HAWKES BAY
FOREST INDUSTRY AND WOOD AVAILABILITY FORECASTS

2008

Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

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Photos provided courtesy of Pan Pac Forest Products and PWP (www.pwp.co.nz).

ENQUIRIES

Any enquiries regarding the content of this report should be directed to John Vaney (tel.: +64 7 921 3407 or email: john.vaney@maf.govt.nz).

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Ministry of Agriculture and Forestry
Pastoral House, 25 The Terrace
P O Box 2526
Wellington 6140
New Zealand
Tel: 64 4 894 0100
Fax: 64 4 894 0741

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DISCLAIMER

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIX TABLES

1 INTRODUCTION

This publication provides new wood availability forecasts and associated commentary for the Hawkes Bay region. Five forecasts have been prepared for radiata pine, and one for Douglas-fir. They have been prepared in co-operation with major forest owners and forest harvesting consultants.

Descriptive information is also provided on the plantation forest and wood processing industries in the region. Opportunities and constraints facing the regional forest industries are discussed.

The information contained in this report is intended to assist the forestry industries, planning practitioners, and infrastructure and service providers in assessing wood processing opportunities, resource management planning, and infrastructure issues. It will also assist the public understand the nature of the forest industry in Hawkes Bay.

References to Hawkes Bay and the Hawkes Bay region involve the land areas of the Wairoa, Hastings, Central Hawkes Bay Districts and Napier city.

This report is one of a series of publications on regional forestry industries and wood availability forecasts being produced by the Ministry of Agriculture and Forestry (MAF).

Readers intending to use these wood availability forecasts for planning or investment decisions are urged to thoroughly review the forecasts or engage the services of a professional forestry consultant who is able to interpret the forecasts in the context of specific planning or investment decisions.

OVERVIEW 2

There is a well-established forest growing industry in the Hawkes Bay wood supply region (referred to as "the Hawkes Bay region", or "Hawkes Bay"); it includes the land areas of the Wairoa, Hastings and Central Hawkes Bay Districts and Napier City.

To assist with future regional forest industry planning, the Ministry of Agriculture and Forestry has compiled wood availability forecasts for the Hawkes Bay region, covering the period 2008 to 2040. These forecasts have been produced in association with the region's major forest growers. The forecasts show the range of harvest volumes potentially available from the planted forest estate, of both large and small-scale growers. The forecasts are supply-based, but incorporate the short to medium-term intentions of the large owners. In utilising these forecasts, users need to recognise that the ultimate determinant of harvesting activity at any particular time is the market demand for logs.

The forecasts indicate that the availability of radiata pine from the Hawkes Bay will remain relatively static over the next decade (2008–2015). While the forecasts indicate a static supply during this period, it is important to recognise that short-term fluctuations are likely as market conditions change.

The forecasts show that an increase in wood availability is possible after 2016, when the Hawkes Bay regional harvest has the potential to increase from the current level of about 1.7 million cubic metres, to around 3 million cubic metres after 2021. Most of the potential increase in wood availability during this period is from the small-scale forest growers who established forests during the 1990s. This increased harvest will provide logs for expansion of local wood processing in the region with substantial benefit to the Port of Napier as the logical export port.

The actual timing of the harvest from these forests will depend on the decisions of a large number of small-scale owners. Market conditions and logistical constraints (availability of logging crews, transport capacity, and wood processing capacity) will limit how quickly the additional wood availability from small-scale owners' forests can be harvested in that period.

In the later part of the forecast period (post-2034) the total harvest is projected to decline. This is in line with the age structure of the resource. The timing (and level) of decrease will depend on the rate at which the regions' post-1990 forests are harvested, the extent to which they are replanted, and also the level of new land planting. The forecasts are based on no new land planting. The area that is expected to be deforested in the Hawkes Bay between 2008 and 2020 is predicted to be only around 5500 hectares: this is quite low compared with some other forestry regions.

While there is limited potential to increase harvest volumes over the next nine years, there are opportunities to more fully utilise the available resource. A number of mills have moved (or are moving) to process some of the lower-quality logs that are currently exported.

The region has a modest range of wood processing industries, dominated in size by Pan Pac Forest Products' large integrated pulp mill and sawmill complex at Whirinaki, and in number by small to medium-scale sawmills (in a New Zealand context). A significant proportion of processed wood products are exported through the Port of Napier, while the volume of log exports has varied over recent years.

The total wood processing capacity is based on the "usual" number of working hours per day for a mill. The existing capacity of the regional sawmills and the Pan Pac pulp

mill is estimated to be about 1 101 000 cubic metres (roundwood input) per year.

Given that some logs are processed outside the region and some are exported, this suggests that there is limited potential for installing additional wood processing capacity for the next nine years unless logs are sourced from outside the region. Beyond 2016 there is potential for additional investment in wood processing capacity: this will be driven by potential harvesting from the resource planted in the 1990s by a large number of small-scale forest owners. The pattern of harvesting from this resource is less certain than harvesting from the large-scale forest owners.

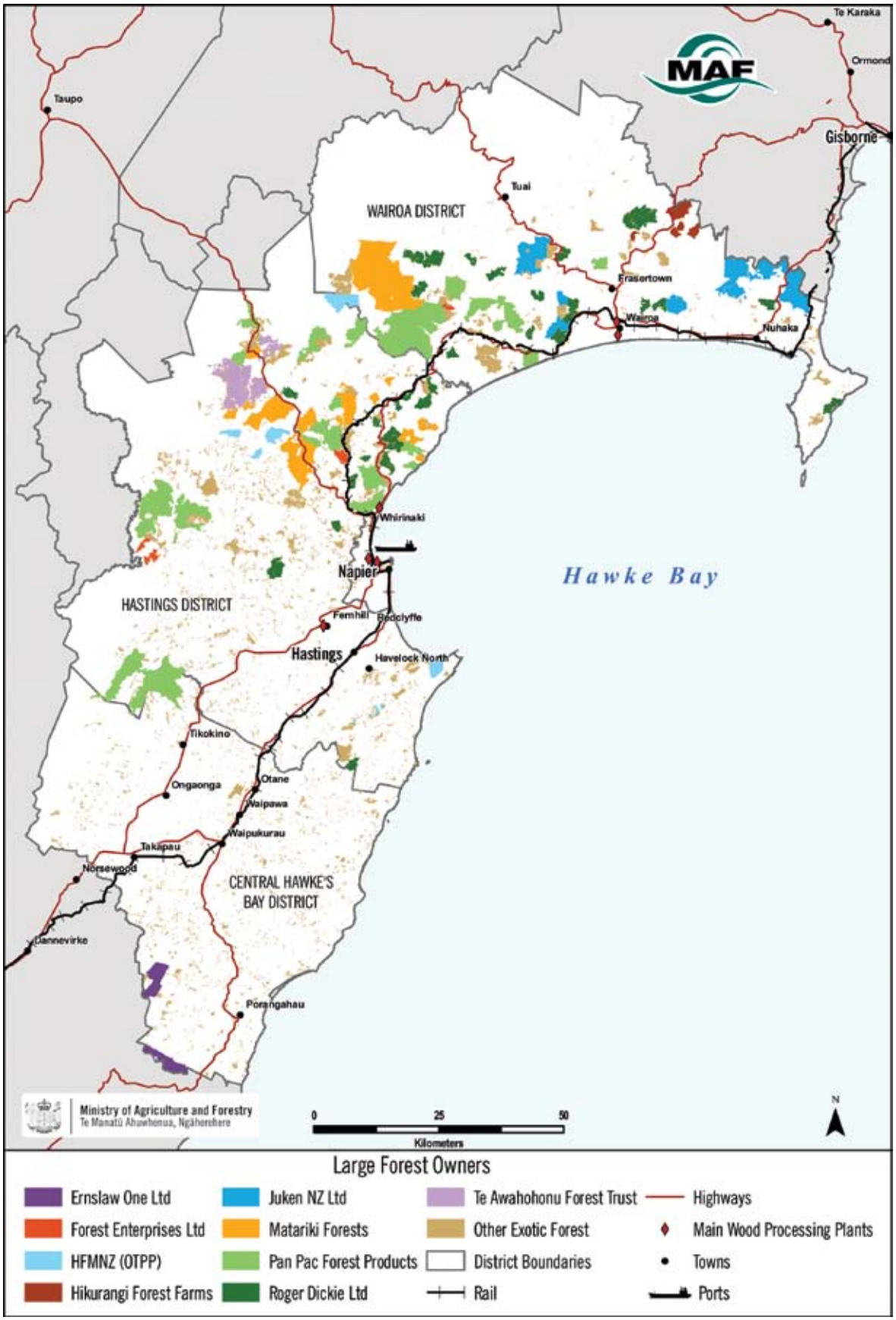
TABLE 2.1: KEY STATISTICS FOR THE HAWKES BAY FOREST INDUSTRY[1]

STATISTIC	VALUE
Stocked plantation forest area as at 1 April 2007 (ha)	132 000
Harvest – estimated roundwood removals – year ending March 2007 (m^3)[3]	1 653 000
Area weighted average age of plantation forest as at 1 April 2007 (years)	13.76
Sawn timber production – year ending March 2007 (m^3)	351 000
Estimated log input to sawmills – year ending March 2007 (m^3)	635 000
Market pulp annual production capacity (tonnes per year)[2]	260 000
Estimated wood processing capacity (m^3)[4] – roundwood input	1 101 000
Log exports – year ending December 2007 (m^3)	542 000
Sawn timber exports – year ending December 2007 (m^3)	274 000
Wood chip exports – year ending December 2007 (BDU)[5]	103 000
Direct employment, forestry and first stage processing as at February 2007 (FTE)	1 083

Sources
1. All statistics from Ministry of Agriculture and Forestry unless indicated otherwise.
2. Pan Pac Forest Products Ltd.

Notes
3. Estimated roundwood removals are derived from processing outputs and log exports. They do not account for inter-regional log flows. See discussion under Historical Roundwood Removals (Chapter 3) for further explanation.
4. This is an estimate of the sum of the individual processing plants' roundwood input capacities and does not take account of the Pan Pac Forest Products pulp mill sourcing some fibre as chips from sawmills.
5. One BDU (bone dry unit) of softwood chips in roundwood equivalent is 2.63 cubic metres and weighs 1090 kilograms when oven dry.

FIGURE 2.1: MAP OF THE HAWKES BAY FOREST INDUSTRY



Source
Ministry of Agriculture and Forestry.

THE PLANTATION FOREST INDUSTRY 3

NURSERIES

Hawkes Bay has no forest nurseries or specialised nurseries producing planting stock for the restocking of harvested areas and establishment of new forests. The most significant and closest forest nursery is the Arborgen Australasia nursery at Puha in the Gisborne District, although tree stocks are also sourced from nurseries in the central North Island and further afield, such as Murray's Nurseries at Woodville.

FOREST OWNERS

Table 3.1 identifies the larger plantation forest owners and managers in the Hawkes Bay region, and the total area owned by the small-scale forest owners.

Pan Pac Forest Products Ltd manages 25 percent of the Hawkes Bay estate, and the four largest owners hold 58 percent among them. This suggests that owners are either very large or small with only a handful in the medium range – effectively allowing the larger operators to have a significant presence in the region. Forest owners in the northern Hawkes Bay such as Juken New Zealand and Hikurangi Forest Farms are more likely to take any production to Gisborne: this is where their significant holdings, including wood processing plants, are located. Similarly, Te Awahohonu Forest Trust and some of the Matariki and Hancock Natural Resources Group-managed forests on State Highway 5 are equidistant from some of the wood processing centres in the central North Island and the Hawkes Bay.

TABLE 3.1: OWNERS AND MANAGERS OF PLANTATION FORESTS IN HAWKES BAY (IN HECTARES)

ENTERPRISE	STOCKED AREA (HA)
Pan Pac Forest Products Ltd	32 800
Matariki Forests	19 400
Roger Dickie (NZ) Ltd	13 900
Juken New Zealand Ltd	10 600
Te Awahohonu Forest Trust	5 200
Ernslaw One Ltd	2 600
Hancock Natural Resources Group (OTPP)	2 100
Forest Enterprises Ltd	1 600
Hikurangi Forest Farms Ltd	1 600
Small-scale forest owners	42 000
Total	**131 800**

Sources
Individual forest owners and Ministry of Agriculture and Forestry, 2008.

