflow issue for the harvesting contractor if there are no provisions in the harvesting contract to cover this.

The same applies to many blocks planted by farmers. Historically as well as now, plantings are often at the back of the farm and generally have poor existing access. If the block is small, there is often every likelihood (to the landowner's inevitable dismay) that the costs of getting a road built to get logs out will be worth more than the value of the logs. The risk here is that a harvesting contractor in order to "make things work" so that he/she gets a job, will be prepared to take some risks and shortcuts. One of which may be using less than adequate farm tracks with minimal upgrade, sometimes put in by a farmer without the requisite experience in building a road suitable for harvesting traffic.

11.1 Summary of Key Points

1. The quality of roading infrastructure is often an issue for much of the woodlot/investment plantings that took place from the early 1990s with many of the forest owners of these blocks deliberately choosing to not make the early capital investment but instead to complete roading immediately prior to harvesting.

2. There are risks to this approach in terms of the forest owner trying to minimise spend by reducing roading and skid/landing density; and with little time being given for the road to "settle" which can be a particular issue when there are high-intensity rainfall events.

3. Farm woodlot blocks are also commonly planted in areas of farm that are difficult and costly to access and this can lead to "shortcuts" in terms of access quality that can negatively impact harvesting operations and pose a health and safety risk.

12.0 Mechanisation

Although there were elements of mechanisation in the industry (machines replacing manual labour) for activities such as tree felling and flat terrain breaking out[89] as far back as the late 1970s, it took some time for machinery manufacturers to provide machines of sufficient size and robustness to handle New Zealand conditions (variable terrain and, by international standards, large and heavy stems). It wasn't until the early 2000s that mechanical felling, delimbing, cross-cutting and breaking out (in flat land) became ubiquitous in New Zealand harvesting operations.

In addition to removing the high-hazard activities of felling trees in particular, other advantages have been increased productivity and the ability for most workers to be in the cab of a vehicle with all the attendant benefits – not just in terms of safety but also comfort. Working on a muddy skid, delimbing and cross-cutting[90] stems in the cold and wet is far from a glamorous job, as is lugging a heavy chainsaw and all the felling accoutrements (fuel, tools, wedges, first aid kit etc) over rough terrain in 30°C temperatures. It is no doubt that these conditions, that are just part of the job, can contribute to poor decision-making and hence health and safety problems. In this way mechanisation by removing these tasks has played a major role in improved health and safety outcomes.

Whilst the drive for mechanisation has seen mechanised felling become commonplace – even on steep slopes, the same cannot be said for breaking out in cable operations where technical innovations including grapple carriages and the use of GPS[91] where there are breaker-outs on the hill, are far from widespread.

One of the other benefits of mechanisation is that older workers can now continue in roles past the time where, in earlier days, they may have been forced to step away from work in the bush. This is good and bad. Regardless of the use of machines, there remains a physical part of the job. Walking across the cutover to get to the felling machine; or even stepping up and down from the cab, whilst unlikely to be life-threatening, can (and does) lead to the slips, trips and falls that make up a large number of the incident reports within the industry. Knee/ankle operations/reconstructions can be expensive and, at best, take some time to come right.

Another of the unintended consequences of rampant mechanisation is that there are fewer and fewer fulltime manual fellers across the workforce. Mechanised felling almost invariably (unless the block is pancake flat) can't manage to access or fell all the stems. With no fulltime specialist (who is doing this task daily), this means that felling is often left to part-timers. What makes this worse is that often the trees that the mechanised harvest can't access or fell, are difficult or tricky to handle. This is another issue that needs to be considered in respect of health and safety management.

There are significant financial implications (for the harvesting contractor) that accompany mechanisation. 30 years ago a contractor working on reasonably easy terrain could purchase a second hand skidder and a rubber-tyred loader and be in business for a capital cost that was

[89] Breaking out refers to the process of attaching a felled stem either to a mobile piece of machinery such as a bulldozer or skidder (on flat terrain); or a cable attached to a hauler (on steeper terrain).
[90] Also known as log making i.e. cutting the stem into logs.
[91] https://www.logsafe.co.nz/safe-retreat.php

probably less than $200,000. A relatively greater proportion of the cost of harvesting at that time was in labour. The situation now has switched dramatically and a single (new) harvester (felling/delimbing head on an excavator base) alone can cost $750,000. The effect of this is that harvesting contractors are more heavily exposed than in the past to finance company terms of repayment. This may result in a contractor having to apply for finance with a secure longer-term contract with a forest owner/manager in hand, before finance is made available. It also poses a risk when, for whatever reason, the harvesting contractor is required to slow production. If a harvesting contractor is unable to secure finance, it can "push" them into what may be a higher cost short-term lease/hire arrangement; or purchasing of second-hand, older equipment that may require higher operating (repair and maintenance) costs.

Finally, there are three other issues with mechanised operations that need to be considered.

- Firstly, with fewer crew members and most (sometimes all) crew members in cabs of machines, harvesting can be socially restrictive. Whilst most crews get together over smoko, it is not unheard of for some operators to spend all day, on their own, in the cabs of their machines. For some, this can influence mental health. Even if it doesn't impact on the individual, as noted in the 2014 Independent Forestry Safety Review[92] a lack of opportunities on-site for workers to meet and talk can be an issue as these are the people best placed to:
  - Provide advice on the risk and hazards faced day-to-day on the forest block and the practical implications of proposed changes; and
  - Offer informed advice on the mechanisms that can be used to eliminate, isolate or manage these hazards and risks.
- Secondly, it is not uncommon to find very good operators "burning out" after a year of two of operating levers eight hours a day and then leaving the industry. In part, this is often because of a desire of a harvesting contractor to maximise the utilisation of an expensive piece of machinery. Repetitive strain injury doesn't appear to be widely reported at present by machine operators, but in the future, it may be something to look out for. Running shifts is an obvious answer to increasing utilisation of machinery but remains relatively uncommon in the industry.
- Thirdly, just because an operator is in a machine, by no means guarantees 100% protection. There are examples of broken tops/stems entering the cabs of machine. Also, when machines are used on steep slopes – which is becoming relatively common; if something goes wrong, there is the propensity for the machine to topple and roll downhill, or for a failure of some kind (e.g. failure of a tethering system) putting the operator in the way of potentially serious harm.

12.1 Summary of Key Points

1. Mechanisation of harvesting operations in New Zealand has played a very large part in reducing serious harm incidents and fatalities in the industry and providing a greater level of productivity and allowing older workers to be retained in the industry. But this change in the age profile has possibly also contributed to falls, trips and sprains.

2. There remains some work to do in terms of mechanisation/technology within the New Zealand industry, particularly in terms of reducing the need for manual breaking out through the use of grapple carriages and, where manual breaking out does take place, the use of GPS tracking and warning mechanisms.

[92] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

3. Increased mechanisation has increased the capital cost of plant and equipment and poses financial risks for harvesting contractors when longer term contracts cannot be secured, or production is slowed (for whatever reason).

4. With mechanised felling becoming commonplace, there are fewer fulltime fellers in the bush which means that when stems (occasionally) need to be felled manually, the experience may not be on hand to allow this to happen safely.

