



Biosecurity Profile: Plantation Forestry

March 2016



Contents

Purpose	1
Key contacts	1
Plantation forestry – Industry overview	2
Background	2
Industry structure	2
General overview.....	2
Industry associations	4
Distribution.....	6
Plantation forests	6
Species and at-risk populations	7
Processing and manufacturing.....	8
Distribution centres.....	9
Trade.....	10
Economic value	12
GDP	12
Additional economic contribution	13
Life cycle	14
Data sets	16
Current sets	16
Initiatives	17
Communication.....	18
Written communication	18
Committees.....	18
Communication with the wider industry.....	19
Media spokesperson.....	19
Communication liaison	19
Biosecurity risks	20
Insect pests not currently recorded in New Zealand.....	20
Insect pests currently present in New Zealand	21
Pathogens not currently recorded in New Zealand	21
Pathogens currently present in New Zealand	22



Prioritisation of risk organisms.....	23
Potential entry pathways.....	24
Entry across the border.....	24
Non-border entry.....	24
Surveillance for early detection.....	25
Post-establishment spread scenarios & mitigation	26
Industry risk-mitigation and response preparedness.....	27
Training	27
Response surveillance	27
Organism management	28
Movement control.....	28
Zones	28
Risk goods.....	29
Tracking	29
Policy and legislation.....	29
Pre-agreements	29
Appendix 1 – Additional reading	30
Statistics	30
Organisational information.....	30
Tree species	30
Forest Health Surveillance.....	31
Pests and diseases	31
Appendix 2 – Commercial plantation species.....	32



Purpose

The purpose of this document is to provide MPI staff with an overview of the plantation forestry sector, with particular regard to biosecurity. This document may then assist in the identification of potential activities for readiness and response to biosecurity threats, on which the industry (plantation forestry) and government (MPI) could collaborate. The Biosecurity Profile: Plantation Forestry is the first step in negotiating Operational Agreements and formulating readiness and response plans. It will also provide a foundation for partnership between government and industry going forward.

Key contacts

The Forest Owners Association/Farm Forestry Association (FOA/FFA) Forest Biosecurity Committee would act as key contact on matters of biosecurity within the plantation forestry industry. A number of industry experts sit on the Committee and hold a breadth of knowledge on biosecurity concerns.

Key people

Name	Role	Contact
David Rhodes	CEO Forest Owners Association	027495 5525 David.rhodes@nzfoa.org.nz
David Cormack	Chair Forest Biosecurity Committee	021 222 9315 Dave.Cormack@dn.wenita.co.nz
Bill Dyck	Biosecurity Manager (FOA)	027 474 2161 billdyck@xtra.co.nz
Lindsay Bulman	Science Leader, Scion	07 343 5533 Lindsay.Bulman@scionresearch.com
Dean Satchell	President Farm Forestry Association	021 235 7554 dsatch@xtra.co.nz

Plantation forestry – Industry overview

Background

Plantation forests make up approximately 1.7 million hectares of New Zealand's land area. Approximately 1.1 million of these hectares are owned and/or operated by large commercial entities. Smaller private companies or landowners, some of which may also be farmers, own the remaining hectares.

Plantation forestry is spread throughout New Zealand. It is particularly predominant in the central North Island where an estimated 33% of all planted forest is found. *Pinus radiata* (radiata pine) makes up approximately 90% of all plantation forests. Douglas-fir, eucalypts, cypresses and other hard-and-soft wood species account for the remaining 10%. These species are slightly more populous in the South Island and primarily planted by smaller scale owners or farm foresters, although some larger companies are now planting an increasing number of these 'alternative species'.

Industry structure

General overview

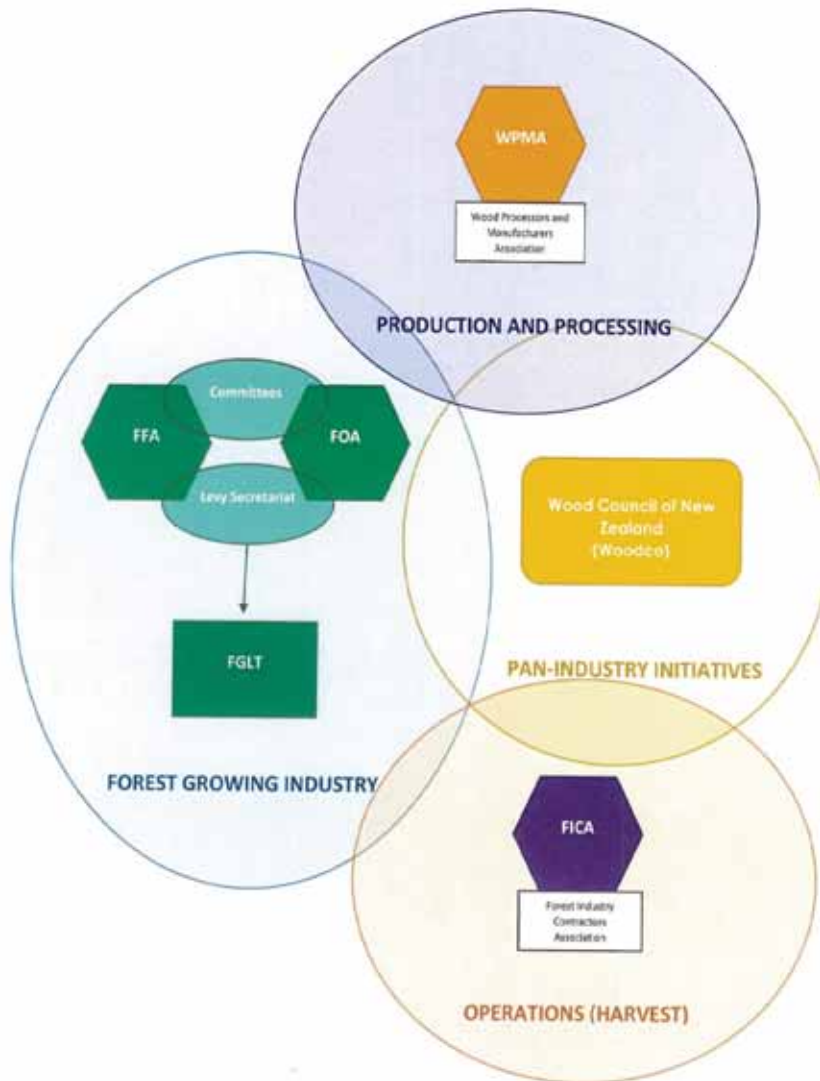
Forestry is a complex and multi-layered industry which is made up not only of large corporate entities, but also smaller landowners who may grow forests but may not define themselves as 'foresters'.

The forest industry itself is separated into two primary parts: the growing of trees and the processing of the harvested product. These two parts of the industry are fundamentally connected and have some common concerns and goals; yet the growing and processing portions of the industry are generally quite distinct and can differ on some issues.

The forest growing industry is now subject to the *Harvested Wood Materials Levy* (the Levy) under the *Commodities Levies Act 1990*. This levy was introduced on 1 January 2014 and includes all harvested wood materials (except for a few select products). The levy is administered by the Forest Growers Levy Trust.

For the purposes of GIA, this document will focus on the structure of the forest growing industry – which has signed the Deed - and its peripheral interactions with other parts of the sector.