PAN PAC FOREST PRODUCTS LTD

Pan Pac Forest Products Ltd (Pan Pac) is an integrated forestry company. It owns forests, a saw mill and pulp mill, a remanufacturing facility, and a chip export facility in the Hawkes Bay. The company is 100 percent owned by Oji Paper. A major purpose of the original establishment of Pan Pac was to provide wood fibre for its shareholders' paper-making operations in Japan.

All Pan Pac's forest resource has Forest Stewardship Council (FSC) certification and the forest estate consists of five forest areas located between 15 and 70 km from the company's wood processing operation at Whirinaki. The five main forest units are Esk Forest (Crown Forest Licence – CFL), Gwavas Forest (CFL), Kaweka Forest (CFL and leasehold), Mohaka Forest (CFL and freehold) and Tongoio Forest (freehold). Trees are intensively managed to produce thinned and pruned stands and most logs are supplied to Pan Pac's own mill, with the balance sold to other customers in the Hawkes Bay and beyond. About 70 percent of harvesting is undertaken using cable systems due to the steep nature of many of the forest areas; the target clearfell age is 30 years.
(www.panpac.co.nz/forest/forests_home/index.htm)

MATARIKI FORESTS

Matariki Forests (Matariki) is a joint venture between Rayonier Inc. (40 percent), AMP Capital Investors Ltd (35 percent) and RREEF Infrastructure which is part of Deutsche Asset Management (Australia) Ltd (25 percent).

Rayonier is a specialist "timberlands" company: originally it bought 100 000 hectares of crown forest licences in Gisborne, Northland, southern and central North Island, Nelson and Invercargill in 1992 before selling around half this area in the mid 1990s. In 2005 Matariki Forests purchased 95 000 hectares of Carter Holt Harvey (CHH) forests in the Northland, Auckland, Hawkes Bay and Canterbury regions. Matariki is currently the second largest exotic plantation forest owner in the Hawkes Bay with 19 400 hectares purchased from CHH, and the third largest in NZ with 143 000 hectares nationally. It is managed by Rayonier New Zealand Ltd, a 100 percent-owned subsidiary of Rayonier Inc. (www.rayonier.com)

› ROGER DICKIE (NEW ZEALAND) LTD

Roger Dickie (NZ) Ltd was formed in 1971 and the company has established 26 000 hectares of syndicated ownership forests in New Zealand. Each forest is typically owned by a partnership comprising up to 30 individual investors. Many of the partnership investors are New Zealand citizens. Since 1990, Roger Dickie New Zealand Ltd has deliberately concentrated its activities in northern Hawkes Bay and on the East Coast. The region produces some of New Zealand's highest forest growth rates and land has been available at reasonable prices. In the North Island, Roger Dickie has established forest blocks in Hawkes Bay, Gisborne, South Taranaki and Wanganui. Roger Dickie has established forests with a total area of about 14 000 hectares in the Hawkes Bay. These forests are all still immature, and harvesting decisions will be made by the individual partnerships. (www.rogerdickie.co.nz)

› JUKEN NEW ZEALAND LTD

Juken New Zealand Ltd (JNL) is a wholly owned subsidiary of Wood One Company Ltd, a Japanese housing construction and building materials business based in Hiroshima and listed on the Japanese stock exchange. Juken New Zealand was established in June 1990, originally as Juken Nissho Ltd and then renamed as Juken NZ in September 2004. The company owns and manages forests in Northland and the East Coast as well as the Wairarapa, and owns wood processing mills at Kaitaia, Gisborne and Masterton. The company has ISO 14001 and FSC certification for its forests in the Wairarapa. The other company forests are as yet not FSC certified, but are managed through the same environmental management system, which is in compliance with the FSC. The company has stated a commitment to the FSC and its processing plants have applied for FSC chain of custody certification.

The JNL production forests in the Wairoa District are intensively managed to produce pruned and thinned stands. Target felling age is between 28 to 32 years. (www.woodone.co.jp/company/english.html)

› TE AWAHOHONU FOREST TRUST

This forest was originally established jointly by the Trust and the Crown as a Māori lease forest. In April 1999 a joint venture was formed in the Hawkes Bay region with Rayonier, GMO Renewable Resources and the Te Awahohonu Forest Trust. Rayonier manages the harvesting and marketing of the tree crop consisting of 5200 hectares of radiata pine. After clearfell the replanted land is returned to the Trust. NZ Forest Managers Ltd manages the forestry operations for the Trust.

› ERNSLAW ONE LTD

Ernslaw One Ltd is controlled by members of the Tiong family of Malaysia. Ernslaw One entered the New Zealand forest industry in 1990 when it purchased the cutting rights to some of the state forests as well as the Conical Hill sawmill. It has expanded since then by buying new land, as well as existing forests including the East Coast estate. It is a vertically integrated company and owns sawmills in Gisborne, Tangiwai and Tapanui, as well

as a pulp mill at Tangiwai. Current forest holdings are 91 000 hectares, with the majority in three regions: East Coast, central North Island, and Otago/Southland. Only a relatively small area is in Hawkes Bay.

› HANCOCK NATURAL RESOURCES GROUP

Hancock Natural Resources Group (HNRG) facilitates investments around the world for large institutional and individual investors. Hancock Timber Resource Group (HTRG) is a division of HNRG and in September 2005 it announced that it had completed the acquisition of Prudential Timber Investments, Inc. (PruTimber), the timberland investment management unit of Prudential Financial, Inc. With the acquisition, HTRG assumed management responsibility for PruTimber's approximately 60 000 hectares in New Zealand, which included around 2000 hectares of forest in the Hawkes Bay managed on behalf of Ontario Teachers Pension Plan (OTPP) Forest Investments. Hancock Forest Management (NZ) Ltd is the New Zealand representative of HNRG while PF Olsen Ltd is responsible for the operational management. (www.hancocktimber.com)

› FOREST ENTERPRISES LTD

Forest Enterprises is a forestry investment company with more than 35 years experience. In 1972 the company began offering forestry partnership investments in New Zealand's radiata pine plantation forests for both New Zealand and overseas investors. Nationally the company has over 6400 investors with 73 plantation investment forests under management, comprising 22 000 hectares; some of these forests are now being harvested and replanted. Forest Enterprises manage the full rotation of radiata pine from establishment to harvest and have forests located in Wairarapa, Gisborne and Hawkes Bay. Their business comprises forest management, harvest management, investment administration and marketing operations. The company began planting forests in the Hawkes Bay region in 1996 and by 1999 had four forests established in this area covering 1600 hectares. (www.forestenterprises.co.nz)

› HIKURANGI FOREST FARMS LTD

Hikurangi Forest Farms Ltd (HFF) is a medium-sized forestry company based at Gisborne. It is a member of TreeOne (NZ) Ltd which is wholly owned by Lingui Developments Berhad, a company listed on the Kuala Lumpur stock exchange. The HFF estate consists primarily of intensively managed radiata pine plantations. The total estate area of HFF is about 35 000 hectares of which approximately 27 000 hectares is production forest, and 91 percent is freehold. The HFF estate was established largely on pasture, buying farms and establishing them as forests. HFF obtained FSC certification in August 2005.

The HFF estate in the Hawkes Bay is about 1600 hectares located mainly in the Wairoa District. It is most likely that the logs will flow to the East Coast for processing or export.

HFF is progressing plans to construct a processing facility adjacent to the Prime Sawmill now owned by Ernslaw One Ltd in Gisborne.
(www.hff.net.nz)

»» OTHER FOREST OWNERS

Approximately 32 percent of Hawkes Bay plantation forest estate is held by small-scale forest owners, mainly individuals, forestry partnerships and small companies, who own less than 1000 hectares each. The impact of these small-scale forest owners on the development of the local industry has been highlighted in the wood availability forecasts with their separation from the large-scale forest owners.

SPECIES COMPOSITION

Radiata pine makes up 99 percent (130 000 hectares) and Douglas-fir less than 1 percent (600 hectares) of the forest area in the Hawkes Bay region. There are nearly 2000 hectares of other exotic hardwood and softwood species in the Hawkes Bay; these have not been modelled in this analysis.

The forest areas are from the *National Exotic Forest Description (NEFD) as at 1 April 2007* (MAF 2008).

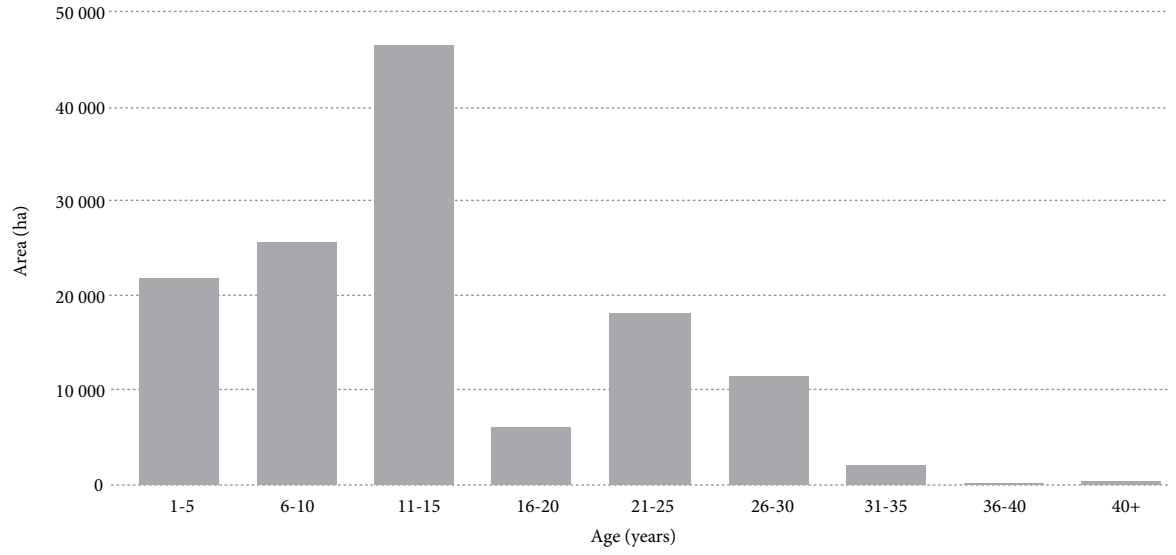
About 75 percent (96 000 hectares) of the radiata pine estate is, or is expected to be, pruned to a height of at least four metres. Approximately 11 percent (10 400 hectares) of pruned radiata pine is older than 25 years.

AREA–AGE CLASS DISTRIBUTION

The Hawkes Bay plantation forest area-age class distribution shows the peak in new forest area planted during the mid to late 1990s which potentially enables an increasing area to be harvested from about 2017. The average age of the Hawkes Bay exotic forest resource is 13.8 years compared with the North Island average of 15.0 years, suggesting the presence of younger forests. About 70 percent of the Hawkes Bay exotic forest resource is aged 15 years or younger.

For detailed information on forest areas and age-class distributions by species refer to the publication *NEFD as at 1 April 2007* (MAF 2008), accessible at: http://www.maf.govt.nz/mafnet/publications/nefd/national-exotic-forest-2007/index.htm

FIGURE 3.1: AREA–AGE CLASS DISTRIBUTION FOR HAWKES BAY PLANTATION FORESTS (ALL SPECIES)



Source
NEFD as at 1 April 2007, MAF 2008.

TABLE 3.2: PLANTATION FOREST AREAS BY TERRITORIAL AUTHORITIES AND SPECIES (IN HECTARES, AS AT 1 APRIL 2007)

TERRITORIAL AUTHORITY	RADIATA PINE	DOUGLAS-FIR	OTHER SOFTWOODS	HARDWOODS	TOTAL
Wairoa District	53 999	167	519	235	54 920
Hastings District	60 893	350	359	221	61 823
Napier City	130	0	2	9	141
Central Hawkes Bay District	14 706	50	214	93	15 063
Region total	**129 728**	**567**	**1 094**	**558**	**131 947**

Source
Ministry of Agriculture and Forestry, 2008.