5. Mechanisation has also led to a degree of social isolation with workers each in their own cab often having minimal social interaction which can have implications for sharing important information on hazards and risk and their management. Additionally, there are instances of "burnout" of young, skilled operators; an issue that could be better managed by operating shifts rather than having a single worker work long hours to maximise machine utilisation. Finally, machine cabs and machines themselves (especially when operating on steep slopes) are not 100% bulletproof.

13.0 Forest Harvesting Contracting Models

Forest owners/managers of larger estates with ongoing harvesting operations are highly likely to have long-term formal arrangements in place with at least a portion[93] of their contractors, in the event that they employ multiple contractors.

Although almost in every case there will be a written agreement of some kind, most contractors would like to see these agreements provide some surety of long-term tenure. Although there will be instances where the forest owner/manager reneges on a contractual agreement, memories are long and the pool (of "good" contractors) is not that deep and this almost certainly, in an environment where the demand for good contractors exceeds supply, helps to keep those forest owners/managers who have the need for contractors on an ongoing basis, reasonably honest in their dealings with those contractors.

It can be useful if contracts define a process in the event that there is a disagreement or dispute; particularly about the rate for a particular block. One of the more useful approaches is to have an independent party complete a production study and review the costing model and make a recommendation (perhaps a binding one) on the rate.

In the past, the arrangements used by some forest owners[94] went a step further and key supplier agreements were made (after a tender process) with contractors who then provided multiple crews – sometimes for an entire forest. One of the key issues with this, from the forest/owner perspective is that this approach (at times) could leave the forest owner/manager in a weaker negotiating position around rates and other issues i.e. if the only option is use one of the key supplier's crews, and if the key supplier is "playing hardball" in terms of the negotiation, then the key supplier could be perceived to be exerting undue leverage.

Often, particularly with investment or farm woodlot blocks, where harvesting is a one-off operation, the forest owner may create issues in terms of changing their mind on harvesting at some stage after a manager has been employed to source and employ a contractor. This can lead to a situation

[93] Whilst owners of very large forest estates almost invariably have ongoing harvesting underway, there might be a degree of annual variation and so some contractors may only have shorter periods of work.
[94] Carter Holt Harvey Forests in the early 2000s.

where the forest manager, absolutely legitimately, says to a contractor, "sorry, the forest owner has changed their mind and harvesting is not going ahead". In a perfect world, all is contracted well-ahead of time and there are clear conditions on the various parties (the owner, the manager and the contractor) in the chain around who makes what decisions and how any disruptions are to be handled. In the latter case this might include notice period or a compensation for being stood down.

However, it can suit a forest owner (in the event that there is uncertainty around log price) to insist on having complete flexibility and a final say on whether or not harvesting actually proceeds as planned, or ceases if it has commenced. In this case, it is sometimes the forest manager who "stands in the middle" and has the unenviable job of giving the contractor the bad news and dealing with the outcome of this i.e. a very unhappy contractor and the damage to the manager's reputation in the industry which may limit the manager's pool of potential contractors for the next job.

All of this is very messy and the key learnings are that:

- Gaps in knowledge/information – particularly on the part of (part-time) forest owners who may not understand the implications of their decisions - need to be filled.
- All parties need to be encouraged to talk about the "what ifs" and, preferably, formally agree on who makes what calls about the operation and how any disrupts are handled.

13.1 Summary of Key Points

1. Almost every harvesting operation will involve a contract of some sort between the forest owner/manager and the harvesting contractor. Some of these contracts may be (formally or informally) of a long-term duration.

2. Although in the past "key supplier" arrangements were common in one major forest owner's forests, allowing one contractor to supply most/all of the harvesting capacity in a forest(s), this approach fell out of favour due to the perception of the balance of power in the relationship shifting away from the forest owner.

3. It is useful if contracts define a dispute resolution procedure, especially if it involves adjustment in the harvesting rate.

4. Small forest/investment single age class blocks can be susceptible to the forest owner changing his/her mind if there is a price fall and pose a risk for the forest manager where the contracting party is the forest manager (on behalf of the owner). This can lead to a forest manager being put in the uncomfortable position of standing down the contractor. In these cases, the solution is a formal agreement before operations commence on who makes what calls about the operation and how any disrupts are handled.

14.0 Port or Other Market Restrictions on Log Production

At times, shipping issues (lack of ships and/or a change in shipping schedules) coupled with a restriction on available port storage, can lead to log stocks accumulating in the bush on skids/landings.

The report discusses in an earlier section the potential health and safety issues associated with high log stocks in the bush (restricted space on skids/landings, congestion around skids/landings and on roads). There is another issue that can lead to stress (for the contractor) and that is the lack of

cashflow caused by logs that may be produced and stacked on the skid/landing during the month but not loaded out. Generally, a contractor's production is totalled and paid monthly based on the tonnage trucked out over that month (as recorded at a weighbridge[95]).

Of course, there is always a base stock level of logs in the bush and provided this broadly remains the same from month to month, there is no issue. But when either a domestic customer or (more commonly) a port places restrictions on the volume delivered, the contractor is at risk of not being paid for that volume until such time as it is loaded and trucked away.

Most corporate forest owners/managers generally have an agreement to "pay for stocks"; in effect an advance payment; but this is not always the case. This is another issue to be wary of in terms of placing financial stress on a contractor's business. The solution is to have this (provision for advance payment for stocks produced but not trucked) covered off in any contractual agreement.

14.1 Summary of Key Points

1. If harvesting operations are curtailed because of an inability of a customer (for export or domestic logs) to take delivery of logs, then there should be an arrangement in place that allows the harvesting contractor to be paid for log stocks rather than the contractor having to wait to have logs uplifted and trucked out. To not do so can put undue stress on a harvesting contractor's cashflow.

15.0 Knowledge/Experience of the Parties and the Need for Professional Input

It is rare to find corporate forest owners/managers or contractors without the experience (sometimes gained the hard way) to foresee either operational problems or "contractual[96]" issues that can arise in the relationship between the parties and to know what constitutes a reasonable range of solutions in both cases. (That, of course, doesn't mean that these "solutions" are always implemented).

This (experience) is not always the case with forest owners/investors or some stumpage purchasers who may try to cut out the middle man (forest manager) and take on the task themselves; if for no other reason but to try to save in the order of $3.00 - $6.00 per tonne of management fee and capture this margin for themselves.

As highlighted throughout this part of the report, oftentimes there is far more to this forestry business than meets the eye and those with a lack of knowledge who don't attempt to get professional advice can quickly come unstuck. One example of this is with farm woodlots and access when the reaction of the farmer, on being told the cost of putting in appropriate access and skids/landings, is to take a decision to use the farm bulldozer or digger to do this him/herself. And whilst it may be acceptable for farmers to use their own machinery to put in farm tracks to be used by side-by-sides or 4WD double cabs, access to get harvesting machinery and log trucks in and out

[95]Part of the harvesting management system is that every truck that departs a forest loaded, either at a customer's yard, or, more commonly a weighbridge en-route, is weighed. This data recorded as part of a log docketing system where every load is uniquely identified. The data then forms the basis for invoicing customers as well as for making payments to those in the supply chain such as the harvesting contractor, the trucking operator and the management contractor.