Explanatory diagram



Industry associations

The Forest Growers Levy Trust

www.fglt.org.nz

The Forest Growers Levy Trust (FGLT) is the board, which oversees the administration of the Levy. It is the responsibility of the FGLT to ensure that the proceeds from the Levy are well-managed and used to best effect for the industry within the bounds of the Levy Order.

The FGLT's only function is the management of the Levy, it is not charged with representing the industry or making any decisions on its behalf that do not involve the administration of the Levy.

In order to assist with the effective administration of the Levy, the FGLT contracted the Forest Owners Association, in conjunction with the Farm Forestry Association, to manage the annual work programme on its behalf.

The Forest Owners Association

www.nzfoa.org.nz

The Forest Owners Association (FOA) was established in the early 1900s as a membership organisation. It is governed by an Executive Council with established rules. Its membership primarily consists of the larger corporate forest owning companies, but also some smaller growers. The current membership is responsible for producing approximately 80% of the annual harvest.

The FOA manages a number of industry-good Committees, which in turn are responsible for creating initiatives that will benefit the industry. The FOA, via its Committee network, produces a number of good management practice guidelines, funds research and manages the Forest Health Surveillance system.

With the introduction of the Levy, the FOA (in conjunction with the Farm Forestry Association) was established as Secretariat to administer the work programme on behalf of the Forest Growers Levy Trust. This means that the FOA now has a responsibility to all forest growers, not only its membership. As a result, while many of the initiatives were once only available to contributing members, these are now open to all current and potential levy payers but still managed by the FOA committee structure.

The Farm Forestry Association

www.nzffa.org.nz

The Farm Forestry Association (FFA) is a membership body that primarily caters for smaller woodlot owners, or farmers who are also foresters. While on many issues the FOA and FFA align, this is not always the case and there are some issues, which affect these parts of the industry slightly differently.

The FFA has a network of regional offices throughout as well as a national coordinator based in Wellington. Since the creation of the Levy, the FFA also has representatives on all FOA-managed committees.



Photo by Phil Taylor - Blakely Pacific

Distribution

Plantation forests

Maps presenting the geographic area of New Zealand's plantation forests are available from the Ministry for Primary Industries (MPI) <http://www.mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/> or from the National Exotic Forest Description: <http://mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/>

From the recent *Facts and Figures* publication (2014)¹, the distribution is estimated to be in the below:

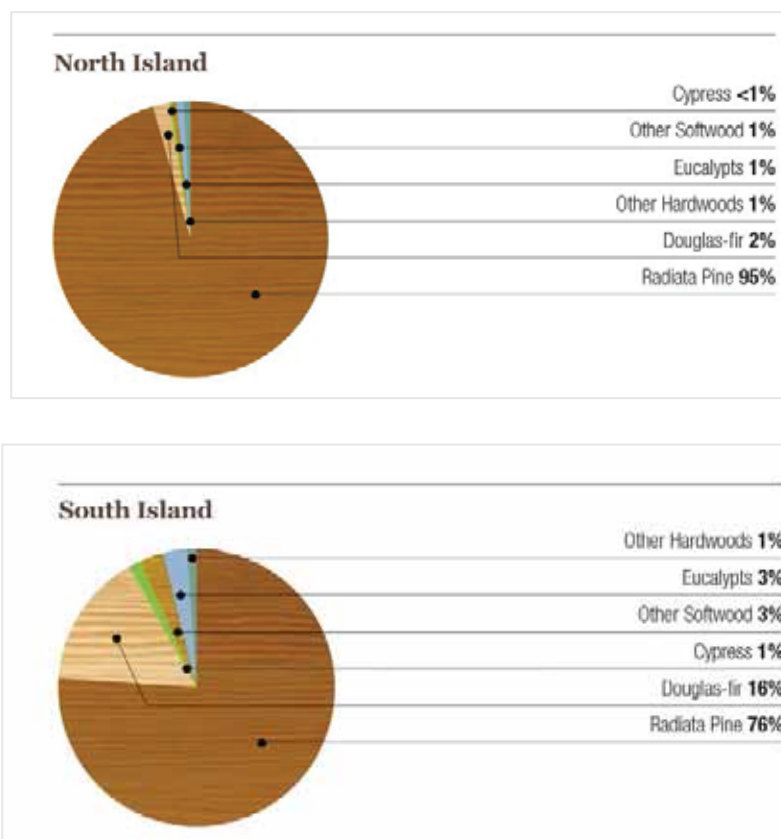
Plantation Forests by Location 2014			
As at 1 April 2014			
	2012 Hectares	2013 Hectares	2014 Hectares
Northland	202,559	201,196	191,512
Central North Island	552,097	553,956	587,104
East Coast	154,289	156,136	156,432
Hawke's Bay	129,586	131,735	133,324
Southern North Island	166,076	165,811	162,779
Nelson/Marlborough	168,585	170,171	168,421
West Coast	32,466	32,351	31,775
Canterbury	110,055	111,981	108,371
Otago/Southland	203,788	205,163	206,885
Total	1,719,501	1,728,500	1,746,603

¹ http://www.nzfoa.org.nz/images/stories/pdfs/factsandfigures_2014_web.pdf

Species and at-risk populations

While a majority of the commercial forest species is *Pinus radiata*, other species are also grown commercially, though on a smaller scale. Primary commercial species and genera are:

- *Pinus radiata* (radiata pine)
- *Pseudotsuga menziesii* (Douglas-fir)
- *Cupressaceae spp* (Cypress family)
- *Myrtaceae spp* (Eucalypts – *Eucalyptus* etc)²