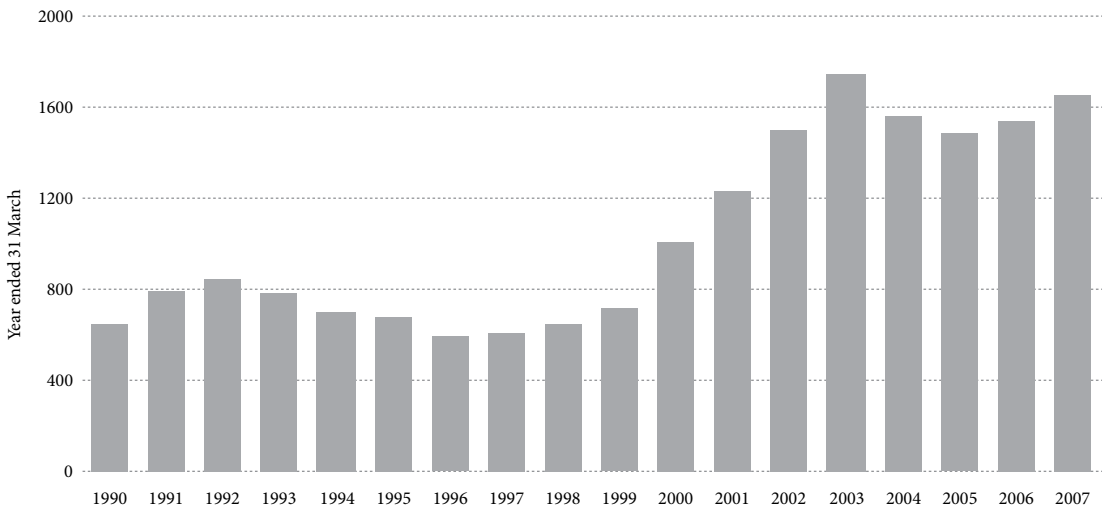
PLANTATION FOREST LOCATION

The majority of the forests (117 000 hectares out of 132 000 hectares) are established in the Wairoa and Hastings Districts, which means a significant volume of forests in the Hawkes Bay are located on a latitude north of Napier.

HISTORICAL ROUNDWOOD REMOVALS

Estimated annual roundwood removals are derived from wood processing production data and the export of logs. They do not take account of inter-regional log flows, for which data are not readily available. The main inter-regional flows are likely to be from JNL and HFF from Wairoa to the East Coast, and some of Te Awahohonu Trust, Matariki Forests and HNRG on State Highway 5 to the central North Island. Some logs are transported from Matariki Forest and Pan Pac Forest Products south to Kiwi Lumber at Dannevirke. Logs are currently transported into the region from the central and southern North Island, and there is still potential for more logs to come from Gisborne District.

FIGURE 3.2: ESTIMATED ANNUAL ROUNDWOOD REMOVALS IN HAWKES BAY



Source
Ministry of Agriculture and Forestry.

The decrease of roundwood removals from 2004 to 2006 reflects the difficult trading period for log exports in particular. The decline in export production was associated with a generally strong New Zealand dollar against the United States dollar, international prices that were often depressed and substantial increases in log shipping costs. Roundwood removals peaked in 2003 and fell away in 2005 before building again to present levels: this is a result of improving export markets and some deliberate cutting strategies to rationalise forest estates to radiata pine. Land use change in the Hawkes Bay forests has been relatively limited, explained by the fact that many of the forests are generally located on more difficult sites not entirely suited for dairy conversion; or they are generally too old to be considered for any other land use at this stage.

HARVEST INTENTIONS SURVEY

A harvesting intention survey of Pan Pac Forest Products, Matariki Forests, Juken New Zealand, Ernslaw One, Hikurangi Forest Farms, Te Awahohonu Trust and Hancock Natural Resources Group (Tiaki Plantations Ltd and Ontario Teachers Pension Plan Forest Investments) was undertaken between late 2006 to early 2007, and information was confirmed in July 2007. Data were provided on the actual level of harvest from these forests for 2005 and the expected harvest for 2006. The harvesting intentions for the next ten years were provided by species for pruned, unpruned and pulp logs, along with the area expected to be harvested.

Table 3.3 provides a summary of the harvest intentions data. For detailed data by log type see Table 1 in the Appendix (page 40). These figures make up the first ten years of the wood availability forecasts for the large-scale forests in Hawkes Bay. The harvest intentions of large-scale forest owners in Hawkes Bay show an increase in volumes for the four-year period 2006–2009, to reach about 1.6 million cubic metres per annum. This reflects their current cutting strategies and clearly indicates that any shortfall after 2009 will have to be uplifted from small forest owners in the region.

TABLE 3.3: HARVEST INTENTIONS SURVEY RESULTS (IN CUBIC METRES)

YEAR ENDING 31 DECEMBER	RADIATA PINE	DOUGLAS-FIR	OTHER SOFT-WOODS	HARDWOODS	TOTAL VOLUME (M^3)	TOTAL AREA (HA)
2005[1]	1 234 000	17 000	25 000	5 000	1 281 000	2 281
2006	1 561 000	6 000	25 000	3 000	1 595 000	2 818
2007	1 514 000	29 000	23 000	4 000	1 570 000	2 699
2008	1 624 000	18 000	22 000		1 664 000	2 783
2009	1 615 000	6 000			1 621 000	2 683
2010	1 547 000	8 000			1 555 000	2 545
2011	1 343 000	1 000			1 344 000	2 094
2012	1 312 000	1 000			1 313 000	2 083
2013	1 285 000	1 000			1 286 000	2 024
2014	1 242 000	1 000			1 243 000	1 921
2015	1 238 000	1 000			1 239 000	1 916

Sources
Individual forest owners covered by the harvesting intentions survey.

Note
1. Actual harvest.

4 WOOD AVAILABILITY FORECASTS

These forecasts show the range of harvest volumes potentially available from the planted production forests in the Hawkes Bay region for the period 2008–2040. They are based on this region's forest resource and the forecasting assumptions described later in this report.

The forecasts have been developed by incorporating the harvesting intentions of the region's large-scale forest owners as outlined below; the results are amalgamated to ensure confidentiality. Large-scale owners (those with 1000 hectares of forest or more) are:

- Pan Pac Forest Products;
- Matariki Forests;
- Juken New Zealand;
- Ernslaw One;
- Hikurangi Forest Farms;
- Te Awahohonu Trust;
- Hancock Natural Resources Group (Tiaki Plantations);
- Hancock Natural Resources Group (Ontario Teachers Pension Plan Forest Investments).

The small-scale owners' resource was defined using the *NEFD as at 1 April 2006* (MAF 2007) data.

Five scenarios were modelled to indicate the potential range of future wood availability. The scenarios indicate that there are many different ways for the forest estate in the Hawkes Bay to be harvested. A key issue is the timing of harvesting by the small-scale forest owners, which will be driven by a range of factors – including individual forest owners' objectives, forest age, log prices, demand by local wood processing plants, and perceptions about future log prices and future wood supply.

It needs to be recognised that forests are managed to maximise the benefits to the enterprise that owns them. Each enterprise has its own harvest strategy based on the owners' objectives, market conditions and the forest estate that it owns or manages. Any change in harvesting strategies by forest owners affects the age-structure and maturity of the forests they own. This in turn feeds back directly into future wood availability.

There are different levels of certainty associated with the wood availability from each component of the estate. The volumes forecast from the large-scale owners' forests are subject to change because of changes in market conditions or changes in the resource description (areas and yields). Yet, they have greater certainty than those forecast from the small-scale owners' estate. Not only are harvest intentions less clear for small-scale owners, their resource descriptions are likely to be less accurate also. To improve the levels of certainty, the forecasts incorporate the views of the region's forest managers and consultants. This feedback was critical for ensuring that the forecasts represent a realistic range of future wood availability scenarios.

SCENARIOS FOR RADIATA PINE

Five wood availability scenarios have been modelled for radiata pine. These scenarios indicate the ways the forests in the region could be harvested in the future.

To ensure the scenarios presented here are reasonable, they were developed in consultation with the NEFD Steering Committee and feedback was received from major forest owners and consultants in the Hawkes Bay wood supply region.

Listed years are assumed to be to 31 December. For example, 2005 indicates the 12 months to 31 December 2005.

› SCENARIO 1: HARVEST ALL AREAS AT AGE 30

All owners are assumed to harvest their trees at age 30. This scenario shows the potential future harvest in any given year, based on the area of radiata forest that reaches 30 years of age in that year.

› SCENARIO 2: LARGE-SCALE OWNERS HARVEST AT STATED INTENTIONS, SMALL-SCALE OWNERS HARVEST TREES AT AGE 30

Large-scale owners' wood availability is assumed to be at stated harvest intentions for 2005 to 2015. After 2015, the large-scale owners' wood availability is assumed not to decrease. Small-scale owners are assumed to harvest trees at age 30.

› SCENARIO 3: NON-DECLINING YIELD (NDY) – TARGET ROTATION 30 YEARS

Large-scale owners' wood availability is assumed to be at stated harvest intentions (as for scenario 2). The total wood availability of radiata pine from the region is modelled to be non-declining in perpetuity.

› SCENARIO 4: SPLIT NON-DECLINING YIELD (NDY) – TARGET ROTATION 30 YEARS

This is the same as scenario 3 except that the total wood availability of radiata pine from the region is assumed to step down from 2034 (at the end of the current rotation). Thereafter, a reduction is assumed.

› SCENARIO 5: TARGET ROTATION AGE VARIATIONS

This is similar to scenario 4 except target rotation ages of 28 and 32 years are also modelled.

»» DISCUSSION ON SCENARIOS

With the exception of scenario 1, the small-scale forest owners have been modelled separately from the large-scale owners. This is because future harvesting by small-scale owners is generally less certain than by large-scale owners.

In scenarios 1 and 2 (Figures 4.1A and 4.1B, respectively), forests owned by small-scale owners are assumed to be harvested at age 30. In scenario 1 all forests (large and small-scale) are harvested at 30 years. In scenario 2, the small-scale forests are harvested at age 30, but the large-scale forests follow their owners' stated intentions. Both scenarios show the "potential" availability of mature forest in any given year and reflect directly the area of forest in each age class in the Hawkes Bay. For practical reasons already described, it is unlikely that the future harvesting would occur this way. The two scenarios simply show the potential magnitude of wood availability under favourable market conditions in any given year.

Scenarios 3 to 5 (Figures 4.1C and 4.1D, respectively) are based on yield regulation. Under these scenarios, the future harvesting model is generally constrained to be non-declining; that is, each year the volume must either be the same or higher than in the previous year. Yield regulation provides a more orderly harvesting volume profile that takes logistical and market constraints into account, to some extent.

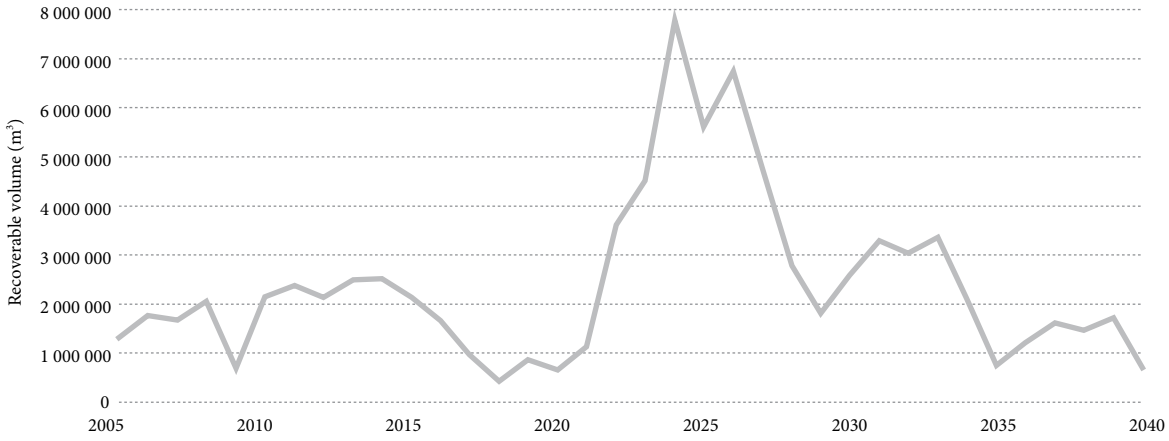
Scenarios 3 to 5 avoid the large year-to-year fluctuations seen in scenarios 1 and 2. A fundamental property of the forests in the Hawkes Bay (like many regions in New Zealand) is the large area of forests established during the 1990s. Scenarios 4 and 5 illustrate the harvesting of these forests by applying a non-declining yield constraint for the period 2006 to 2034. Then once the "bulge" of forests planted during the 1990s have been harvested, the model lets the volume decline again.

The main limitations of scenarios 3 to 5 are that log prices and other market factors significantly determine harvesting in any given year. When log prices go up, harvesting will generally increase. When log prices fall, the level of harvesting will generally decrease. It is beyond the scope of this analysis to predict future timber prices.