[96] Formal or otherwise.

on a daily basis and catering for all weather conditions is a specialist job. It can create health and safety hazards both for the farmer doing the work; and, if the work is not to a proper quality standard, for the harvesting contractor and trucking contractor (and other parties using the access such as the harvesting crew and site visitors e.g. Worksafe inspectors).

This is not to say that a woodlot owner/investor or stumpage purchaser must in each and every case use a forest manager but it is something to watch out for.

15.1 Summary of Key Points

1. Whilst it is rare to find corporate forest owners/managers or contractors without the experience to foresee both operational and contractual problems that can arise in a forest harvesting operation, and know what constitutes a reasonable (range of) solution(s), this is not always the case with the owners of smaller (single age class) forest blocks who can seek to save the costs of getting professional advice. This can lead to all manner of less than ideal practices and poor outcomes across the board.

16.0 Matching Harvesting Equipment (and Method) to the Site Through a Formal Plan

When an experienced forest manager/owner is preparing a harvest plan, data including terrain models, aerial imagery and forest inventory data is used to develop a harvest plan which, as well as suggesting the road and skid/landing layout, will determine the harvesting method (e.g. ground based or cable, the site and the size/capacity of the equipment needed) and the direction of haul to each skid. This is almost always validated by experienced staff via an on-site check. The plan forms a core part of the rate setting/negotiation and is used for ongoing day-to-day management whilst the operation is underway. If there is no formal plan; and if the plan has not been validated as part of an on-site inspection, this should be a warning flag for those reviewing the health and safety system used on the job generally, or when investigating any incidents.

When a forest is into harvesting its second or subsequent rotations, it is usual to use the existing roading network and skid layout. However, with the changes in technology and in harvesting methods and systems over the past 30 years, there are times when skids, in particular will be relocated.

It is almost a given that there will be departures from the formal harvest plan and that the plan will be a "living" document. Commonly, these first surface during the initial roadbuilding/harvest roadline harvesting operations but suggestions/changes can also be initiated by harvesting contractors who will often have suggestions that will improve the operation. Implementing changes can happen very quickly when there are obvious advantages in productivity (tonnes of stems pulled per hour); but may take longer to be put into effect where a change will have health and safety implications. In these instances there may be some reluctance on the part of the forest owner/manager to sign-off on harvesting plan changes where this will lead to an increase in the log and load rate paid.

The real issue is with first rotation forests where there is little or no existing roading and where an arterial roading system with offshoot roads and tracks has to be built from scratch. This can sometimes be more difficult that might be expected as the presence of mature planted forest can hide ground features that are/were obvious when the forest isn't there. If, when putting the roads or skids/landing in, problems are noted and there is a need to make changes, then good practice is that these changes should be recorded and, where necessary factored into any decisions on

harvesting rate. One common issue is finding that putting a skid in a particular (planned) location is not feasible and instead another skid/landing is to be used with a much longer haul distance, thus influencing production.

A further issue is that invariably, whilst every attempt can be made to match a contractor's equipment with a particular block of forest, there will be almost always be areas in the forest where the equipment on hand is less than optimal. Some reasonably common examples are:

- Areas within the stand where tree size is at or over the top end for the manufacturer's recommendations for the harvesting machine.
- Areas within the stand where ground-based harvesting (or machine felling) is at its limit in terms of slope unless there are specific extraction haul tracks built.
- Areas where the particular cable system used can't get to the last corner of the block or a "blind" gully.

Most harvesting contractors will, in their attempt to complete a job well, and as part of being perceived as a "good" contractor with a "can-do" attitude, will attempt to harvest everything within the block unless the harvest plan says an area cannot harvested. (Note that this also applies at an individual level within a crew where it is not uncommon for individuals to get themselves into situations that are fundamentally unsafe or that they are perhaps not best suited to handle).

As noted in the 2014 Independent Forestry Safety Review, "There is a strong "can do" culture in the New Zealand forest industry. This needs to become a "can do safely" culture"[97]. "Can do can mean pushing machines, harvesting systems and people to and over the limit in terms of what can be safely handled. Well managed contract harvest operations have processes for managing these issues – most notably the daily tailgate meetings. If issues like these are not coming up in discussions on the harvesting plan or in tailgate meeting records, this again should be a red flag for those reviewing systems or investigating incidents.

16.1 Summary of Key Points

1. Detailed harvesting plans are an absolute requirement in terms of managing health and safety on the job. These should be "living" documents which provide for input from harvesting and engineering contractors who are in the best position to suggest improvements. Where changes have implications for the harvesting contractor in terms of productivity, there needs to be scope for the negotiated $/tonne rate to be reviewed.

2. There will almost always be instances (in anything other than absolutely flat terrain), where the equipment a harvesting contractor has on site will not be ideally suited to every part of the block being harvested. The "can-do" attitude that prevails in the New Zealand forest industry generally means that "work-arounds" using the equipment and people on hand will often be used to ensure 100% of the block is harvested. This can lead to harvesting systems and people being pushed into situations that can be unsafe and crew management (and forest management) processes need to identify and manage this risk.

17.0 Workforce Issues and Crew Management

Forestry work, whilst arguably more glamorous than it used to be because of the move to mechanisation, is still harder and dirtier than many other "comparable" outdoor physical occupations e.g. working on a construction or building site or working in a road building/maintenance crew. Couple this with long work days and what is presently an abundance of

[97] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

work opportunities in the sectors mentioned above, and it is hardly surprising that the industry has difficulty in attracting and retaining people.

Difficulty in recruiting and retaining staff in an environment where turnover can be high also places immediate pressure on the rest of (a short-handed) crew which is exacerbated in times where there is production pressure on the crew.

It is not just at the entry level that there are problems. There is a real and ongoing shortage of people who want to be or have the capability to be crew leaders/foreman. This is exacerbated with a contractor moving from having a single crew where he/she is on the job every day, to perhaps establishing a second/third crew. The harvesting contractor membership of FICA (the Forest Industry Contractors Association which is 200 strong, reports average crew ownership (per contractor) as 1.8 crews per contractor[98].

Couple this with the age-old problem that applies to any organisation of "promoting the best or most senior worker to management" and it is possible for:

- There to be revolving door of people in entry-level roles in a crew – particularly in regions where there are attractive other opportunities.
- There to be no designated fulltime on-site crew leader or foreman with the prime contractors taking on this role over a number of crews whilst trying to run a substantial business[99].
- Relationships within a crew (due to poor leadership and management) to be a contributing factor in the case of health and safety incidents.

Turnover can be a problem also in terms of the demand for crew members. In a tight labour market there is always a (new) home "down the road somewhere" for a crew member who may have been exited from a crew due to performance issues. This means that if the pressure is on a crew member to lift his/her game because, for example, they have a habit of operating unsafely, finding a job in another crew – often in the same forest – isn't unheard of.

Finally, there is no substitute for the prime contractor to be closely involved operationally with the day-to-day work of a harvesting crew. If it is not possible for the prime contractor to be on site full time, then at the very least there needs to be suitable crew leader/foreman in place backed by systems (and recordse.g. daily tailgate meeting records) that allows the prime contractor to remain closely in touch with the work of the crew.