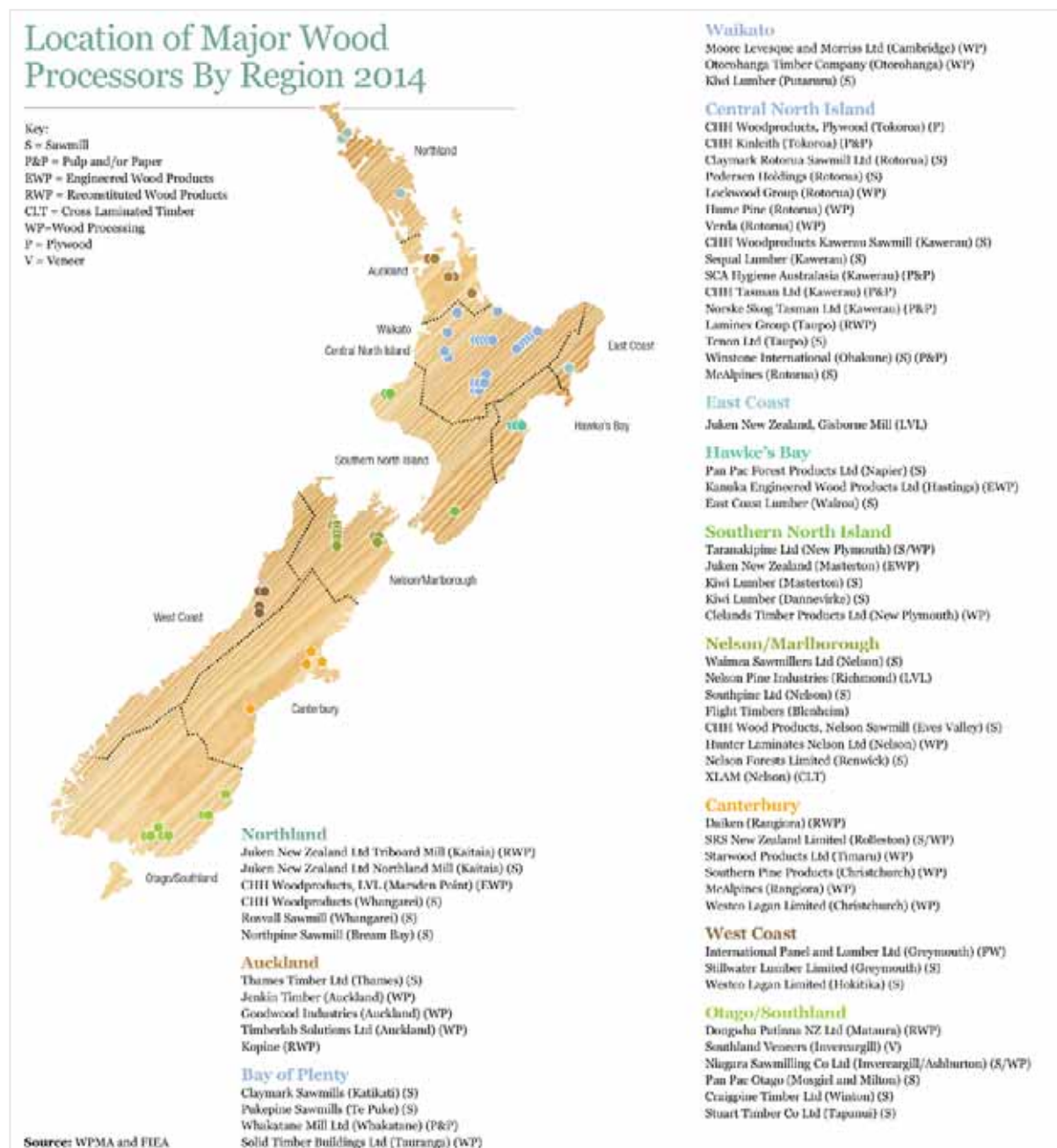
Facts and Figures 2014

However, while planted as commercial plantation trees, a number of these species/genera are also found in domestic or public gardens, and have functionality on farms. The family of *Myrtaceae* (which include commercially grown eucalypts) for example, also includes pohutakawa, rata, manuka, kanuka and others. Therefore, many biosecurity threats to commercial forest enterprises also need to take into account potential effects on indigenous and ornamental plants, including some iconic species.

² See Appendix 2 – Commercial plantation species for a relevant species list of species

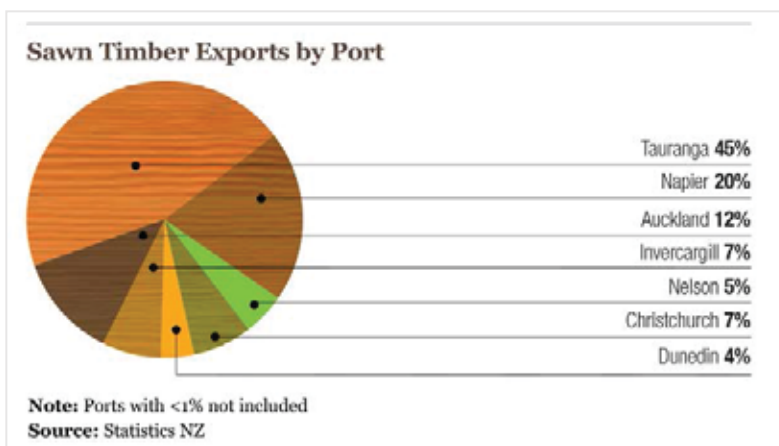
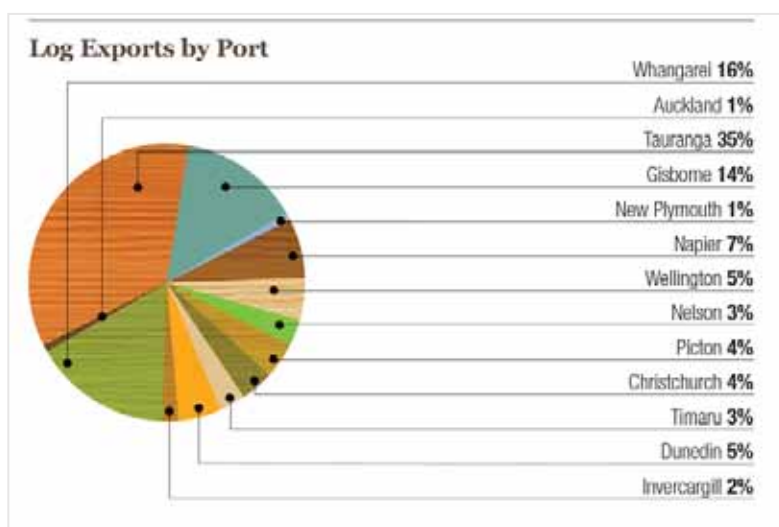
Processing and manufacturing

There are a large number of processing and manufacturing businesses in New Zealand and many of these are identified on the map below. However, there are a number of 'nomadic' processing businesses, (such as portable sawmills), which are not accounted for.



Distribution centres

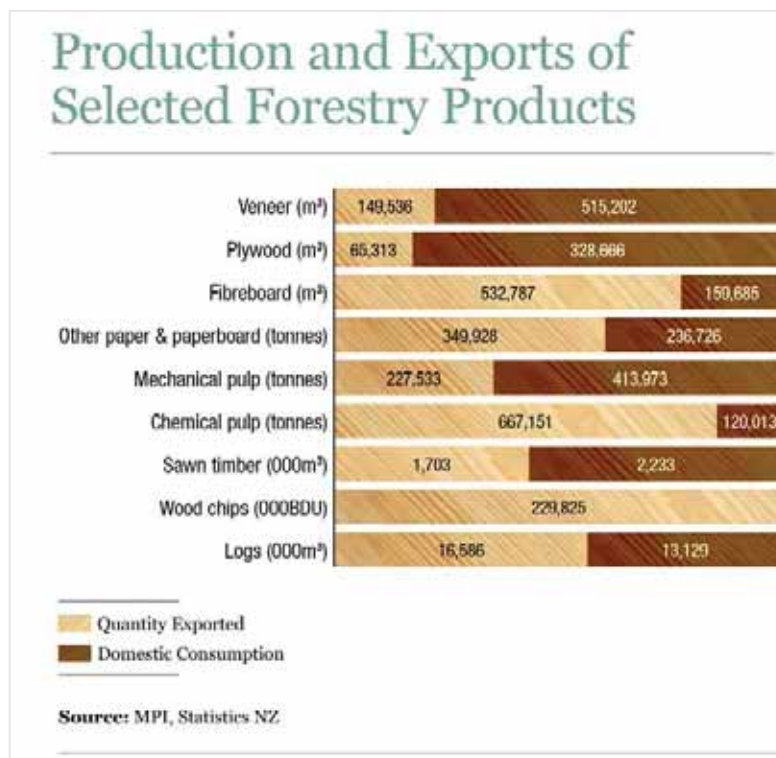
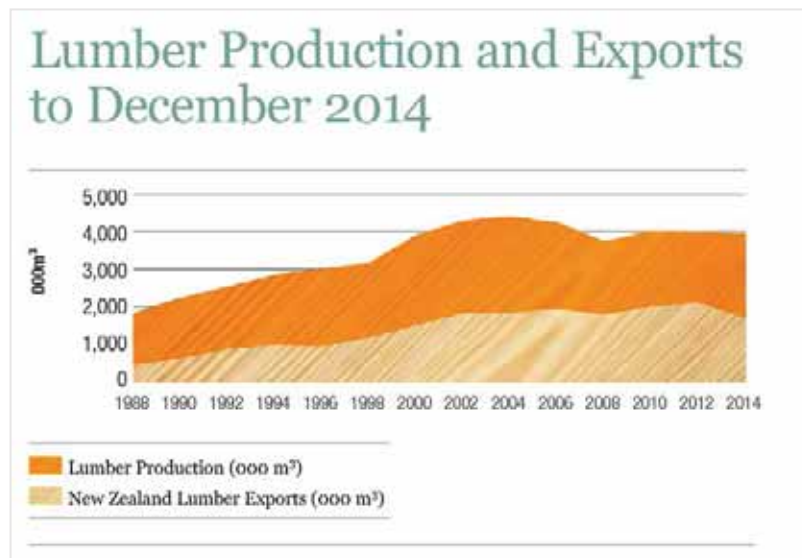
After processing or manufacturing, the resulting product may be sent to timber stores, furniture distributors or ports for export. After minimal processing, logs will continue straight to port for fumigation or debarking (depending on the requirements of the receiving country). Below are the statistics for the ports within New Zealand.