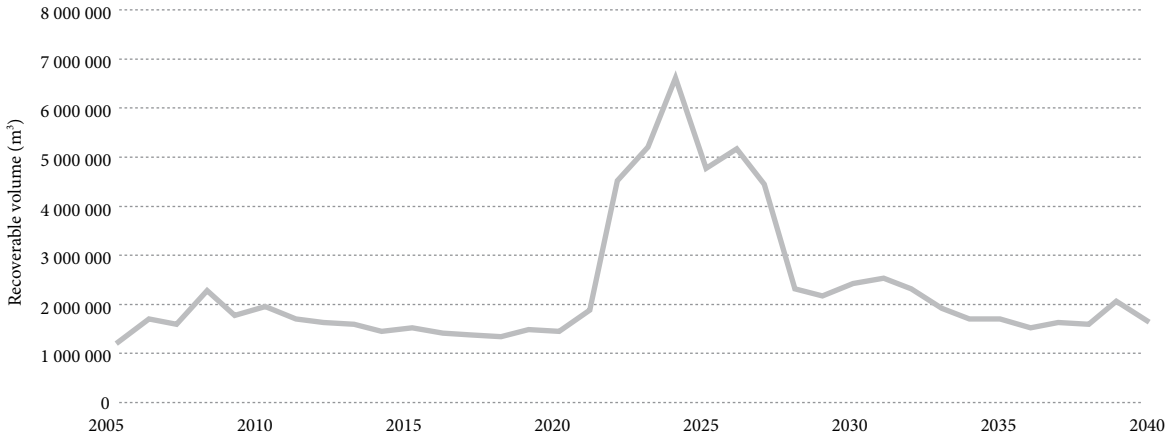
Figures 4.1A to 4.1D summarise the sequence of models that are presented in the remainder of this report.

FIGURE 4.1: THE SEQUENCE OF WOOD AVAILABILITY SCENARIOS PRESENTED FOR RADIATA PINE

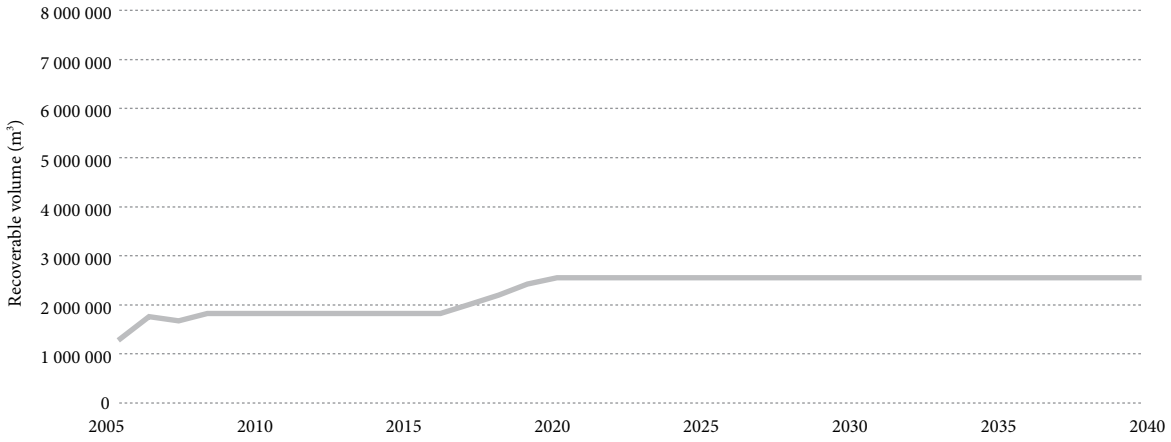
4.1A – SCENARIO 1 EXAMPLE: HARVEST ALL TREES AT AGE 30



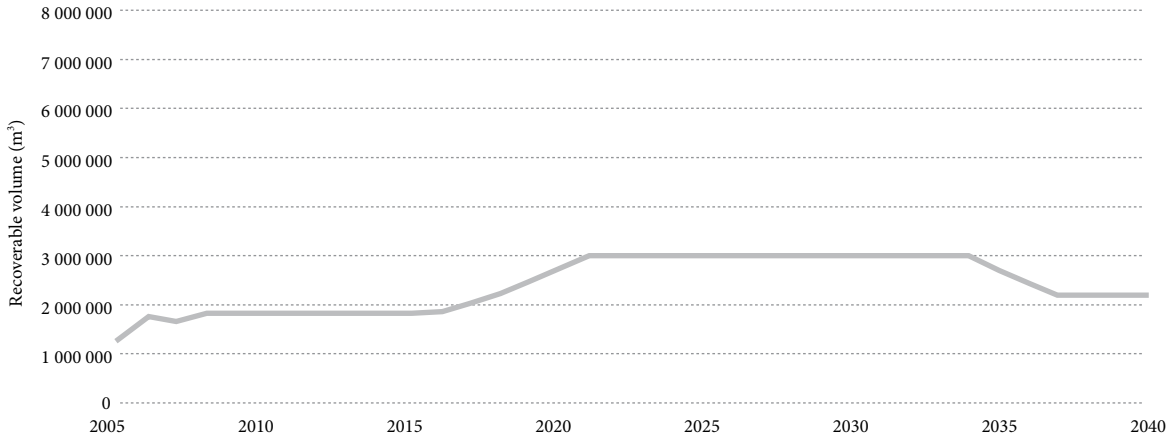
4.1B – SCENARIO 2 EXAMPLE: LARGE-SCALE OWNERS HARVEST AT STATED INTENTIONS, SMALL-SCALE OWNERS HARVEST TREES AT AGE 30



› 4.1C – SCENARIO 3 EXAMPLE: NON-DECLINING YIELD – TARGET ROTATION 30 YEARS



› 4.1D – SCENARIO 4 EXAMPLE: SPLIT NON-DECLINING YIELD – TARGET ROTATION 30 YEARS



SCENARIO FOR DOUGLAS-FIR

One scenario is presented for Douglas-fir (all owners), similar to scenario 4 for radiata pine. It is based on the harvest intentions of large-scale owners for 2005 to 2015 with yield regulated in subsequent years. Target rotation age is 45 years for Douglas-fir.

OTHER SPECIES

Wood availability from other species has not been modelled. The *NEFD as at 1 April 2007* (MAF 2008) records 1652 hectares of other species in Hawkes Bay, but 55 percent of this resource is less than 21 years old and, with the exception of some of the minor softwood species, is unlikely to be harvested within the next ten years. In addition, markets are not well established for some of the hardwood species.

TABLE 4.1: AREAS OF OTHER SPECIES IN HAWKES BAY (IN HECTARES)

	AREA (HECTARES) AGE 21–40 YEARS	TOTAL AREA (HA)
Cypress species	38	222
Other softwoods	221	872
Eucalypts	48	204
Other hardwoods	131	352
Total	**438**	**1652**

Source
Ministry of Agriculture and Forestry, 2008.

DATA

METHOD USED TO OBTAIN FOREST AREAS

Area figures were obtained from the *NEFD as at 1 April 2005* (MAF 2006). To reflect the regime split in the harvest intentions data, 1534 hectares in the large-scale owners' estate was transferred from the old pruned croptype into the old unpruned croptype. In addition, the areas of the small-scale owners' estate, apart from the investment syndicates managed by Roger Dickie New Zealand and Forest Enterprises, were reduced by 15 percent because the area in this ownership category is often reported on a gross area rather than net stocked area basis (which excludes unplanted areas, areas not successfully established, streams, wetlands and so on). In addition, reductions were made to the area of over-mature stands in the small-scale owner estate (as described later in the report).

METHOD TO DEVELOP YIELD TABLES

In 2007 new yield tables for Hawkes Bay were developed in the following manner:

- large-scale owners provided yield tables for their estates;
- these were averaged on an area-weighted basis to get regional yield tables for each croptype;
- yield tables for old (age 16+ years, planted in 1989 and earlier) radiata pine and Douglas-fir were then calibrated to match the harvest intentions data provided by large-scale owners: the assumption is that the harvest intentions data provides the most accurate information available as it is based predominantly on detailed inventory;
- yield tables for young radiata pine croptypes (planted in 1990 and later) were also adjusted in consultation with large-scale owners;
- the yield tables developed for the large-scale owners' estate were also applied to the small-scale owners' estate.

LARGE-SCALE OWNERS HARVEST INTENTIONS

Large-scale owners were asked to provide details of planned harvest volumes by log grades and areas from 2005 to 2015. These harvest intentions were included at the beginning of the forecasts to provide the most realistic wood availability forecasts over this period.

ASSUMPTIONS

The wood availability forecasts for Hawkes Bay are based on the following assumptions:

REPLANTING

All the area that is harvested is replanted (with a regeneration lag of 1 year) except 5500 hectares in the large-scale owners' estate which is being deforested and 20 percent of the area in the small-scale owners' estate. The area awaiting replanting as at 31 March 2005 is included as area at age 0 – that is, area to be replanted in the 2005 planting season.

SPECIES/REGIME

Areas are replanted into the same species and regime except that:

- all Douglas-fir in the large-scale owners' estate is replanted to radiata pine after harvest;
- in 2005–2019, 25 percent of the pruned area is replanted into the unpruned croptype after harvest. Subsequently (2020–2034) 10 percent of pruned area is replanted into the unpruned croptype.

HARVEST 2005–2007

The total volumes of radiata pine harvested by large and small-scale owners in 2005–2007 are shown in Table 4.2. The large-scale owners' returns are based on the harvest intentions data supplied to MAF and are estimates for the 2006 and 2007 years. The small-scale owners' estimates in 2005–2007 are based on feedback from the major forest owners and consultants in the Hawkes Bay wood supply region.

TABLE 4.2: VOLUMES OF RADIATA PINE HARVESTED IN 2005–2007

HARVEST YEAR	LARGE-SCALE OWNERS (M^3)	SMALL-SCALE OWNERS (M^3)
2005	1 234 000	80 000
2006	1 561 000	200 000
2007	1 514 000	160 000

OVERMATURE STANDS

For overmature stands it was assumed that any area of radiata pine in the small-scale owners' estate that was aged over 40 years would not be harvested, so forests aged 41 years or older (54 hectares total) were removed from the model.

HAWKES BAY WOOD AVAILABILITY FORECASTS

SCENARIO 1: HARVEST ALL AREAS AT AGE 30

In this scenario, all trees are harvested at age 30, indicating the "pure" (unconstrained) availability of wood from Hawkes Bay. This means wood availability reflects the age-class distribution. Figure 4.2 shows the age-class distribution of radiata pine in Hawkes Bay, and Figure 4.3 shows the wood availability. The low point of 30-year-old trees in 2018 in Figure 4.3 occurs because of the small area (687 hectares) at age 17 (planted in 1988) in Figure 4.2. Conversely, the high point at 2024 (Figure 4.3) occurs because of the large area (12 161 hectares) at age11 (planted in 1994) in Figure 4.2.

Figure 4.3 indicates that wood availability does not have the potential to increase markedly over the next 15 years.