17.1 Summary of Key Points

1. In a tight labour market, forestry has a history of struggling to attract people into the labour force to work in harvesting crews. This applies at entry level and, arguably the more important, crew manager/leader/foreman level. Reduced staffing levels can place additional stress on the remaining crew members who are working to a daily production target.

2. Turnover can be high and it is not uncommon for workers who have proven to be higher risk in terms of health and safety performance, to readily find a new crew instead of improving their performance.

[98] Pers comm Prue Younger, FICA

[99] Forest owners/managers all have experienced how splitting a high-performance crew (with the addition of additional appropriate plant and equipment and the necessary additional crew members) seems always to result in an "A team" and a "B team" in terms of performance.

3. Good leadership is critical in ensuring good health and safety outcomes and if a crew owner is unable to perform this, or if he/she is largely unavailable for day-to-day management on site, then a good crew manager/foreman is essential.

18.0 Cultural Issues

Many harvesting crews – particularly in some key North Island regions have a large Māori component and it is not uncommon for there to be close whanau linkages (father/children, uncles/ nephews & nieces etc) within crews.

The issues this can create in terms of younger whanau members sometimes being unwilling to speak out (on health and safety issues) or to contradict or point out shortcomings they may see on-site (including the instructions/directions being given) is a well-known phenomenon in the industry and is one that is being addressed through various work streams. However, it remains an issue, and not just for Māori as it takes a degree of courage for any younger and relatively inexperienced person in a crew to take issue with the performance or directions of someone more senior/experienced.

Another problem that can arise is when a forest owner/manager working on land owned by a Māori entity is told "here is/are the contractor(s) you must employ". This is entirely understandable as employment on lands owned is almost always an issue that comes with owner "politics" when Māori land is involved. In a relatively small number of cases this requirement (to employ people with connections to the land) is contained in the applicable lease, licence or forestry right, but more usually, the "obligation" to employ people directly connected to the land is implied, but the consequences in terms of the potential for negative impact on the relationship are made clear to the forest owner/manager.

Even with all the best will in world to attempt to create a level playing field, this situation ties the hands of the forest owner/manager and can lead to:

- Corners being cut in terms of any pre-qualification process the forest owner/manager may wish to run in respect of harvesting contractors
- Less than ideal matches between the equipment needed for the job and what the contractor has available
- A crew with a history of poor performance from both a production and a health and safety perspective (and potentially inferior to other choices available to the forest owner/manager) being hired/retained
- Harvesting contractors being "levered" into accepting particular employees if they want to get the job.

This is a clear example where the land-owning entity is exposed to legal risk under the Health and Safety at Work Act 2015. Best practice in this instance would see a selection/tender committee comprising representatives of both the forest owner/manager and land-owning entity representatives following a robust process.

18.1 Summary of Key Points

1. The phenomenon of younger workers, particularly those who are Māori operating in a crew where there are other whanau, being reluctant to point out health and safety issues or contradict older and more experienced crew members is well known in the industry and is being addressed. However, there is another issue involving forest owners and managers being "required" to take on particular harvesting crews (or contractors take on particular employees) if they want to get a harvesting job involving Māori land. In these instances, the Māori land

owning entity needs to be part of a robust process for shortlisting and making appointments, with health and safety performance figuring prominently in the decision-making.

19.0 Geographical Issues

19.1 Travel

Whilst is it probably at the upper end, it is not unheard of for harvesting crews to have daily travel of four hours per day (two hours each way) from their homes to the worksite. The reason is very simple. People (and, more importantly, their families) prefer to live in larger centres where amongst other things:

- There is more schooling choice for children and wider range of extra-curricular activities available
- Partners can (more easily) find paid work and have a wider choice of work options
- There is a greater choice in housing and those owning houses are more likely to benefit from a rise in the value of housing (than is the case in a smaller centre).

Gisborne and Napier are probably the best example when most of the work is closer to Ruatoria or Wairoa, but there are plenty of examples elsewhere in across New Zealand (e.g. Kaitaia, New Plymouth, Masterton, Dunedin, Invercargill).

Additionally, for those crews specialising in woodlot and smaller investment blocks, there is the opportunity to travel radially and be in a good position to harvest many blocks from a single, central point.

The key factor from a health and safety perspective is that a long work day (five days per week) runs the risk of fatigue influencing decision-making and performance. This is particularly the case in summer high temperature conditions and when there isn't aircon in the cabs of machines. Although most crews finish or at least start winding down for the day around 3.00-3.30pm, the early starts (on-site by 6.30am or 7.00am) can see crew workers often on the road at or around 5.00-5.30am. And whilst it is true that in a crew-truck situation the passengers can (and often do) grab some extra sleep; this clearly isn't possible for the driver who is often the designated driver and who will drive every day.

Loader drivers can often work even longer hours as it can be helpful at either end of the day, and especially where skid space is restricted, to get a "head start" and load out trucks.

In assessing health and safety risk; or in investigating incidents, the travel component of the work day should be considered.

19.2 Inherent Hazards and Risks

Forest harvesting is inherently dangerous work. Whilst it can appear at first glimpse that there are some regions where there are inherent HSE hazards, due to a range of factors e.g. difficult road access, terrain creating hazards on-site, weather creating issues etc; it is overly simplistic to say that different hazard profiles will lead to different health and safety outcomes. The analogy around how some traffic authorities deliberately make driving more complex in some town centres via a variety of means (no traffic signals, the nature of the surface, items placed close to the edge of the roadway) is a good one i.e. by making driving in these situations more complex than usual, drivers slow down and take a greater level of care in their driving. This applies equally in forestry. For

example, if harvesting is underway in a stand where there are many standing dead trees, manual fellers and those operating felling machinery are likely to adjust the way they undertake their work to take greater notice and care during felling operations.

It is common for health and safety incident reports to indicate that environmental conditions are involved. Typically, these relate to inclines of varying steepness. There are also frequently concerns about holes or troughs concealed by slash. Wetness, mud and slipperiness also play a part[100]. This is exacerbated if crews do not stop work in (truly) adverse weather conditions.

Commonly in forestry, conditions on the job "tempt" people to take shortcuts and either move away from the required operating procedure(s) or "box on" in truly adverse conditions. Examples include:

- The breaker-out for a cable logging operation in steep and undergrowth-heavy forest who knows he/she has to retreat two tree lengths from the drag line before the in-haul commences and who decides on a 30°C Friday afternoon than "one tree length will do". 99% of the time (or maybe even 99.9%), he/she may get away with this decision. But when the dice rolls the wrong way, the consequences can be fatal.
- The skid/landing worker who trips and falls when the mud on the skid/landing is knee-deep.
- The tree faller who has three trees sit back on the stump and who wants to carry out a 1 on 3 drive[101]. In accordance with operating procedure this situation requires the presence of an observer before starting any felling cuts, but the feller decides he/she doesn't want to disrupt the operation and goes ahead with the drive on their own. Again, the risks may be low, but the consequences can be very high.

These examples illustrate that almost invariably, it is the decision-making on the job, sometimes exacerbated by production pressures, rather than factors peculiar to the forest that leads to poor health and safety outcomes. **But** poor decisions are almost invariably influenced by other factors e.g. in the examples above, fatigue and an unwillingness to disrupt the operation.