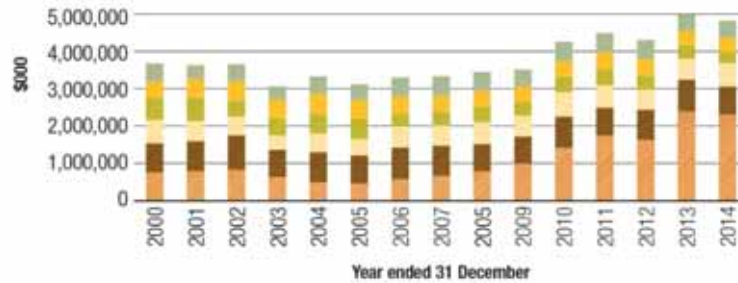
Facts and Figures 2014

Trade

Forest product exports are the third highest export earner in New Zealand. Below are the breakdowns of domestic versus export market and the various products.

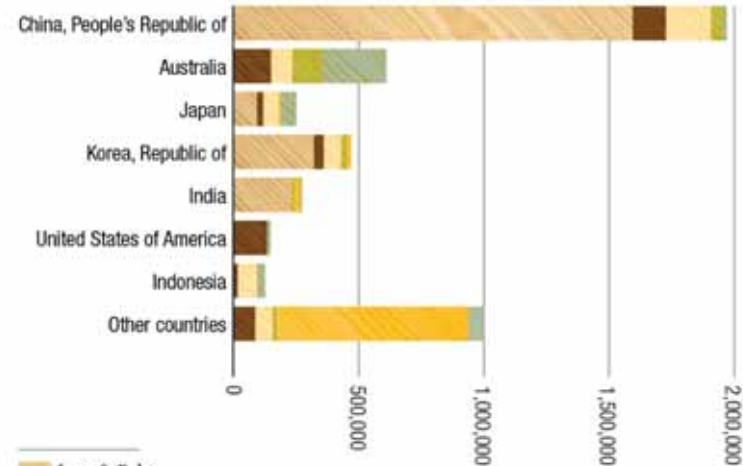


Major Export Earners



- Logs and wood chips
- Sawn timber and sleepers
- Wood pulp
- Paper and paperboard
- Panel products
- Other forestry products

Note:
Excludes re-exports
Source: Statistics NZ and MPI



- Logs & Poles
- Lumber
- Wood Pulp
- Paper & Paperboard
- Panel Products
- All Other Forestry Products

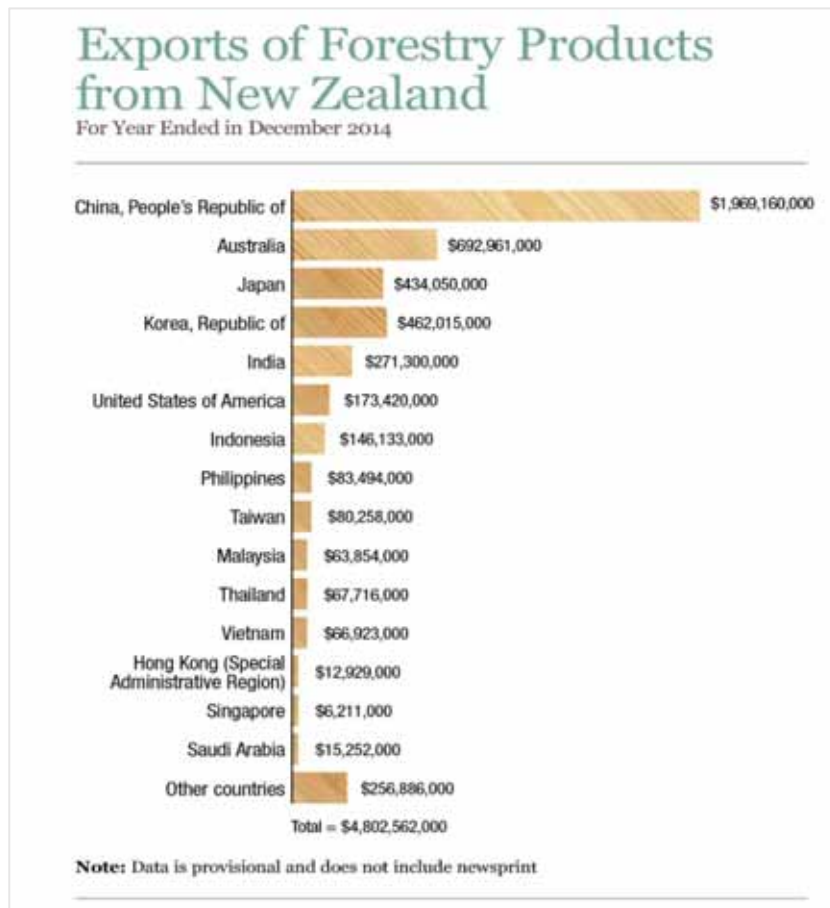
Note: Excludes re-exports. Newsprint data 12 months ending June 2010
Source: Statistics NZ

Economic value

GDP

Nationally, forestry contributed approximately \$4.8 billion in exports to the New Zealand economy in 2014, approximately 3% of the GDP, when taking into account the manufacturing sector also. It employs approximately 7000 people, however this figure is requiring some confirmation and does not taken into account those outside of the direct operational activities (i.e. – outside of those working in forestry and logging). In addition to this, the processing and manufacturing sector employs approximately 10,000 people.