FIGURE 4.2: AGE-CLASS DISTRIBUTION OF HAWKES BAY RADIATA PINE – COMBINED ESTATE AS AT 1 APRIL 2005

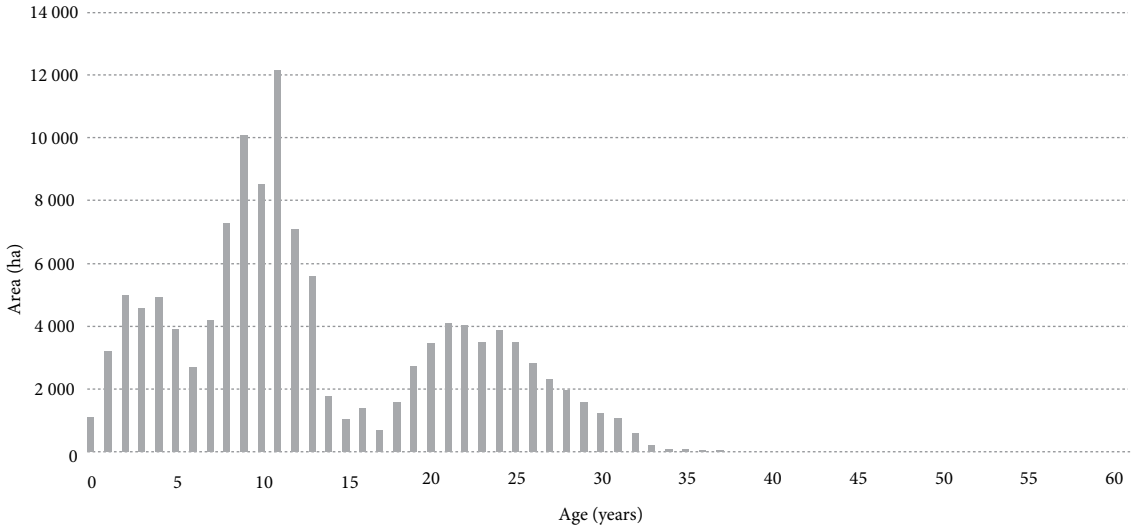
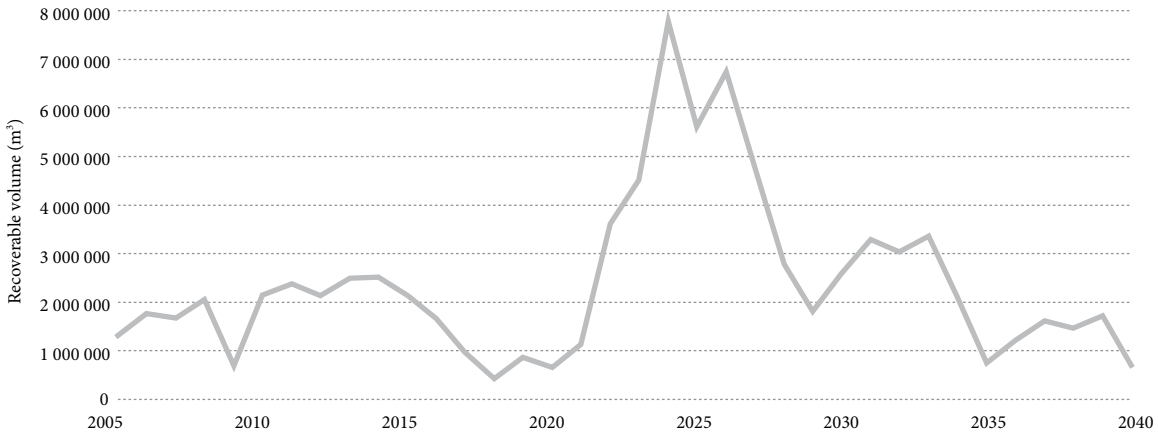


FIGURE 4.3: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 1



› SCENARIO 2: LARGE-SCALE OWNERS HARVEST AT INTENTIONS, SMALL-SCALE OWNERS HARVEST TREES AT AGE 30

LARGE-SCALE OWNERS' ESTATE

The age-class distribution of the large scale owners' estate (Figure 4.4) indicates a large variation in the area in age-classes. There is relatively little area in age-classes 14 to 18 years because of limited planting in 1987 to 1991. The area at age 0 is the area awaiting replanting as at 31 March 2005 (to be replanted in the 2005 planting season).

For this scenario, the availability of wood from large-scale owners is based on stated harvest intentions for 2005 to 2015. Thereafter the availability is constrained to be non-declining with a target rotation age of 30 years. The wood availability of large-scale owners (Figure 4.5) is forecast to decline after 2008 but increase from 2015 reaching 1.5 million cubic metres per year from 2022.

FIGURE 4.4: AGE-CLASS DISTRIBUTION OF THE HAWKES BAY RADIATA PINE ESTATE – LARGE-SCALE OWNERS AS AT 1 APRIL 2005

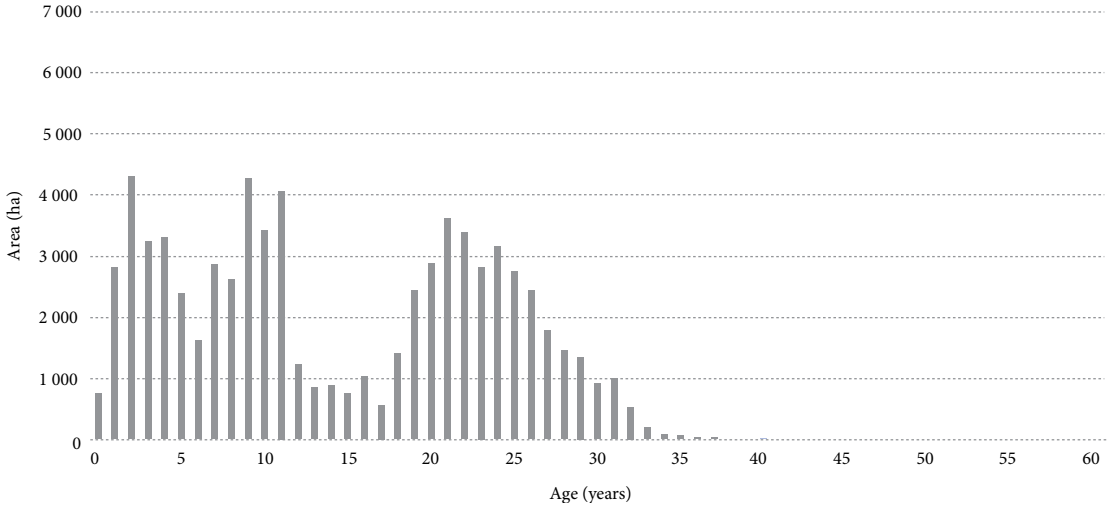
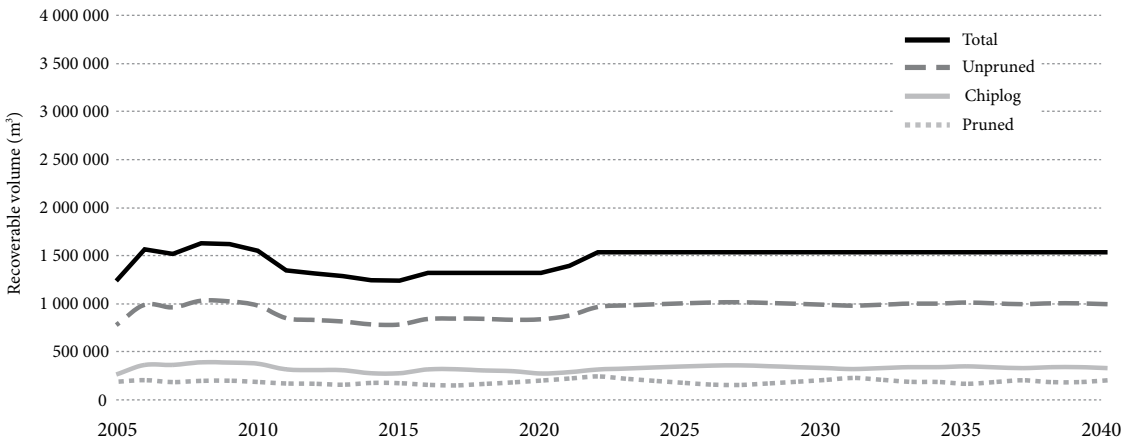


FIGURE 4.5: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – LARGE-SCALE OWNERS



SMALL-SCALE OWNERS' ESTATE

The age-class distribution of the small-scale owners' estate (Figure 4.6) is irregular with over 4000 hectares in each of ages 8 to 13 years (planted in 1992 to 1997) and much less in all other age-classes. Forecasting the availability from this estate depends on how the large area in ages 8 to 13 will be harvested:

- at a fixed rotation age (scenario 2);
- spread over many years (scenario 3);
- spread over an intermediate number of years (scenarios 4 and 5).

COMBINED ESTATE

The wood availability from all owners is presented in Figure 4.7. For the large-scale owners' estate, it is the same as in Figure 4.5 (scenario 2, where the entire small-scale owners' estate is assumed to be harvested at age 30). The fluctuations in the total volume harvested reflect the variation in the age-class distribution of the small-scale owners' estate.

The large increase in volume from 2022 (Figure 4.7) occurs when the large areas from the small-scale owners' estate in young age-classes (8–13) is harvested. For example, the increase in 2022 is a consequence of the 4737 hectares planted by small-scale owners in 1992 (age 13 in Figure 4.6) being harvested at age 30 years.

FIGURE 4.6: AGE-CLASS DISTRIBUTION OF THE HAWKES BAY RADIATA PINE ESTATE – SMALL-SCALE OWNERS AS AT 1 APRIL 2005

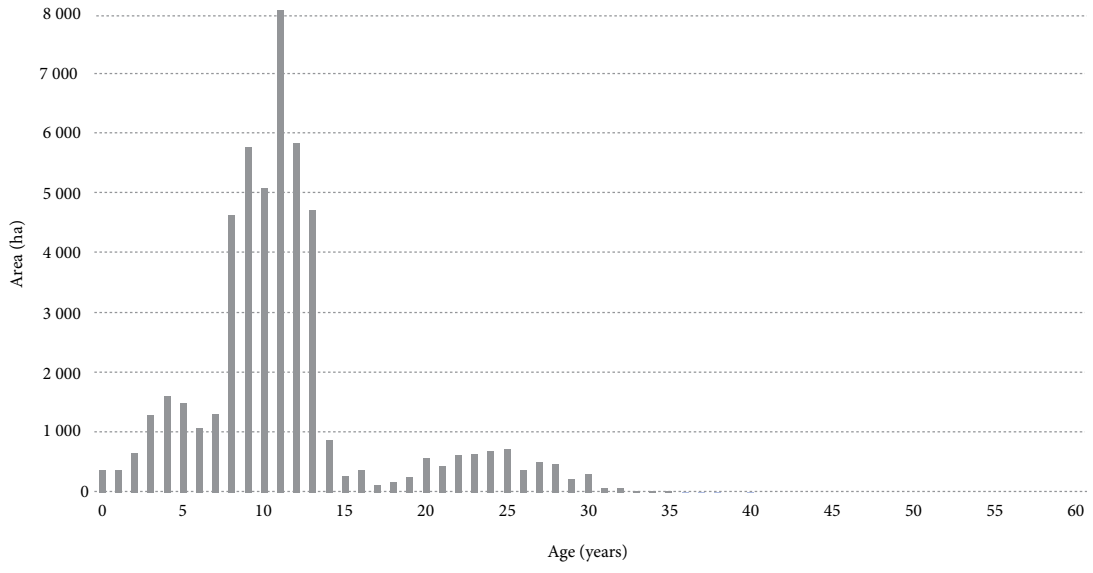
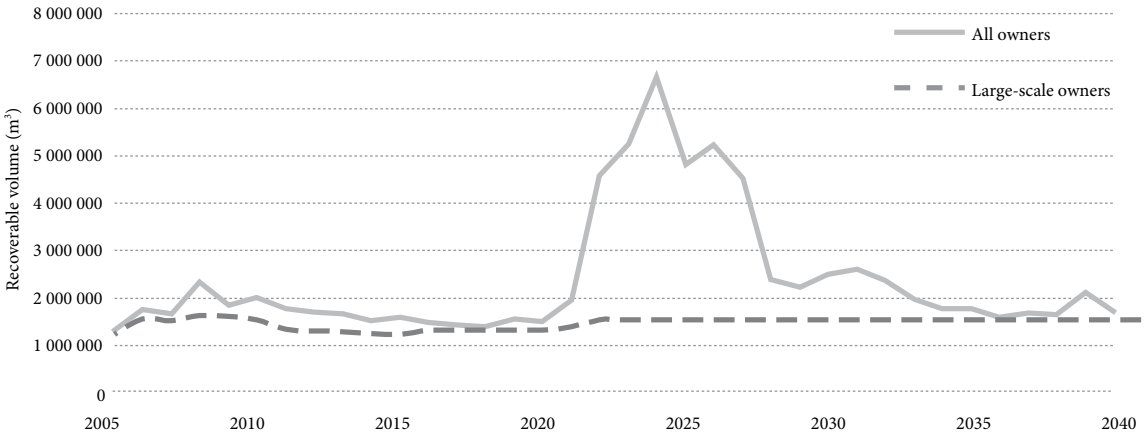


FIGURE 4.7: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – COMBINED ESTATE



Fluctuations in harvest volumes of the magnitude shown in Figure 4.7 would be impractical for the local industry to cope with, because of marketing and logistics realities. There would not be enough harvesting capacity (harvesting crews and equipment) to cut all the volume available during the peak period, and it would be difficult to get short-term sales contracts to cover this volume.

Rusticated siding, prior to being treated and primed. Destination US. Photos: PWP. www.pwp.co.nz

Inspecting and packing 1x12" trim boards for US market. These products will be LOSP treated and double primed before export.