As noted in the 2014 Independent Forestry Safety Review[102], "Serious injuries and fatalities occur on large and small forest blocks. They occur in forests under corporate control. It is our view that size is not a defining factor to the provision of safe work and safe workplaces in the forestry industry."

This situation has not changed i.e. size of the block and other environmental factors are not defining factors in these instances, but can contribute to poor decision-making.

19.3 Summary of Key Points

1. Travel time (and the need for very early workday starts) can be a contributing factor to poor health and safety outcomes not just on the job, but also during the drive to and from the site if people are fatigued. In a situation where the crew is transported in a single crew vehicle, the driver can be particularly impacted. Loader drivers also are impacted as, for operational reasons, their workday can be longer than other crew members.

2. Whilst conditions in some forests (terrain, ground conditions, forest type) appear inherently higher risk than others, it is not always true to equate these physical conditions with poorer health and safety outcomes. What is generally more important are the factors that influence decision-making on the part of individuals undertaking high risk (dangerous) tasks and these are often the things, along with production pressure, that contribute to a job being difficult and

[100] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf
[101] Tree driving is the process of knocking a tree, (or trees) to the ground, by felling another tree on to them.
[102] https://www.fisc.org.nz/uploads/6/6/2/5/66257655/final-report-independent-forestry-safety-review.pdf

dirty. In these cases, people can break rules and shortcut operating procedures often with dangerous consequences.

20.0 FSC and PEFC Certification

Almost all of the major corporate and institutional fund-based forest owners in New Zealand are aligned to one or both of the two key international "environmental" certification schemes that operate internationally; Forestry Stewardship Council (FSC) or Programme for Endorsing Forest Certification (PEFC). Both have published standards[103], against which the performance of the forest owner is independently audited. Audits are conducted annually with a more substantial review (using a team of auditors) every five years.

Effectively, the driver for having environmental certification is market access. Customers (initially offshore but now also domestic) for anything that uses fibre from an unprocessed log to paper products have increasingly required that input fibre comes with a "green tick". Certification is a major expense and requires significant effort on the part of the forest owner/manager and once obtained, companies work very hard to maintain certification.

Whilst many believe the major component of both schemes is purely environmental, this is not true and both can play a part in ensuring forest owners are meeting a wide range of standards including health and safety, working conditions and worker rights. The standards themselves are detailed and based on a number of broad ***principles***, multiple ***criteria*** for assessment and very specific ***indicators*** (of performance) against the criteria and ***verifiers***.

Chart 10 overleaf lists those (more than 20) forest owners/managers with environmental certification as at December 2020. FSC has the greatest coverage (PEFC is predominantly favoured by those companies marketing product directly or via domestic processors in Australia where PEFC is more common) and so the rest of this section will concentrate on FSC. Note that this report is based on Version 3.9 of the FSC Draft Standard dated March 2021. The draft standard is currently in its final stages of development however FSC's International Performance and Standard Unit (PSU) recently assessed this draft of the standard and have indicated that it will be approved following the closure of a handful of conditions.

[103] FSC - https://nz.fsc.org/en-nz/policies/standards-development
and PEFC - https://cdn.pefc.org/pefc.org/media/2019-04/5aca5f57-38cf-4664-8dc2-b32b2df4b48b/5e21be3c-c2b6-581c-9085-0ea8e5377574.pdf

Chart 10 – Major Forest Owners with Environmental Certification as at December 2020

Environmental Certification

As at 31 December 2020

Company	Environmental Certification Body	
	FSC (ha)	PEFC (ha)
Rayonier New Zealand Ltd	157,827	157,827
PanPac Forest Products Ltd	46,073	
NZ Forest Managers Ltd[1]	59,122	
Wenita Forest Products Ltd	29,182	-
Aratu Forests Ltd	35,013	35,013
Juken New Zealand Ltd	32,299	
PF Olsen Ltd	9,130	
Summit Forests NZ Limited	30,618	
The Rohatyn Group	966	
Kaingaroa Timberlands Limited	186,266	186,266
Port Blakely Ltd	37,370	
Southland Plantation Forest Company of New Zealand	13,907	
M&R Forestland Management Ltd	12,061	
China Forestry Group Corporation	20,050	
Tasman Pine Forests Ltd	36,559	
Ngai Tahu Forestry	45,828	
Forest Enterprises	18,066	
City Forests Ltd	23,731	
Ernslaw One Ltd	103,102	
Hancock Forest Management (NZ) Ltd	170,775	170,775
Craigpine Timber Ltd	2,266	
RMS FGI		5,164
OneFortyOne	79,935	
Total	**1,150,146**	**555,045**

Source: Forest Owners Association Facts & Figures 2020/21 - NEW ZEALAND PLANTATION FOREST INDUSTRY
https://www.nzfoa.org.nz/resources/publications/facts-and-figures

20.1 What Does FSC Say About Workers' Rights and Health & Safety in Particular?

About **Health and Safety**:

1. The Organisation shall comply with all Applicable laws, regulations and nationally-ratified international treaties, conventions and agreements.
2. Operations cease in areas while disputes exist where: …….2) The dispute is related to safety issues;
   The Organisation shall maintain or enhance the social and economic wellbeing of workers.
3. This includes compliance with the following Acts: ….Health & Safety at Work Act 2015…..
4. All persons receive the same rate of remuneration when they do the same or substantially similar work in accordance with the Equal Pay Act 1972
5. The Organisation shall implement health and safety practices to protect workers from occupational safety and health hazards.
6. The Organisation complies with the Health and Safety at Work Act and has systems in place to ensure compliance with the Approved Code of Practice for Safety and Health in Forest Operations. New control methods may be identified which surpass those of the existing ACOP.
7. Workers shall be given the opportunity to participate in health and safety initiatives.

8. Workers have personal protective equipment appropriate to their assigned tasks and provided by their employer, compliant with the Health and Safety at Work Act and the Approved Code of Practice for Safety and Health in Forest Operations.
9. Use of personal protective equipment is enforced.

In relation to **systems**:

10. The Organisation operates a health and safety management system that is consistent with the Health and Safety at Work Act.
11. There is a system for reporting and investigating health and safety incidents, which includes: Notifiable incidents (previously serious harm incidents) are reported to WorkSafe and fully investigated; and 2) Where identified, investigations practices are improved to minimise incident recurrence; and 3) Relevant findings of investigations are communicated to workers; and 4) The Health and Safety practices are reviewed and revised as required after major incidents or accidents.
12. The Organisation participates in collective incident databases, such as IRIS or Scion learning review.

In relation to **pay rates**:

13. The Organisation shall pay wages that meet or exceed minimum Forest industry standards or other recognized Forest industry wage agreements or living wages, where these are higher than the legal minimum wages. When none of these exist, The Organisation shall through engagement with workers develop mechanisms for determining living wages.
14. Wages paid by The Organisation meet or exceed the requirements of the Minimum Wage Act 1983.
15. For employees on piece rates, the amount earned can't be less than the minimum hourly wage equivalent.
16. The Organisation commits to paying a living wage to Competent Workers directly employed within the management unit. Where work is contracted, the living wage is factored into contract rates.
17. Where unit rates are paid, an operation cost model can convert piece-rate productivity into an equivalent annual, daily or hourly rate of pay.