Contribution to regional GDP is not well documented. Statistics NZ collects this information, however the industries of forestry, fishing and mining are generally reported together – making it difficult to use this information reliably. There have been some economic studies completed by members of forestry industry, such as the Regional Wood Councils. In one such study, completed for the Gisborne region in 2013, it was estimated that forestry had contributed approximately \$225 million directly to the economy, with an estimated additional \$383 million throughout the value chain. This is an area that has been identified as requiring further study by the industry.



Facts and Figures 2014

Additional economic contribution

Not included in GDP figures is the value plantation forests add via the recreational sector. A number of forests are open for public use, and access is usually free. Therefore, estimating the value of open-access plantations is difficult but not impossible. There have been two studies into the economic value of recreational access into Whakarewarewa forest in Rotorua. One of these was commissioned by the Rotorua City Council³ in 2009, (and undertaken by APR), and another completed by Scion in 2012⁴.

The APR report established that approximately 304,040 people had visited the forest for the purposes of a wide range of activities and this resulted in a contribution of approximately \$11,105,800 (annually) to New Zealand when considering the entire value chain.

The Scion study looked at what walking and mountain bike riding visitors to the forest would be willing to pay to use the forest. Using the visitor statistics from the APR report for these groups (walker = 88,500, mountain bike riders = 101,800) and a survey, Scion estimated that the average walker would be willing to pay \$34 per visit and the average mountain biker \$48 per visit. This estimate resulted in approximately \$8,000,000 (between \$5.5 and \$16.4 million annually when considering a 95% confidence interval).



Photo by Phil Taylor - Blakely Pacific

³ APR Consultants Ltd. 2009. *Recreational use and economic impact of Whakarewarewa forest: 2009 Update* from aprconsultants.co.nz/index.php/download_file/-/view/128/. Retrieved 11 November 2015

⁴ Dhakal, Bhubaneswor; Yao, Richard T.; Turner, James A.; Barnard, Tim. 2012. *Recreational users' willingness to pay and preferences for changes in planted forest features*; Forest Policy and Economics 17 (2012) 34-44

Life cycle

There are only three suppliers of seed for commercial exotic plantation species in New Zealand. Seedlings are generally cultivated in independent nurseries rather than by the commercial companies themselves, although there are a few plantation forest companies which do also have nursery businesses. The nurseries cultivating commercial forest species may or may not also produce seedlings for ornamental or produce purposes, and regularly grow cuttings also. While a forest owner may normally select seedlings or cuttings available near their forest, sometimes seedlings or cuttings may travel great distances.

The seedlings are planted at approximately 1 year of age, usually between late Autumn and early Spring, and then the area may be sprayed for weeds (depending on the country area) between ages 1 to 3 years.

The first thinning of the forest is likely to occur between ages 5 and 7 – this means that some of the trees will be removed to enhance the growth and form of the remaining crop component. The number of trees ‘thinned’ depends on the type of regime being employed by the forest owner. If the forest owner is intending to prune the lower stems of trees free from branches, more trees are ‘thinned’ in order to enhance the diameter growth of the pruned crop. If the forest owner is not going to practice pruning, fewer trees are ‘thinned’ to restrict branch growth and enhance the final crop yield. A forest may be ‘thinned’ 1 to 3 times in a rotation.

Harvesting of a radiata pine plantation forest generally occurs between the ages of 27 and 32, although trees may be harvested from 22 years onward if the market makes doing so advantageous. Douglas-fir generally has a 45 - 60 year cycle, while cypress species may be harvested from 40 years, and eucalypts from 12 – 15 years.

Once harvested, logs may be either sent to a port where they are fumigated (with methyl bromide or phosphine), or debarked and then exported overseas, or transported to a domestic processing plant. In 2014, approximately 56% of logs were exported as opposed to processed in New Zealand.

As planting generally occurs in late Autumn to early spring, the time between harvest and replanting is dependent on when harvest took place and how long it took to prepare the land for new seedlings. Land may remain cleared for longer, however and under the Emissions Trading Scheme becomes registered as ‘deforested’ after four years.

During the cycle, spraying for pests and fungi occurs on an as-required basis. There are two formal programmes running within the industry for the purpose of identifying potential biosecurity/ health risks: the Forest Health Surveillance Scheme, which is primarily aimed at detecting new pest incursions, and an annual survey to assess if stands need treating to control *Dothistroma*⁵ Needle Blight. In some parts of the country, radiata pine is particularly prone to *Dothistroma*, and these areas are surveyed in winter, then sprayed with copper fungicide in November if disease levels

⁵For more information, see Pests and diseases under Appendix 1 – Additional reading

are above a particular threshold. A particularly heavily diseased area may be resprayed in February. Additional surveillance and spraying is carried out on some eucalypt species (primarily *E. nitens*) due to an introduced beetle, *Paropsis charybdis*, the eucalyptus tortoise beetle, which can defoliate certain eucalypt species.



Photo by Phil Taylor - Blakely Pacific

Data sets

Current sets

Supplier	Description	Access	Analysis
MPI	Comprehensive data on harvesting, processing, exports and imports. It provides the best data available	MPI website http://www.mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/	Much of the data is from Stats NZ. This means there are some significant holes in the data designed to preserve anonymity of suppliers or when dealing with areas that have smaller numbers.
Stats NZ	Supplies data on economic input, workforce etc.	Stats NZ website and Infometrics tool http://businesstoolbox.stats.govt.nz/IndustryProfilerBrowse.aspx	Some useful material, however Stats NZ generally combines statistics for forestry with other industries such as mining and fishing, therefore it is not useable. As a majority of this data is collected via census, there is some removal to ensure anonymity and generally does not define its data sets.
National Exotic Forest Description	A comprehensive annual overview of the current state of plantation forestry.	Via MPI website http://www.mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/	Data collected via national survey of forest owners with over 40 hectares of planted forest. The survey gets a good response rate, however relies on <i>known</i> forest owners of which there is no comprehensive list.
Facts and Figures	A yearly publication put together by FOA with assistance from MPI. This publication combines all valid statistics on the forestry industry into one publication.	Via FOA website or through hard copy booklet http://www.nzfoa.org.nz/images/stories/pdfs/factsandfigures_2014_web.pdf	Good overview of the industry but using current statistics available from MPI, Stats NZ and the NEFD. Therefore, it has the statistical issues related with these data sets.

Initiatives

The industry acknowledges that there is a need for improved data, as well as improved access to data. Currently there are two projects funded by the industry, which may assist in gaining clarity on the current state of the industry, as well as to communicate this easily with the public.

Research

A project that will provide a more accurate analysis of the forestry contribution to the following is under consideration:

- National and Regional GDP
- Employment – across the value chain
- Other significant data

Dissemination of information

A project is underway to create a forest portal where all information, including statistics, about the industry will be available. Currently this data will come from sources listed in the previous table, along with any other science or study conducted.



Photo by Phil Taylor - Blakely Pacific

Communication

Written communication

Both the FOA and FFA produce regular publications for their membership and several external entities.

The FOA produces a monthly electronic newsletter, exclusively for its membership. *E-News* communicates key occurrences in the industry or politics, which may affect forest growers.

In addition to this, the *Bulletin*, circulated three times a year is available to external parties. The *Bulletin* caters to an external audience and displays what the industry is doing or any concerns it may have.