› SCENARIO 3: NON-DECLINING YIELD – TARGET ROTATION 30 YEARS

The third scenario assumes a non-declining yield, with a target rotation age of 30 years. An extra constraint was modelled so the total volume could not increase by more than 10 percent annually.

Figure 4.8 indicates that when the small-scale owners' estate is harvested to complement the large-scale owners' estate, the total volume (of radiata pine) has the potential to increase after 2016. The potentially available volume increases to 2.5 million cubic metres per year from 2020. This scenario is similar to the base case scenario adopted in the *National Exotic Forest Description, National and Regional Wood Supply Forecasts 2000* (MAF 2000). However, it results in the small-scale owners' estate being harvested at rotation ages that differ markedly from 30 years (Figure 4.9).

FIGURE 4.8: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 3

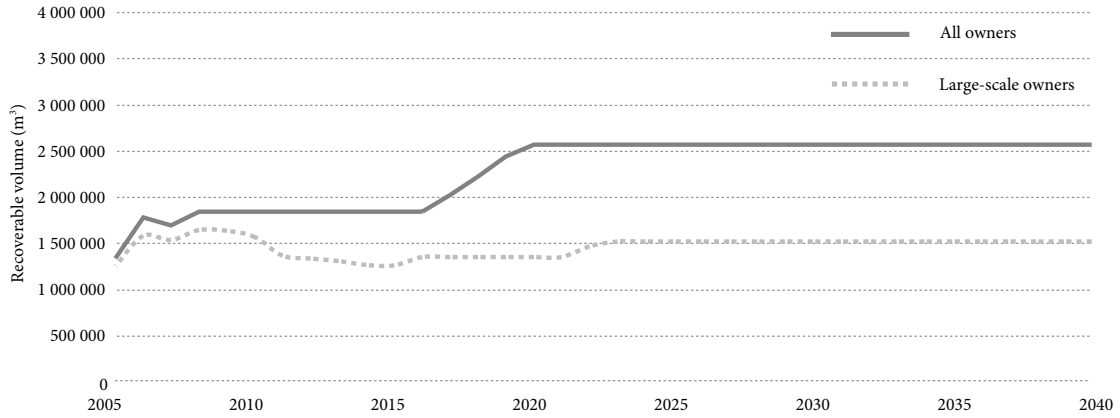
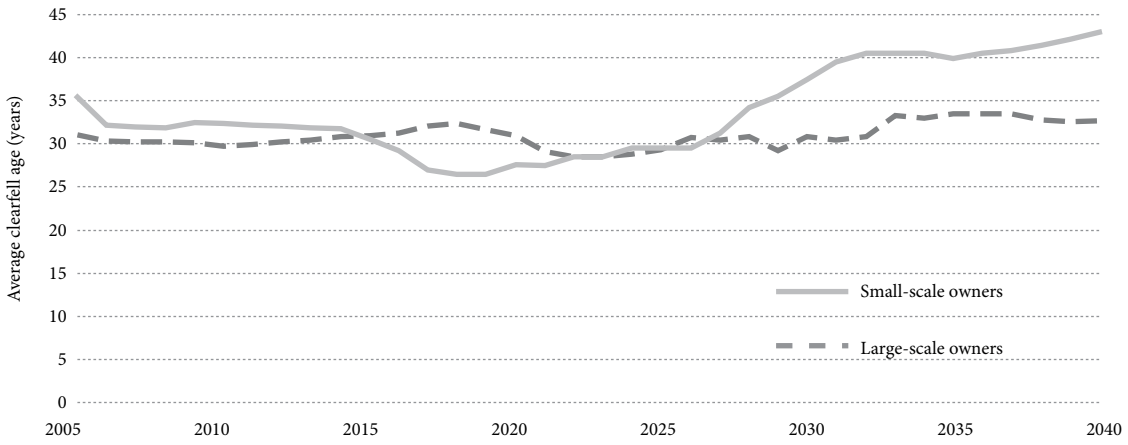


FIGURE 4.9: AVERAGE RADIATA PINE CLEARFELL AGE IN HAWKES BAY BY OWNERSHIP CATEGORIES UNDER SCENARIO 3



› SCENARIO 4: SPLIT NON-DECLINING YIELD – TARGET ROTATION 30 YEARS

The fourth scenario is based on a split non-declining yield with a rotation age of 30 years. This scenario gives a forecast wood availability that is similar to scenario 3 through to 2019 (Figure 4.10). Wood availability has the potential to increase to 3.0 million cubic metres per year from 2021 before reducing to 2.2 million cubic metres per year from 2037.

The main difference from scenario 3 is that the large area of young stands in the small-scale owners' estate is assumed to be harvested over a shorter period of time. Therefore the total volume was modelled to be non-declining from 2007 to 2034, for the current rotation. Thereafter an annual reduction of up to 10 percent was assumed, with the yield to be non-declining for the next rotation (from 2037). As a consequence, the average clearfell age for small-scale owners stays closer to the target of 30 years than in scenario 3 (Figure 4.11).

FIGURE 4.10: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 4

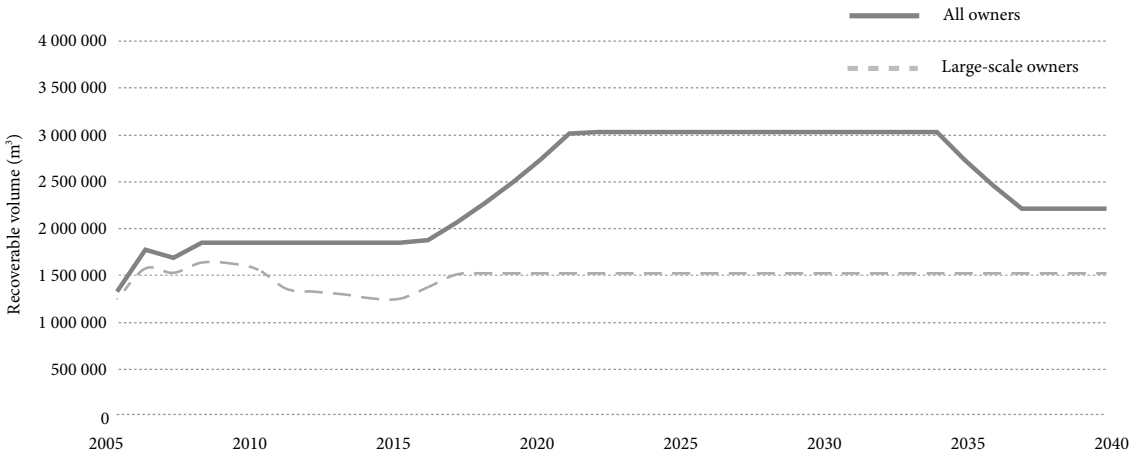
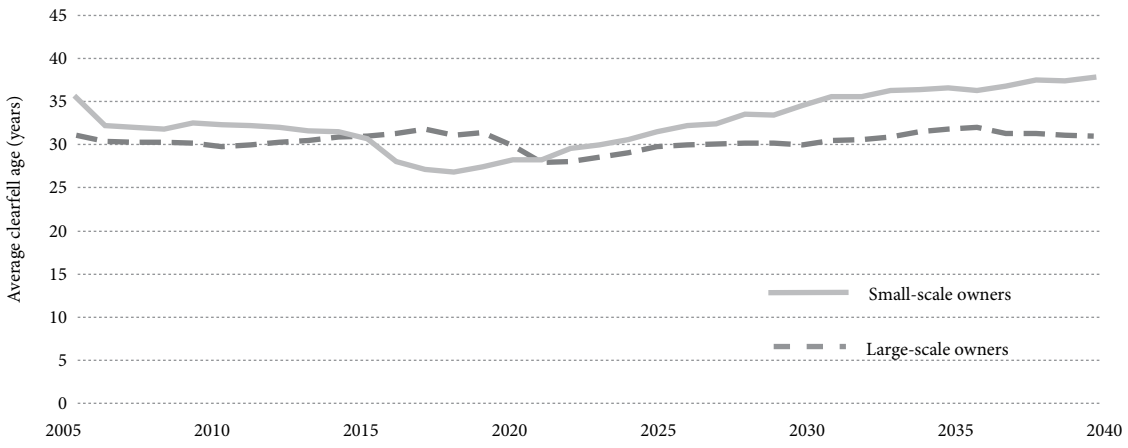
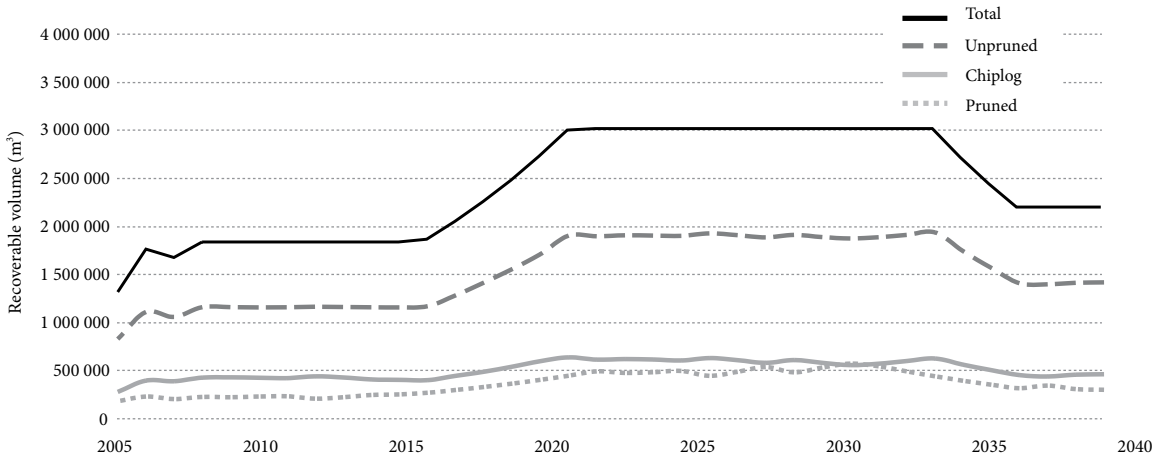


FIGURE 4.11: AVERAGE RADIATA PINE CLEARFELL AGE BY OWNERSHIP CATEGORY IN HAWKES BAY UNDER SCENARIO 4



The total volume forecast for scenario 4 is broken down by log grade in Figure 4.12.

FIGURE 4.12: HAWKES BAY RADIATA PINE AVAILABILITY BY LOG GRADE UNDER SCENARIO 4



Steep country cable logging operation at Ohane Forest Hawkes Bay. Photo: Pan Pac Forest Products.

› SCENARIO 5: TARGET ROTATION AGE VARIATIONS

Different wood availability profiles are generated if target rotation age is changed from 30 years to either 28 or 32 years (Figure 4.13). Because of the limitations imposed by the current age-class distribution and large-scale owners' stated harvest intentions, it takes some time to achieve separation of average clearfell age (Figure 4.14). No increase was assumed from 2008 to 2019 for the 32-year variation in order to get separation in harvest volumes.

Figure 4.13 shows that there is the potential for a significant increase in the Hawkes Bay harvest volumes by increasing the target clearfell age. However, there is a range of possibilities for both the timing of the increase and the level of the potential harvest volume.