In relation to **training**:

18. Workers are trained, or in training, for the task(s) they are performing, with supervision to safely and effectively contribute to the implementation of the management plan and all management activities.
19. Every person undertaking Forestry work shall be either under documented training and close supervision, or deemed "competent"; and/or Workers shall meet recognised Forest industry individual certification requirements or similar schemes relevant to their role.

20.2 What Happens When There are Failings Against the Standard?

If audits identify failings, in the case of FSC these are either:

- Observations (on the part of the auditor) where performance could be improved; which are often a precursor to:
- Minor corrective actions – where the organisation has a period of time (grace) to make corrections and demonstrate that the standard(s) in question are being met and during which time, certification remains in place
- Major corrective actions – where the organisation has a very limited amount of time to make (signed off) changes before certification can be confirmed.

An important factor is that audits see the independent auditors talking one-on-one (without the presence of the forest manager/owner) with a wide range of people involved directly and indirectly with the forest(s) being audited. This extends to talking directly with contractors and their employees as individuals. Note that the auditors (who are independent bodies such as Scientific Certification Systems (SCS) or SGS Qualifor) are themselves audited and accredited by the parent body (FSC International for FSC).

Both sets of standards allow for wider community consultation on the full range of forest management issues and those seeking certification must demonstrate that there has been genuine consultation. Additionally, both sets of standards provide for a formal record of "disputes" and a dispute management process that must be formally recorded. These avenues provide for parties not directly related to the forest to air and discuss, with the forest owner/manager concerned, any concerns or grievances.

20.3 Summary of Key Points

1. Most of the large forest owners/managers in New Zealand have Forestry Stewardship Council (FSC) Certification with a few also having the similar PEFC certification.

2. This certification requires the companies involved to comply with detailed standards that in addition to covering off environmental and financial performance, also have detailed standards involving worker/employee/contractor rights and health and safety.

3. Certification involves annual audits and major five yearly reviews of performance against the standard and, once obtained, forest owners/managers are highly motivated to maintain certification.

4. In addition to interviews with contractors and crew members where issues and concerns can be (privately) raised with an auditor, there are opportunities for parties not directly involved in forest operations to raise concerns and issues and the standards require any disputes to be disclosed and managed transparently.

21.0 Getting the Balance and Management Consistency Right in HSE - Having the Right People Involved in doing the Right Things

Ensuring the forest manager is not doing the contractor's job for them in terms of health and safety management is important. Whilst it is less common than was the case a decade or so ago, there are still examples where forest management staff find themselves doing more than just encouraging and supporting a contractor in their preparation and operation of a health and management system. Examples include the use of a company/generic template for a contractor's health and safety plan (which may be inadequate), through to management staff leading/chairing crew health and safety meetings and generally reflect a level of unwillingness or sometime a lack of ability on the part of the contractor/crew owner to take on these tasks. Because a forest manager will not be on the job daily, a lack of within-crew leadership in terms of health and safety is far from ideal and should be a red flag when systems and practices are reviewed.

A further issue can arise when a harvesting contractor has crews working across a number of forest owners and each owner has a completely bespoke approach to health and safety. In the worst cases these can be contradictory. In some regions there are Wood Councils (Northland, East Coast,

Southern North Island, Otago-Southland are the best examples) where there is an opportunity for a ensuring a degree of regional consistency around common issues and concerns. e.g. the standard of HSE, radio communication protocols etc.

21.1 Summary of Key Points

1. Care should be taken to ensure harvesting contractors have “ownership” of their health and safety system and manage it in a hands-on way rather than out-sourcing this work or relying on others who will not be at the workplace on day-to-day basis.

2. There are opportunities through regional wood councils to get (at least regional) consistency around common concerns and issues.

Appendix 1 – Summary of All Key Points

The Supply Chain

1. There have been major changes over time in New Zealand forest ownership and the current picture is vastly more complex and variable than was the case in the early 1980s with the rise of institutional investors and out-sourced forest management in particular being a constant theme.

2. Although there is a low barrier to entry in terms of being a forest manager, many of the larger companies have a 20 year plus history of offering these services in a competitive environment where quality of service features as a key component and, for corporate-owned[104] forests in particular, health and safety performance and records form a critical part of selection processes of management contractors and harvesting contractors.

3. Outsourcing forestry operations to independent contractors has been a long-standing (40+ years) practice and any wide-scale return to carrying out operations in-house is highly unlikely.

4. Many New Zealand commercial forests are now owned by off-shore entities (a mix of forestry companies and funds managers). This ownership model sees a degree of churn in terms of ongoing sales and purchases.

5. Māori – mostly through Treaty of Waitangi settlements – are now major owners of forest lands in New Zealand and are increasingly seeking to become forest owners and, in some cases are taking on forest management as well. This can create a complex management situation with respect to the same parcel of land as areas are "surrendered" post-harvest, back to Māori owners.

6. Forest owners are represented through the NZ Forest Owners Association (FOA) – mostly for larger corporate forest owning entities; and the Farm Forestry Association which represents many farm foresters. Industry good funding is achieved via a levy of wood harvested and administered through the Forest Growers Levy Trust. This funding also underpins the Forest Industry Safety Council (FISC).

7. Wood Councils (regional entities that exist to promote and support forestry with a region) are a possible means of developing, promoting and co-ordinating regional level health and safety initiatives.

8. Harvest contracting models have evolved along with the capital investment and management skills needed to successfully run the businesses. However, many are still "owner operator" although "corporate" operations involving multiple crews are becoming more common. Harvesting contractors are represented by the Forest Industry Contractors Association.

9. Whilst there are a number of other parties that directly interact with harvesting contractors at their place of work, for the most part these parties do not leave the skid/landing and the major health and safety risks are around the use of forest roads. This applies also to logging truck drivers.

10. There are multiple operating models in terms of the supply chain. Some are more complex (involve more players) than others.

[104] As contrasted with farm foresters whose prime business is farming and who are part-time participants in the forestry sector.

Forest Owners and Managers

11. The commercial forestry (owning) sector in New Zealand is hugely varied from very large international funds where the New Zealand investment represents a small but important portion of their total investment; to long-standing forestry companies – many with their origins offshore; to syndicated investments and individual farm foresters.

12. Estates owned by the very large investment funds and forestry companies are generally large in size and are now mostly into second and subsequent rotations (i.e. have infrastructure in place).

13. The rise of investment funds and syndicated investments has led to the rise of specialist forest management companies thus adding another party in the supply chain.

14. The larger forest owners/managers tend to have well-experienced forest management staff and the use of specialist health and safety managers is common.

15. Forest growers are well represented in New Zealand and through the use of a levy on logs sold, collectively fund "industry good" projects that includes the Forest Industry Safety Council.

16. There is not good information on the large number of smaller forest owners which includes both farmers and investors and most are not linked into industry organisations.

Where are the Forests?

17. In the age range 21-35 years, which is the age range for harvesting radiata pine in New Zealand, the key regions for commercial planted forest, collectively making up more than 50% of the total age class area, are the Central North Island, the Southern North Island and the East Coast.