The FFA produces the *Treegrower* on a quarterly basis, which is available to its membership and external parties. The magazine produces articles of interest to its membership and looks at the political issues of the day.

Lastly, there are other publications run by the NZIF in the form of newsletters and journals, plus regular independent weekly newsletters called Friday Offcuts and Wood Week.

Committees

The FOA has a Committee structure, and the FFA has representation on all Committees. These Committees manage key subject matter areas relevant to the forestry industry and meet four times per year. The Committees are:

- Forest Biosecurity
- Forest Research
- Fire
- Forest Resources and Environment
- Transportation and Logistics

These Committees are key to communication throughout the industry, and for technical expertise. However, admission to the Committees is only open to FOA and FFA membership.

Communication with the wider industry

With the introduction of the Levy, it is important that FOA communicates more widely than its membership. In order to achieve this, the Forest Growers Levy Trust created a website. This website is the primary avenue of communication with the unidentifiable levy payers and is updated with key information as required⁶.

An additional avenue for communication is via the Regional Wood Councils of New Zealand. There are five established Regional Wood Councils within New Zealand:

- Eastland Wood Council
- Northland Wood Council
- Hawkes Bay Forestry Group
- Southern Wood Council
- Marlborough Forest Industry Association
- Southern North Island Wood Council

These groups are made up of representatives of the industry within the specified region, often throughout the value chain. These groups are well placed to disseminate information to groups beyond the FOA and FFA membership.

Communication with the wider industry is also achieved through the annual Forest Biosecurity workshops, which are a joint event with MPI, and there are a number of research workshops, which bring members of the industry together.

Media spokesperson

The identified media spokesperson for matters on biosecurity is David Rhodes, CEO of FOA.

The identified media spokesperson for matters on biosecurity in David's absence is David Cormack, Chair of the Forest Biosecurity Committee.

Communication liaison

All communication related to a response will be coordinated through the FOA Office.

⁶ www.fglt.org.nz

Biosecurity risks⁷

There are a number of organisms, which present a threat to the plantation forest industry. Some of these are already present in New Zealand, while others pose a potential risk should they enter the country.

Insect pests not currently recorded in New Zealand

Pest (Scientific name)	Pest (Common name)	Primary host	Description
<i>Lymantridae</i>	Gypsy moths	Many species	Several species have been found in New Zealand (e.g. -white spotted tussock moth, painted apple moth, fall webworm, Asian gypsy moth) and have been eradicated. Of a major concern is the nun moth (<i>L. monacha</i>) which is not present in New Zealand currently
<i>Dendroctonus and Ips.</i>	Bark beetles	<i>Pinus radiata</i>	<i>Dendroctonus</i> and <i>Ips.</i> pose serious threats to New Zealand forestry should they establish
<i>Rhyacionia buoliana</i>	Pine shoot moth	<i>Pinus radiata</i>	This is currently causing issues in Chile
<i>Thaumetopoea pityocampa</i>	Pine processionary moth	<i>Pines and cedars</i>	One of the most destructive species to pines and cedars in Central Asia, North Africa and the countries of southern Europe

⁷ For general additional information see Pests and diseases in Appendix 1 – Additional reading

Insect pests currently present in New Zealand

Pest (Scientific name)	Pest (Common name)	Primary host	Description
<i>Sirex noctilio</i>	Sirex wood wasp	<i>Pinus radiata</i>	Under management. May cause concern with logs and is a reason for methyl bromide fumigation
<i>Arhopalus tristis</i>	Burnt pine longhorn beetle	<i>Pinus radiata</i>	Under management. Attacks logs and can cause seasonal issues for exports as a hitchhiker.
<i>Hylastes ater</i>	Black pine bark beetle	<i>Pinus radiata</i>	Widespread and attacks seedlings. Managed through log fumigation.
<i>Hylurgus ligniperda</i>	Golden haired bark beetle	<i>Pinus radiata</i>	Similar to Hylastes. Under management.
<i>Essigella californica</i>	Monterey pine aphid	<i>Pinus radiata</i>	No current issues in New Zealand, known to cause defoliation in Australia.
<i>Paropsis charybdis</i>	eucalyptus tortoise beetle	<i>Eucalyptus nitens</i>	Originally from Australia, this beetle causes defoliation.

Pathogens not currently recorded in New Zealand

Pathogen (Scientific Name)	Disease (Common Name)	Primary host	Description
<i>Endocronartium harknesii</i>	Western gall rust	<i>Pinus radiata</i>	Found in North America and causes serious damage to pine in some areas
<i>Bursaphelenchus xylophilus</i>	Pine wilt nematode	<i>Pinus radiata</i>	Not currently present in New Zealand. Has been recorded causing damage to radiata pine in Portugal. Little damage in natural radiata pine in California.
<i>Fusarium circinatum</i>	Pitch canker	<i>Pinus radiata</i>	Causes disease in radiata pine in California, Chile, South Africa and Spain. Not in NZ.
<i>Phytophthora pinifolia</i>	Dano Foliar del Pino (DFP)	<i>Pinus radiata</i>	Found in Chile and resulted in logs being banned in Australia and South Korea
<i>Phytophthora ramorum</i>	Sudden oak death	<i>Douglas-fir</i>	Perceived threat resulting in logs from Oregon being banned for export to China
<i>Heterobasidion annosum</i>		<i>Conifers</i>	It is considered the most economically important forest pathogen in the Northern Hemisphere.

Pathogens currently present in New Zealand

Pathogen (Scientific Name)	Disease (Common Name)	Primary host	Description
<i>Dothistroma septosporum</i>	Dothistroma needle blight	<i>Pinus radiata</i>	A needle blight widespread throughout New Zealand (barring dry areas). Managed through surveillance and spraying
<i>Cyclaneusma minus</i>	Cyclaneusma needle cast	<i>Pinus radiata</i>	Needle cast which causes growth loss. Some management in silviculture and breeding
<i>Phytophthora pluvialis</i>	Red Needle Cast	<i>Pinus radiata</i>	Widespread barring the southern South Island and is weather dependent. No export issues, but is detrimental to general forest health. No known management.
	Physiological needle blight	<i>Pinus radiata</i>	Probably caused by a phytophthora but not as serious as red needle cast. Does not affect logs. No known control.
<i>Sphaeropsis sapinea</i>	Diplodia	<i>Pinus radiata</i>	A fungus, which can infect wounds in trees and cause dieback. Not considered serious.
<i>Neonectria fuckeliana</i>	Nectria flute canker	<i>Pinus radiata</i>	Found in South Island. Fungus which infects tree wounds (i.e. – during pruning). Managed via silviculture.
<i>Phytophthora multivora</i>		<i>Pinus radiata</i>	Present in New Zealand and may cause future issues for radiata pine.
<i>Seiridium cardinale</i>	Seiridium canker	<i>Cupressus macrocarpa</i>	Fungus which can result in dieback and tree death, originally from North America
<i>Phaeocryptopus gaeumannii</i>	Swiss needle cast	Douglas-fir	Fungus originally from North America which can result in defoliation and stunted growth
<i>Colletotrichum acutatum f. sp. pinea</i>	Terminal crook	<i>Pinus radiata</i>	Can result in dieback at the tops of seedlings in the nursery.