FIGURE 4.13: HAWKES BAY RADIATA PINE AVAILABILITY BY TARGET ROTATION AGE UNDER SCENARIO 5

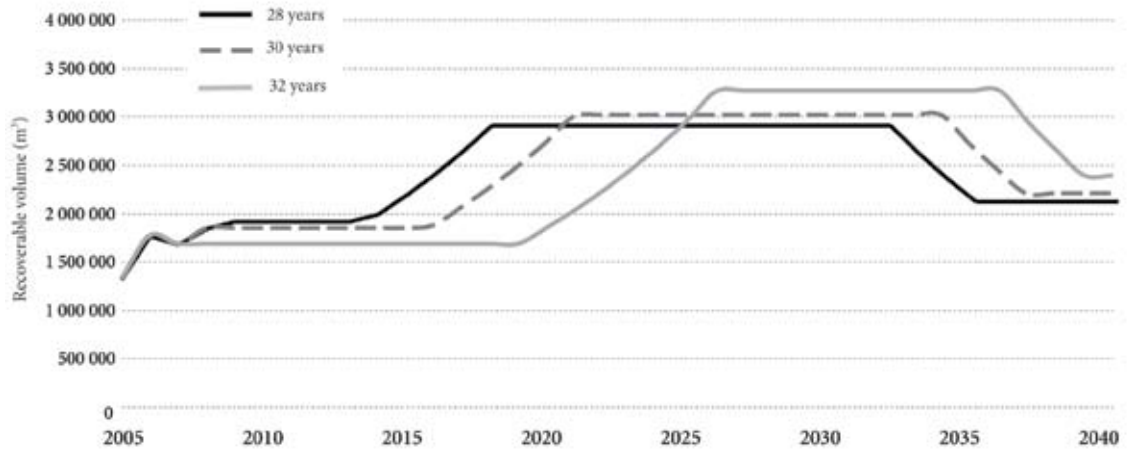
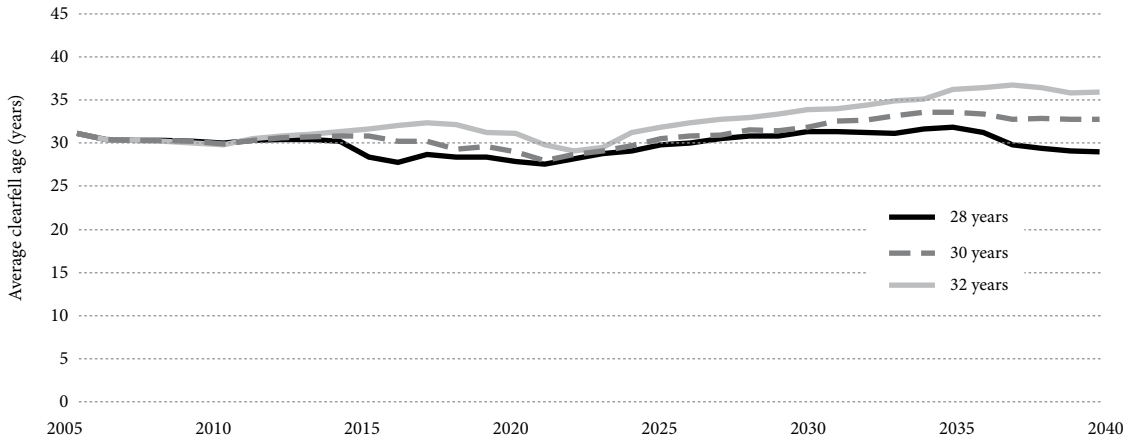


FIGURE 4.14: AVERAGE RADIATA PINE CLEARFELL AGE IN HAWKES BAY BY TARGET ROTATION AGE UNDER SCENARIO 5



OTHER SPECIES

DOUGLAS-FIR

The area of Douglas-fir in Hawkes Bay is less than 1000 hectares. The age-class distribution of Douglas-fir is not uniform (Figure 4.15).

The Douglas-fir harvest for the large-scale owners' estate is based on intentions for 2005 to 2015. From 2015 to 2049, clearfell volume is limited to an upper limit of 30 000 cubic metres per year (Figure 4.16).

FIGURE 4.15: AGE-CLASS DISTRIBUTION OF HAWKES BAY DOUGLAS-FIR – COMBINED ESTATE AS AT 1 APRIL 2005

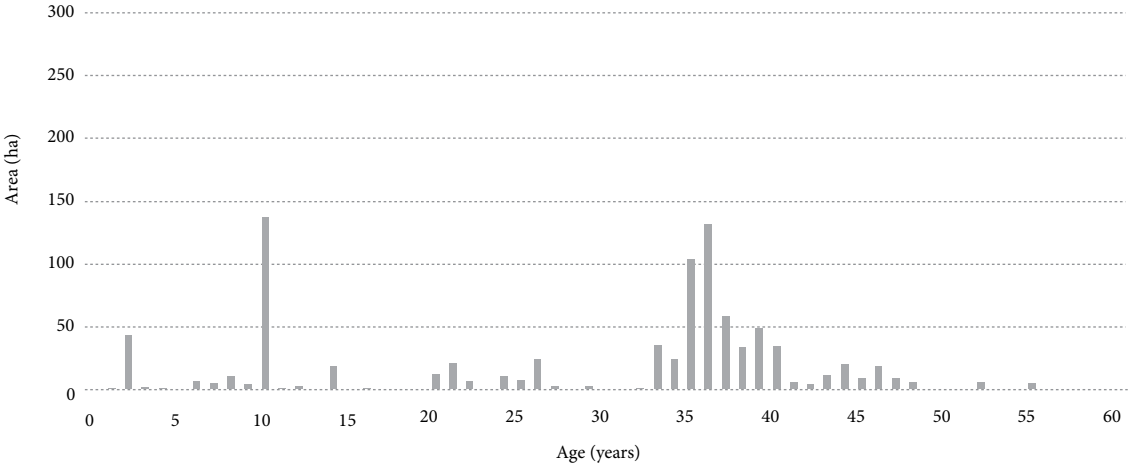
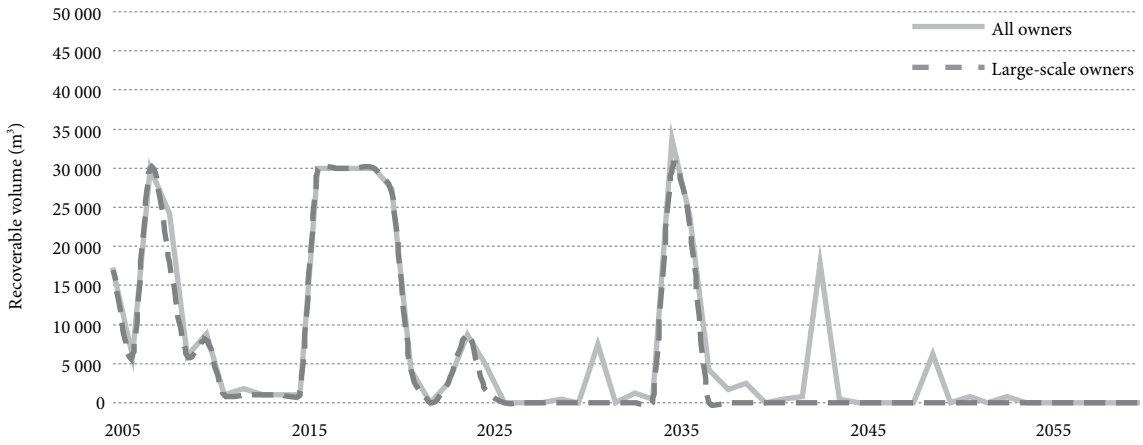


FIGURE 4.16: HAWKES BAY DOUGLAS-FIR AVAILABILITY – COMBINED ESTATE AS AT 1 APRIL 2005



THE WOOD PROCESSING INDUSTRY 5

SAWMILLING

The sawmilling industry in Hawkes Bay is based around one large processor and a number of small-scale operations located throughout the region. Those fixed mills (as opposed to portable mills) with annual production levels above 500 cubic metres of sawn timber are listed in Table 5.1.

The total installed sawmill capacity in the region is conservatively estimated to be in the order of 381 000 cubic metres of sawn timber per year (2006), based on mills' usual hours of operation.

TABLE 5.1: FIXED SAWMILLS OPERATING IN HAWKES BAY

SAWMILL	LOCATION
A. PRODUCTION LEVEL: 50 000–300 000 M³ SAWN TIMBER PER ANNUM	
Pan Pac Forest Products Ltd	Whirinaki
B. PRODUCTION LEVEL: 25 000–49 999 M³ SAWN TIMBER PER ANNUM	
None	
C. PRODUCTION LEVEL: 10 000–24 999 M³ SAWN TIMBER PER ANNUM	
Clyde Lumber Company Ltd	Wairoa
East Coast Lumber Ltd	Wairoa
Napier Pine Limited	Napier
Waipawa Timber Supplies Ltd	Hastings
Waitane Mill Ltd	Napier
D. PRODUCTION LEVEL: 5 000–9 999 M³ SAWN TIMBER PER ANNUM	
None	
E. PRODUCTION LEVEL: 500–4 999 M³ SAWN TIMBER PER ANNUM	
Watts to Mill/The Kiwibackyard Company	Waipukurau

Source
Individual sawmillers.

PAN PAC FOREST PRODUCTS LTD

The Pan Pac sawmill at Whirinaki converts approximately 2000 cubic metres of logs every day for 250 days per year, and has a capacity of around 300 000 cubic metres of lumber per annum. Logs are sourced from Pan Pac's own forests (50 percent) and the remainder mainly from other forest owners within the Hawkes Bay region. The grades of sawlogs utilised at this mill are pruned and part-pruned logs (22 percent), and sawlog grade logs with 32 cm minimum small end diameter.

In 1997 Pan Pac invested $50 million on a refit to build a new highly automated sawmill and install new kilns and a dry mill. The primary sawing equipment comprises an Optimil chipper canter and quad bandsaw combination, with a secondary Optimil chipper canter and twin bandsaw configuration. The higher-density outerwood is converted into remanufacturing grades and the corewood into packaging flitches and boards. The kiln capacity at this sawmill is 200 000 cubic metres per annum. A total of 130 permanent staff are employed at the mill which produces lumber for the following markets: New Zealand (27 percent), Japan (32 percent), China (25 percent), US (6 percent) and other (10 percent). (www.panpac.co.nz/lumber/lumber_home/index.htm)

CLYDE LUMBER COMPANY LTD

Clyde Lumber is owned by John Ebbett; over the last few years the mill has produced both radiata pine and Douglas-fir lumber for niche export markets. This sawmill is currently registered with MAF's Indigenous Forestry Unit to cut indigenous timber from logs for which sustainable forest management approvals have been granted.

EAST COAST LUMBER LTD

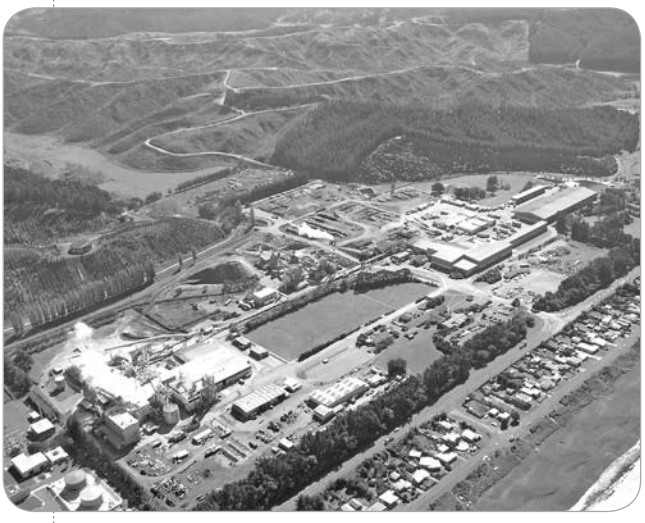
East Coast Lumber at Wairoa is owned by Ian McSporran and Mike Pollock and cuts 150 tonnes of pruned logs per day for the US, Australian, European and domestic markets. This mill also has low temperature drying and CCA wood treatment facilities.

› NAPIER PINE LTD

This sawmill, being rebuilt after a fire early in 2008, is based in the Pandora industrial estate in Napier. The mill is expected to be up and running again in October 2008, producing around 150 cubic metres per day when fully operational. Before the fire, this company was processing over 60 000 cubic metres per annum on this site, half of which was produced from their own sawmill. The company also has a 2.5 MW wood waste boiler for the supply of energy for the kilns located on this site. Napier Pine produces a range of lumber products suitable for picture framing, furniture, joinery, mouldings and packaging. They supply timber to the US, China, South East Asia, Australia and the domestic market. (www.napierpine.co.nz)

› WAIPAWA TIMBER SUPPLIES LTD

Waipawa Timber Supplies provides kiln-dried appearance-grade radiata pine lumber to the New Zealand market and exports to Australia, the US and Europe. The company has two conventional headrigs, two breastbench saws and one resaw, plus a CCA preservation plant and three kilns.



Aerial view of Pan Pac mill site with Pan Pac's Tangoio Forest in the background. Photo: Damon Wise/Pan Pac Forest Products.

› WAITANE MILL LTD

The Waitane Mill is located on an old Carter Holt Harvey site at Onekawa in Napier. It currently has four principal shareholders; one of whom is Rotorua-based Grant Butterworth from Verda New Zealand Ltd who is also the mill's managing director.