18. Other regions that figure prominently in the planted area in the key (26-30) age class are Hawkes Bay, Otago/Southland Nelson/Marlborough – all about 11% of the total area for the age class; and Northland on 9%.

19. This "order of importance – area-wise" will continue to play out for the next 25-30 years as the forests that will be harvested over this period are already planted.

Wood Availability Forecasts

20. Annual harvest volume is predicted to rise steadily from a current 35.7Mm^3 to a peak of just under 40Mm^3 in 2025, before the decreasing to a "low" of 25.5Mm^3 in 2034; from which point it will grow to a "steady" yield of around 32Mm^3 per annum thereafter.

21. This rise, followed by a fall, will have a significant impact on the industry as after 2025 there is likely to be surplus capacity in respect of harvesting before harvesting levels rise again. If an annual average production rate of 150,000 tonnes per year (24 loads per day) is assumed – and this might be on the high side – the 14Mm^3 reduction over the nine-year period of decreasing harvest period from 2025 to 2034 will equate to around 93 harvesting crews[105].

22. The steady rise in harvest volume over the next 4-5 years is driven largely by "small forest" (i.e. forest owners with less than 3,000 hectares of forest) harvesting – reflecting the boom of planting that happened in the mid-1990s by small-scale investors (see section 4.1). This rise is most pronounced in the Southern North Island.

[105] Assumes annual production of 150,000 tonnes per annum, 220 working days in the year and 28t per load.

23. Small forest owner harvesting is likely to account for almost all of the variability in wood availability for the next 40 years. Over the period of these forecasts, the harvest from the forests of larger forest owners (i.e. owners with more than 30,000 hectares of forest) stays remarkably constant at around 20Mm^3 per annum.

24. The regional breakdown of total wood availability (Chart 4) points to the dominance of the same key regions in volume terms as the forest ownership area data in the previous section. The Central North Island is dominant in volume terms (around 13Mm^3 per annum over the next five years). Northland, Hawkes Bay, East Coast, Southern North Island, Nelson-Marlborough and Otago-Southland are all similar (in the range 3.0 - 4.5Mm^3 per annum). Canterbury harvest will decrease – from what is already a fairly low base due to forest areas being converted to farmland post-harvest. There is relatively little harvest volume on the West Coast reflecting a small planted forest base (low land availability and difficult commercially in terms of distance from market).

Log Exports

25. Production forestry in New Zealand is a commercial business and log price is a critical consideration for every forest owner.

26. Access to log export markets is vitally important for New Zealand forest owners, most of whom have no other alternative for a reasonable proportion of their harvest.

27. Because of the strong export market for radiata pine logs from New Zealand and the fact that most forests in New Zealand are reasonably close to an export port, export log prices effectively set a benchmark for domestic log sale.

28. Most large forest owners/managers have ongoing harvest and long-standing formal and informal supply arrangements in place with domestic mills and, regardless of log price, take a strategic approach to ongoing supply to these mills. This is not always the case for smaller forest owners with a single age class who will be heavily motivated to harvest only when prices are good.

29. When export log price reduces suddenly, harvesting operations that are heavily exposed to log export markets are impacted and it is not uncommon for contractors to be laid off, or put on quotas, or asked to take a harvesting price decrease.

The Profit and Loss Equation (and its Implications)

30. Costs are critically important to the forest owner/manager and are especially so in a situation when log prices have dropped suddenly and forestry harvesting operations which previously, were profitable, are suddenly losing large sums of money on a daily basis. The impact of this will invariably be greater for a forest owner who:
    - Doesn't have a "portfolio" of forests where losses from one operation can be offset by other more profitable forests. (Larger forest owners generally take this approach and accept that amongst the forests they own/manage, the (financially) "good" performers offset the "bad".
    - Is completely exposed to the log export market.

31. It is not uncommon for contractors to be laid off or put on a quota with a month's notice – or in worse cases, a week's notice. Unless there are other options (like another forest block to move to), this creates huge financial pressure on contractors who have fixed costs to meet and their own staff to look after.

32. The other option of having harvesting contractors reduce price in order to stay in business can be as bad or worse for the contractor as a complete shut-down. (Slow financial death is every bit as final as when it happens quickly but is arguably worse for the contractor as the level of indebtedness can be greater).

33. When contractors are laid off (or in the lead-up to a quota being imposed) there is a strong incentive to "make hay whilst the sun is (still) shining" and to produce at a very high rate. This can lead to stress and shortcuts on the job as well as high log stocks (and associated congestion with trucking activity) on roads and skids.

34. In addition to being focused on harvesting costs, forest owners/managers who are working on slim margins are incentivised to watch every dollar of spend closely. Road/skid construction (as one of the other key cost components particularly on first rotation forests) can often be the next port of call for shaving costs – particularly in situations like woodlots and small investment forest blocks where the forest area is small and there is limited harvest volume over which expenditure can be spread.

Rate/Price Setting

35. Almost every harvesting operation in New Zealand uses a piece rate payment system based on cost per tonne ($/tonne). This approach is common world-wide.

36. Price setting (determining a rate per tonne) is generally done block-by-block as key inputs will change. The process involves determining the (daily) costs of an operation and dividing this by an estimate of daily production.

37. Costs (i.e. calculating a daily crew cost) are more easily calculated than is production. But balancing this is a "library of knowledge" in the industry on the part of harvesting managers and harvesting contractors on what constitutes a reasonable production range if not a specific number.

38. In the event that the derived rate does not work for a harvesting contractor, what commonly happens in larger, "corporate" forests where long-term relationships are important and a contractor has ongoing work and is shifted between blocks and/or forests, is that data is collected in the field by work/production study and the rate reviewed and re-negotiated.

39. In smaller (woodlot or investment single age class block) operations or where a contractor has bid for work via a tender system, there is a risk that the contractor will be held to the rate he/she has bid. This potentially puts pressure on the contractor to reduce costs and/or lift production – with attendant health and safety implications – or cease work and perhaps incur additional financial penalties.

40. The rate setting process needs to make allowance for the health and safety management and training time requirements of the crew's working day/week/year.

Owners' Decisions on Time of Harvest

41. Time of harvest for the owners of large forest estates with ongoing harvest is generally based on tree age and size and whilst market process does influence the volume harvested, these owners are unlikely to cease harvesting altogether if price drops. But they may seek to increase harvest to capture the benefits of a very high market price.

42. This is contrasted with the owners of small, single age class estates who are highly motivated by spot log price given the nature of their investment i.e. one chance in 25-30 years to get the maximum return. This contributes highly to the "boom – bust" nature of the industry. When prices are strong, finding a contractor is difficult and shortcuts are common in terms of pre-qualification and/or due diligence. When prices go in the other direction, these owners are the first to stop harvesting with very short notice given to the harvesting contractor.

43. Production pressure is an environmental factor that, in combination with other management and harvest crew culture failings (management complacency, role ambiguity, poor communications and low prioritisation of safety) will lead to poor health and safety outcomes.

Within Forest Access

44. The quality of roading infrastructure is often an issue for much of the woodlot/investment plantings that took place from the early 1990s with many of the forest owners of these blocks deliberately choosing to not make the early capital investment but instead to complete roading immediately prior to harvesting.