Prioritisation of risk organisms

Scientific Name	Common Name	Reason
<i>Phytophthora pinifolia</i>	Dano foliar pini	Radiata pine is main host and is highly susceptible in parts of Chile. Upon arrival, it would be spread by airborne spores and extremely difficult to eradicate (if not impossible). May result, based on Chilean experience, in high mortality at least in wetter regions. Additionally there would be immediate impact on the trade of radiata pine.
<i>Fusarium circinatum</i>	Pine pitch canker	Considerable degree of uncertainty as to potential to spread and impact. While it could be eradicated quickly upon discovery if in a confined area (e.g. a nursery), as a presence of high nitrogen can exacerbate growth, it may spread easily throughout New Zealand through movement of nursery stock. Radiata pine is very susceptible to the fungus but dry regions may be unaffected. Additionally there would be immediate impact on trade until such a time as it could be proven as eradicated or mitigated by fumigation.
<i>Endocronartium harknesii</i>	Western gall rust	Impact would be high in the unlikely instance of arrival.
<i>L. monacha</i>	Nun moth	If caught early it could be eradicated, however it would cause considerable growth loss if a population spread.
<i>Phytophthora ramorum</i>	Sudden oak death	Would negatively affect trade if discovered in New Zealand. Has not been seen to affect radiata pine, but has caused trade issues in the North West of the USA with Douglas-fir. Major disease issue on larch in the UK.
<i>Bursaphelenchus xylophilus</i>	Pine wilt nematode	Significant impact on trade with a need to prove to trading partners of 'clean' products. Effect on tree health is uncertain.
<i>Heterobasidion annosum</i>		Potential for significant mortality within conifer plantations and high economic losses. As this is a root disease, symptoms do not appear generally until the tree is nearly dead. Has caused major concern in the USA.

Potential entry pathways

Entry across the border

Industry specific

The industry imports very few high-risk products. However, there is a high risk on imported machinery, which may have already resulted in risk organisms arriving, but remaining dormant and potentially becoming active and spreading to forests.

Other pathways

The primary risk to the forestry industry is the importation of ornamental plants, seeds and plant cuttings used in floristry.

An additional pathway is simply hitchhikers in cargo or imported wood products such as wooden materials and packaging, used vehicles and containers on ships or planes – as well as the ships and planes themselves.⁸ Camping and sporting equipment (e.g. golf clubs) may carry insect pests or pine foliage and forest debris that hosts pathogens.

Illegal imports, such as by plant collectors, also pose a risk, however the magnitude of this issue is unknown.

Non-border entry

Environmental

It is uncommon for pests and pathogens to spread in this fashion; however, wind is a factor in fungal and insect dispersal, for example species of rust being blown from Australia.

Domestic industry specific

Domestically, pests and pathogens have the potential of spreading via the movement of infected nursery plants or on the vehicles, including recreational transportation, from infected forests.

⁸ Poland & McCullough, 2006 as cited in Brockerhoff and Bulman, 2014; *Biosecurity risks to New Zealand's plantation forests and the rationale for pathway risk management* from *NZ Journal of Forestry*, August 2014, vol 59, no. 2

Surveillance for early detection

The Forest Health Surveillance scheme (FHS) - recently changed to the Forest Biosecurity Surveillance scheme (FBS) - has been active for over 60 years, well before the term "biosecurity" was coined. This scheme was originally only available to FOA member companies however, subsequent to the introduction of the Levy, it will be an all-of-industry system from July 2016.

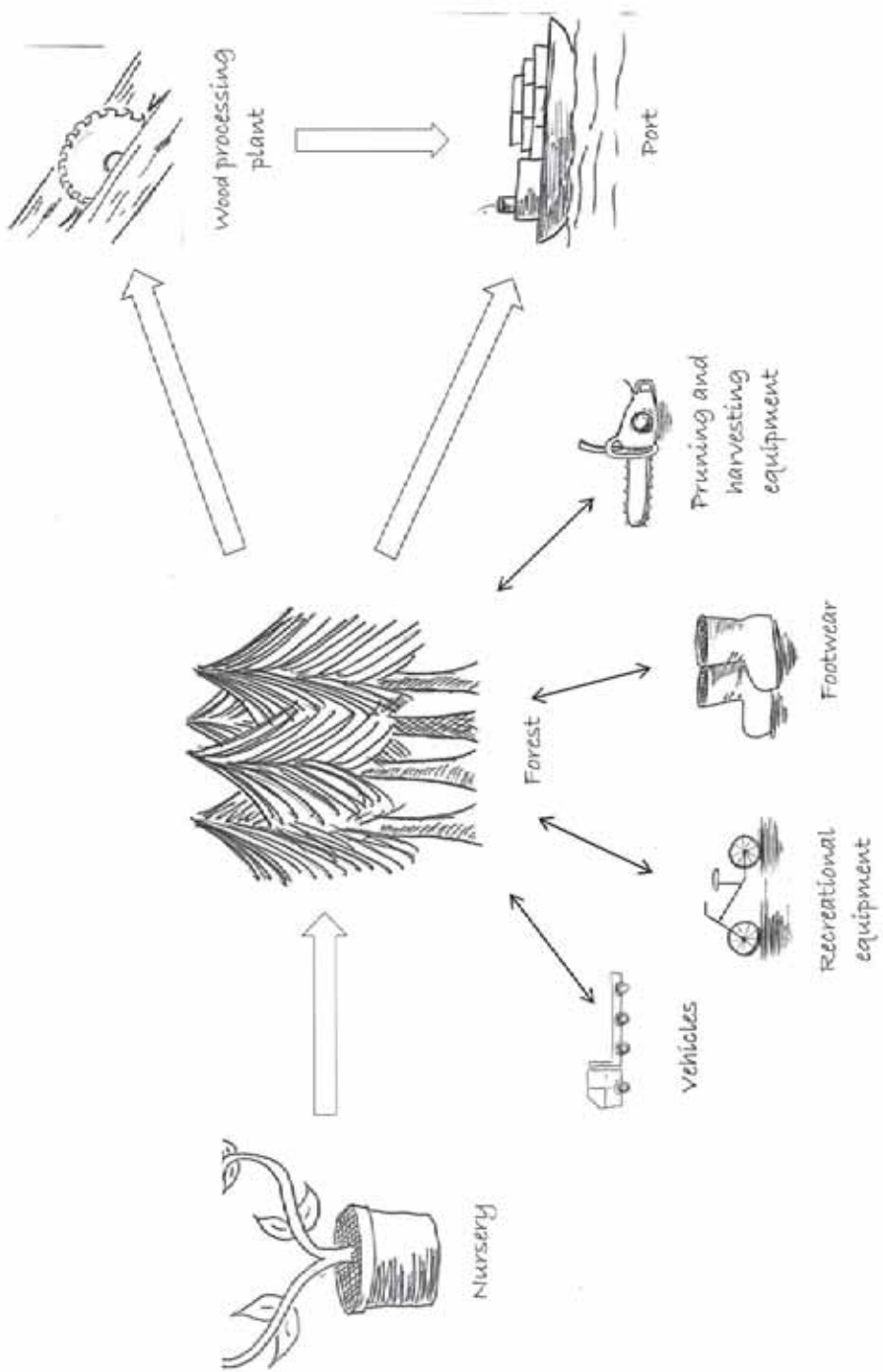
While the industry scheme focuses on early detection of risk organisms in-forest, it complements the MPI High Risk Site Surveillance, which focuses on potentially high-risk areas for incursion on woody vegetation.