45. There are risks to this approach in terms of the forest owner trying to minimise spend by reducing roading and skid/landing density; and with little time being given for the road to "settle" which can be a particular issue when there are high-intensity rainfall events.

46. Farm woodlot blocks are also commonly planted in areas of farm that are difficult and costly to access and this can lead to "shortcuts" in terms of access quality that can negatively impact harvesting operations and pose a health and safety risk.

Mechanisation

47. Mechanisation of harvesting operations in New Zealand has played a very large part in reducing serious harm incidents and fatalities in the industry and providing a greater level of productivity and allowing older workers to be retained in the industry. But this change in the age profile has possibly also contributed to falls, trips and sprains.

48. There remains some work to do in terms of mechanisation/technology within the New Zealand industry, particularly in terms of reducing the need for manual breaking out through the use of grapple carriages and, where manual breaking out does take place, the use of GPS tracking and warning mechanisms.

48. Increased mechanisation has increased the capital cost of plant and equipment and poses financial risks for harvesting contractors when longer term contracts cannot be secured, or production is slowed (for whatever reason).

49. With mechanised falling becoming commonplace, there are fewer fulltime fellers in the bush which means that when stems (occasionally) need to be felled manually, the experience may not be on hand to allow this to happen safely.

50. Mechanisation has also led to a degree of social isolation with workers each in their own cab often having minimal social interaction which can have implications for sharing important information on hazards and risk and their management. Additionally, there are instances of "burnout" of young, skilled operators; an issue that could be better managed by operating shifts rather than having a single worker work long hours to maximise machine utilisation. Finally, machine cabs and machines themselves (especially when operating on steep slopes) are not 100% bulletproof.

Forest Harvesting Contracting Models

51. Almost every harvesting operation will involve a contract of some sort between the forest owner/manager and the harvesting contractor. Some of these contracts may be (formally or informally) of a long-term duration.

52. Although in the past "key supplier" arrangements were common in one major forest owner's forests, allowing one contractor to supply most/all of the harvesting capacity in a forest(s), this approach fell out of favour due to the perception of the balance of power in the relationship shifting away from the forest owner.

53. It is useful if contracts define a dispute resolution procedure, especially if it involves adjustment in the harvesting rate.

54. Small forest/investment single age class blocks can be susceptible to the forest owner changing his/her mind if there is a price fall and pose a risk for the forest manager where the contracting party is the forest manager (on behalf of the owner). This can lead to a forest manager being put in the uncomfortable position of standing down the contractor. In these cases, the solution is a formal agreement before operations commence on who makes what calls about the operation and how any disrupts are handled.

Port or Other Market Restrictions on Log Production

55. If harvesting operations are curtailed because of an inability of a customer (for export or domestic logs) to take delivery of logs, then there should be an arrangement in place that allows the harvesting contractor to be paid for log stocks rather than the contractor having to wait to have logs uplifted and trucked out. To not do so can put undue stress on a harvesting contractor's cashflow.

Knowledge/Experience of the Parties and the Need for Professional Input

56. Whilst it is rare to find corporate forest owners/managers or contractors without the experience to foresee both operational and contractual problems that can arise in a forest harvesting operation, and know what constitutes a reasonable (range of) solution(s), this is not always the case with the owners of smaller (single age class) forest blocks who can seek to save the costs of getting professional advice. This can lead to all manner of less than ideal practices and poor outcomes across the board.

Matching Harvesting Equipment (and Method) to the Site

57. Detailed harvesting plans are an absolute requirement in terms of managing health and safety on the job. These should be "living" documents which provide for input from harvesting and engineering contractors who are in the best position to suggest improvements. Where changes have implications for the harvesting contractor in terms of productivity, there needs to be scope for the negotiated $/tonne rate to be reviewed.

58. There will almost always be instances (in anything other than absolutely flat terrain), where the equipment a harvesting contractor has on site will not be ideally suited to every part of the block being harvested. The "can-do" attitude that prevails in the New Zealand forest industry generally means that "work-arounds" using the equipment and people on hand will often be used to ensure 100% of the block is harvested. This can lead to harvesting systems and people

being pushed into situations that can be unsafe and crew management (and forest management) processes need to identify and manage this risk

Workforce Issues and Crew Management

59. In a tight labour market, forestry has a history of struggling to attract people into the labour force to work in harvesting crews. This applies at entry level and, arguably the more important, crew manager/leader/foreman level. Reduced staffing levels can place additional stress on the remaining crew members who are working to a daily production target.

60. Turnover can be high and it is not uncommon for workers who have proven to be higher risk in terms of health and safety performance, to readily find a new crew instead of improving their performance.

61. Good leadership is critical in ensuring good health and safety outcomes and if a crew owner is unable to perform this, or if he/she is largely unavailable for day-to-day management on site, then a good crew manager/foreman is essential.

Cultural Issues

62. The phenomenon of younger workers, particularly those who are Māori operating in a crew where there are other whanau, being reluctant to point out health and safety issues or contradict older and more experienced crew members is well known in the industry and is being addressed. However, there is another issue involving forest owners and managers being "required" to take on particular harvesting crews (or contractors take on particular employees) if they want to get a harvesting job involving Māori land. In these instances, the Māori land owning entity needs to be part of a robust process for shortlisting and making appointments, with health and safety performance figuring prominently in the decision-making.

Geographical Issues

63. Travel time (and the need for very early workday starts) can be a contributing factor to poor health and safety outcomes not just on the job, but also during the drive to and from the site if people are fatigued. In a situation where the crew is transported in a single crew vehicle, the driver can be particularly impacted. Loader drivers also are impacted as, for operational reasons, their workday can be longer than other crew members.

64. Whilst conditions in some forests (terrain, ground conditions, forest type) appear inherently higher risk than others, it is not always true to equate these physical conditions with poorer health and safety outcomes. What is generally more important are the factors that influence decision-making on the part of individuals undertaking high risk (dangerous) tasks and these are often the things, along with production pressure, that contribute to a job being difficult and dirty. In these cases, people can break rules and shortcut operating procedures often with dangerous consequences.

FSC and PEFC Certification

65. Most of the large forest owners/managers in New Zealand have Forestry Stewardship Council (FSC) Certification with a few also having the similar PEFC certification.

66. This certification requires the companies involved to comply with detailed standards that in addition to covering off environmental and financial performance, also have detailed standards involving worker/employee/contractor rights and health and safety.

67. Certification involves annual audits and major five yearly reviews of performance against the standard and, once obtained, forest owners/managers are highly motivated to maintain certification.

68. In addition to interviews with contractors and crew members where issues and concerns can be (privately) raised with an auditor, there are opportunities for parties not directly involved in forest operations to raise concerns and issues and the standards require any disputes to be disclosed and managed transparently.

Getting the Balance Right in HSE Ownership

69. Care should be taken to ensure harvesting contractors have "ownership" of their health and safety system and manage it in a hands-on way rather than out-sourcing this work or relying on others who will not be at the workplace on day-to-day basis.

70. There are opportunities through regional wood councils to get (at least regional) consistency around common concerns and issues.

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