The FOA contracts two independent companies, which implement the FHS.



Photo by Phil Taylor - Blakely Pacific

Post-establishment spread scenarios & mitigation



Industry risk-mitigation and response preparedness

Industry reduces biosecurity risk by working closely with MPI to ensure border measures are in place and that Import Health Standards are up to date and being correctly applied.

The industry also operates a Forest Biosecurity Surveillance system (previously the FHS) to enable early detection of any unwanted organism that breaches the border and provides substantial funding to biosecurity research to improve understanding of key biosecurity risk organisms, but present in New Zealand and offshore.

Currently there is only one response plan (*Fusarium circinatum*), although it is likely that a nun moth response plan will be developed in the near future.

Recently the Forest Biosecurity Committee agreed to establish an industry network to improve biosecurity readiness and response preparedness.

Training

Aspects of forest health are taught in forest management programmes at Waiariki and University of Canterbury.

Additionally, a workshop was held for members of the Southern North Island Wood Council (SNIWC) recently in Palmerston North. Led by Don Hammond and Richard Calvert (AsureQuality), the workshop looked at the structure and intent of the NBCN. It also included an incursion scenario to encourage thinking about the potential impacts of a response.

MPI staff, forestry consultants and managers, and the President of the Forest Nursery Growers Association attended the workshop. A similar workshop was held in the South Island last year, and was refreshed this year.

Response surveillance

Currently the industry does not participate in response surveillance. Although, the Dothistroma spraying project could be considered a response surveillance programme. It is likely that the FHSS could be adapted to include response surveillance, should the need arise.

Work is being completed on remote sensing of Red Needle Cast, with both aerial and ground detection being tested. Additionally, there is early sensing tests available now through Ubiquitome (and other diagnostic tools), which can detect the presence of Pthyophthora.

Organism management

Currently the industry engages in spraying for *Dothistroma* and is also researching the use of phosphites and of copper to control red needle cast. Additionally, Alpha cypermethrin is used to control *Paropsis* on eucalypts.

When considering organism management, this would very much depend on the organism in question. With the exception of *nectria flute* canker, few are managed in-forest but are rather fumigated or treated for transport. In the case of the above, the use of copper for *Dothistroma* has proven effective, although not a permanent solution. There are options to breed resistance against certain pests and pathogens. The other management option is tree removal and destruction, which is costly, may increase spread of the organism, and will decrease exports.

Movement control

Zones

Defining movement control zones is likely to be a challenge for forestry. Critical considerations when defining these zones are:

- The type of organism
- The spreading mechanism of the organism
- In large forest estates, whether the organism has spread or has a high potential to spread throughout the whole forest
- The potential for spread to neighbouring forests
- Whether nearby wood processing plants, trains or ports may have become a source of spread
- The likelihood that there has been contamination via transportation or people to other forests or sites

Movement control zone may be any or a combination of the following:

- A section of infected forest based upon hectares
- A whole forest
- A whole district
- A whole region
- A whole island
- A portion of highway
- Wood processing plants
- Ports

To attempt to mitigate the risk of spread there may need to be consideration given to the decontamination of trucks, people, tools, buildings and equipment.

Risk goods

When considering risk goods, these may be plants or inanimate objects. Plant cuttings for the ornamental or floristry industries may carry, pathogens or pests – while some polyphagous pests such as the brown marmorated stinkbug are known to enter New Zealand through multiple channels, such as on cars, in mail or via containers.

Tracking

Tracking through the supply chain relatively easy when considering in terms of seed, to seedling, to nursery to forest. Once harvested and transported however, the ability to trace a log back from the receiving processor or port, becomes more complicated. While those processors or ports may have an inventory of delivery, there is not necessarily a guaranteed way of identifying which log came specifically from which forest – most commonly the log would be to be tracked to one of many companies which delivered harvested products.

Policy and legislation

The industry needs to comply with the Biosecurity Act 1993, the Resource Management Act 1991, Health and Safety at Work Act 2015, the HASNO Act 1996 and any policies or restrictions that are issued from MPI or overseas customers.

Pre-agreements

The forestry industry is not currently part of the National Biosecurity Capability Network, however it has completed some joint work with AsureQuality and may consider joining in the future.

Appendix 1 – Additional reading

Statistics

2014 Facts and Figures:

http://www.nzfoa.org.nz/images/stories/pdfs/factsandfigures_2014_web.pdf

National Exotic Forestry Description and other MPI statistical information:

<https://mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/>

Organisational information

NZFOA:

www.nzfoa.org.nz

NZFFA:

www.nzffa.org.nz

FGLT, including past, current and future work programmes, and other general information about the Levy and Board:

www.fgl.org.nz

Tree species

General information on tree species grown for the specialty timber market in New Zealand:

<http://www.nzffa.org.nz/specialty-timber-market/showcase/>

Growing radiata pine:

MacLaren, J.P., 1993 *Radiata Pine Growers' Manual*

Forest Health Surveillance

Forest Health Surveillance Scheme:

<http://www.nzfoa.org.nz/resources/file-libraries-resources/foa-workshop-conference-reports/forest-health-workshops/fh205/553-protecting-the-industry/file>

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/forestry-biosecurity-surveillance-in-New-Zealand/>

<http://www.fglt.org.nz/work-programme/forest-health-surveillance/>

Pests and diseases

Forestry pests and diseases, general information:

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/assessing-and-sampling-forest-health/>

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/Forestry-pests>

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/Forestry-diseases>

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/Pests-diseases-by-tree-species>

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/New-and-unwanted>

Dothistroma

<http://www.nzffa.org.nz/farm-forestry-model/the-essentials/forest-health-pests-and-diseases/diseases/Needle-diseases/Dothistroma/dothistromaFRB220/>

http://www.scionresearch.com/_data/assets/pdf_file/0007/18781/Dothistroma-needle-blight-P05.pdf

Appendix 2 – Commercial plantation species

The following trees are those considered to be commonly grown for commercial purposes. Due consideration of species which are also less commonly grown will be given in a biosecurity response on a case by case basis, with particular concern regarding carrier species.

- Radiata Pine (*Pinus radiata*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Cypress (*Cupressaceae spp*):
 - Macrocarpa (*Cupressus macrocarpa*)
 - White Cedar (*Cupressus lusitanica*)
 - Redwoods (*Sequoia sempervirens*)
- Eucalypts (*Myrtaceae spp*):
 - Shining Gum (*Eucalyptus nitens*)
 - Brown Barrel (*Eucalyptus fastigata*)
 - Mountain Ash (*Eucalyptus regnans*)
 - Sydney Blue Gum (*Eucalyptus saligna*)

Every effort has been made to ensure that the statistics and information found within this document are an accurate and fair. The Forest Owners Association provides no warranty as to the accuracy and shall not be liable to any person or organisation for any loss or damage for the use, directly or indirectly, of the information.

This document is designed for information use only and should not be distributed without permission or used in isolation for any policy or biosecurity decisions relating to the plantation forest industry without consulting the Forest Owners Association.