The mill is currently on a two-shift operation cutting large unpruned structural grade logs (75 percent of production) and pruned logs. This sawmill is a conventional band headrig, band resaw and circular edger configuration with two timber drying kilns. The Waitane Mill undertakes some custom kiln drying for outside clients. Production for the domestic market is primarily focused on the outdoor structural lumber market for landscaping and retaining structures supplying major retail outlets. Preservative treatment is outsourced as the Waitane Mill does not have a wood preservation plant on site.

The Waitane Mill supplies lumber for sawn components for the Japan and US markets; board grades for China; decking lumber for Thailand; and decking lumber and some structural framing lumber for the Australian market. The Waitane Mill installed a machine stress grader in 2007 and is grading for the New Zealand market.
(www.v3wood.co.nz/manufacturing/process/waitane.asp)

› WATTS TO MILL/THE KIWIBACKYARD COMPANY

The Waipukurau based mill is a portable mill. It is located at their James Street yard and currently saws around 10 cubic metres per week and also purchases lumber from portable sawmillers. This company is a macrocarpa specialist who mills and supplies all grades of *Cupressus macrocarpa* suitable for housing and furniture applications (beams, flooring, door jambs, joinery, sarking, window reveals) and also manufactures macrocarpa children's play equipment, garden buildings

and accessories (for example, garden beds, dog kennels, chook houses, dovecots and sleep-outs). (www.kiwibackyard.co.nz)

SECONDARY WOOD PROCESSING AND SOLIDWOOD MANUFACTURING

PACIFIC WOOD PRODUCTS

Pacific Wood Products (PWP) is a subsidiary of Pan Pac Forest Products and specialises in the manufacture of appearance-grade products. The plant in Napier opened for business in April 2002, the result of a $4.5 million investment package aimed at increasing vertical integration and adding value to the lumber from Pan Pacific Forest Products sawmill at Whirinaki. The plant comprises an Ultimizer Grade Scanner, Dimter 350 optimising saw, a Raimann multirip saw, a Waco twin bandsaw, three precision moulders, edge-to-edge finger jointer and RF Edge glue press. The processing capacity of the plant is approximately 30 000 cubic metres input per year, and targets markets in New Zealand, Japan, the US and South East Asia.

The majority of PWP's production comes from clear lumber which is transformed into untreated edge-joined wide boards for interior DIY projects. Sawlog grades are defected and optimised for furniture components, exterior treated mouldings for flashing and finishing houses, and mouldings for interior joinery. All products hold the FSC mixed sources and chain of custody certification.

The remainder of the output is tight knotty grade lumber which can be turned into cavity battens and furniture components, and the knotty lumber used as door cores or filling laminates in lintels and beams. (www.pwp.co.nz)

TUMU TIMBER GROUP

Tumu Timber was founded in Dannevirke in 1975. The Hastings branch started from an empty transport depot in 1983 and has expanded considerably to its current site of 7.5 hectares. It operates as both an ITM store and major remanufacturing operation. The wood processing plant on Maraekakaho Road in Hastings has CCA treatment plants producing outdoor-treated timbers and roundwood, Windsor kilns, Paul optimising docking system, planers, band resaw, pallet assembly and bin assembly jigs. The remanufacturing part of the business has been expanded to meet challenges of large-scale palletisation and bin manufacture to the horticulture industry and other industrial users. Tumu Timber is a major supplier of these products to the apple, kiwifruit, vegetable and meat industry sectors. The Tumu Timber Group has ITM stores in Hastings, Dannevirke, Gisborne, Havelock North and Masterton. It is associated with Kiwi Lumber,[1] which is involved with sawmilling, processing and exporting, and major roundwood manufacturer Permapine. (www.itm.co.nz/tumuhastings/index.html)

WAIROA TIMBER PROCESSORS LTD

This company is a joint venture between Clyde Lumber and East Coast Lumber located in Crarer Street, Wairoa. This new three-kiln facility has been developed to allow an overall capacity of ten kilns utilising wood waste for drying heat. A 4800-square metre dry store with planer facilities has been approved for the 2.5 hectare site.

[1] Kiwi Lumber Company Ltd: Although this mill is located just outside Hawkes Bay wood supply region's boundaries (in Dannevirke), it is a significant customer of logs from this region. The company specialises in producing clearwood timber from its medium-sized sawmill and wood processing site.

PULPING AND CHIPPING

PAN PAC FOREST PRODUCTS LTD

From its inception, Pan Pac's main purpose was to provide wood fibre for its shareholders' papermaking operations in Japan. The pulp mill at Whirinaki has 15 disc refiners that produce unbleached thermo-mechanical pulp (TMP) and is rated at 260 000 tonnes per annum. Over 240 000 tonnes of TMP is produced annually and shipped to Japan. In addition, up to 20 000 tonnes per annum of news-grade bleached TMP is produced for markets in Asia.

The electricity usage at this plant is about 80 MW which is similar to that used by Napier City. An on-site co-generation plant was installed in 2005 capable of producing up to 13 MW for internal use. Over 80 percent of the energy purchased is electrical with 90 percent of this for the pulp refining process. The remainder is thermal energy which is used for drying pulp and timber. More than 90 percent of the thermal energy comes from two boilers where mill waste material is burnt to produce steam, thus reducing the need to dump waste to landfill and reducing reliance on fossil fuels. Natural gas is used to boost the boilers when necessary. High-pressure boiler steam is used to generate electricity, and the low-pressure output steam is used as a heat source for pulp and timber drying.

The Pan Pac chip mill had a rated capacity of 400 000 green tonnes per annum. Pan Pac is currently replacing this chip mill to increase capacity by up to 50 percent. Chip exports through the Port of Napier provide wood fibre for Oji Paper's kraft pulp and paper operations in Japan.
(www.panpac.co.nz)

PRODUCTION AND EXPORT DATA

SAWN TIMBER PRODUCTION

Sawn timber production in Hawkes Bay has increased by 240 percent since 1990. This reflects the increase in the log harvest and upgrading and expansion of sawmill capacity since then, primarily driven by Pan Pac Forest Products Ltd.

TABLE 5.2: SAWN TIMBER PRODUCTION IN HAWKES BAY (IN CUBIC METRES)

YEAR ENDED 31 MARCH	INDIGENOUS FORESTS (M^3)	PLANTATION FORESTS (M^3)	TOTAL (M^3)
1990	615	102 542	103 157
1991	120	104 708	104 828
1992	21	113 418	113 439
1993	0	116 028	116 028
1994	1 122	124 879	126 001
1995	508	126 056	126 564
1996	2 386	137 679	140 065
1997	1 805	136 859	138 664
1998	16	127 224	127 240
1999	23	170 102	170 126
2000	205	224 097	224 302
2001	0	245 909	245 909
2002	736	272 106	272 842
2003	0	324 047	324 047
2004	0	315 809	315 809
2005	0	342 447	342 447
2006	0	361 157	361 157
2007 (Provisional)	0	350 806	350 806

Source
Ministry of Agriculture and Forestry.

› SAWN TIMBER EXPORTS

Export volumes of sawn timber from the Hawkes Bay region have increased by 258 percent since 1990.

TABLE 5.3: SAWN TIMBER EXPORTS FROM PORT OF NAPIER (IN CUBIC METRES)

YEAR ENDED 31 DECEMBER	NAPIER PORT (M^3)
1990	106 392
1991	117 524
1992	122 615
1993	119 901
1994	128 378
1995	127 708
1996	114 132
1997	108 298
1998	93 340
1999	141 540
2000	156 074
2001	167 270
2002	186 755
2003	203 595
2004	257 446
2005	267 587
2006	290 467
2007	274 468

Source
Ministry of Agriculture and Forestry.

› LOG EXPORTS

Exports ex Napier peaked at 611 000 cubic metres around 2002 and then dropped off before increasing again to 546 000 cubic metres in 2006. Variation in log exports reflected international market trends and opportunities at the time, availability of forest woodlots for harvesting and the early felling of non-radiata stands and replanting with radiata pine. The demand for export logs is variable; in recent years the high exchange against the US dollar and high shipping costs have depressed log exports.

TABLE 5.4: LOG EXPORTS FROM PORT OF NAPIER (IN CUBIC METRES)

YEAR ENDED 31 DECEMBER	TOTAL (M^3)
1990	192 000
1991	323 095
1992	282 928
1993	191 022
1994	248 441
1995	194 963
1996	101 092
1997	169 183
1998	71 642
1999	298 250
2000	345 453
2001	576 611
2002	611 317
2003	608 250
2004	480 873
2005	362 970
2006	546 351
2007	542 213

Source
Ministry of Agriculture and Forestry.

6 INDIGENOUS FORESTS

Natural forests occupy relatively little of the Hawkes Bay lowland: the early extensive areas of lowland forest were cleared during land settlement. The remaining extensive areas of forests are now restricted to steepland areas along the western ranges, much of which is within the control of the Department of Conservation. The 6000-hectare Mangataniwha forest in the northern part of the region has been identified as a timber production area under the Forests Act 1949, but most of the forest has limited capacity for timber production under sustainable management principles. Other forest remnants in private tenure further east and south are generally small isolated stands within predominantly pastoral land. Many are protected and maintained by landowners or, in some cases, under some form of covenant as key examples of the earlier forests. The total area of natural forest in the region is 266 000 hectares (MAF, 1997) of which 77 660 hectares is privately owned and available for sustainable forest management.

There are currently two MAF-approved Sustainable Forest Management plans and six Sustainable Forest Management permits covering 8440 hectares (11 percent) of the private indigenous forest in the Hawkes Bay. New Zealand's indigenous forest policy is to maintain its indigenous forests in perpetuity. In keeping with this, Part IIIA of the Forests Act 1949 (the Forests Act) was enacted in 1993 to promote the sustainable management of indigenous forest land. There are currently five portable and one fixed sawmill in the Hawkes Bay registered to mill indigenous forest logs from forest land that is subject to a registered Sustainable Forest Management Plan, Sustainable Forest Management Permit, or any other milling provision listed in the Sawmill Controls section of Part IIIA of the Forest Act.

EDUCATION AND TRAINING 7

FITEC

FITEC (Forest Industries Training Education Council) is the forest industry-owned training organisation covering:

- forest establishment, silviculture and harvesting;
- solid wood processing;
- pulp and paper converting;
- wood panel manufacturing;
- forest health and biosecurity;
- credit and finance.

FITEC also has responsibilities that include:

- setting national standards and qualifications and developing learning resources;
- developing training programmes for employers and employees;
- developing arrangements for training delivery;
- maintaining a database of trainees and their learning records;
- arranging quality assurance of training producers, industry trainers and assessors;
- providing leadership in industry on skills and learning issues.

FITEC has a training advisor covering the Hawkes Bay region.
(www.fitec.org.nz)

TAIRAWHITI POLYTECHNIC

Tairāwhiti Polytechnic began logging and forestry training out of their Gisborne campus in the early 1990s to provide skills-based forestry training on the East Coast. In 1999 the Polytechnic established the Papatoa cable logging and now has 13 bases around New Zealand including the Hawkes Bay.

Tairāwhiti Polytechnic also offers courses in forest harvesting, forestry driving and heavy-vehicle driving.
(www.tairāwhiti.ac.nz)

MV Sunny Napier 11 **loading Pan Pac wood pulp at the Port of Napier. Pulp is being shipped to Oji Paper's news print mill at Tomakomai in Japan. Photo: Pan Pac Forest Products.**

INFRASTRUCTURE 8

PORTS

PORT OF NAPIER

The Port of Napier has facilities to handle all forms of shipping and operates 24 hours a day, 7 days a week. The container terminal handles cargo of all types with an emphasis on refrigerated products. Facilities are also available to handle non-containerised cargo including logs, woodchips, cement, oil products, bulk liquids, fertiliser, pulp and lumber products, vehicles and foodstuffs. Napier has four mobile container cranes and a wide variety of cargo handling equipment. The port can handle a maximum ship draft on departure of 11.7 metres and ship length of 281 metres. For further detail please access information at this link: http://www.portofnapier.biz/pdf/MarineWeatherLimitsPolicy.pdf

In 2007 a new reclamation provided storage capacity for an additional 100 000 tonnes of log exports annually. The reclamation inside the breakwater has provided exporters with approximately 8000 tonnes of additional storage, bringing total log storage to about 5 hectares. This work, plus the recent purchase of "bookends" to provide a greater density in stacking logs, will enable the port to take better advantage of the next upturn in log exporting.

The Pan Pac chip facility receives chip trucks from the Pan Pac site at Whirinaki, and at 1.2 hectare in size, is capable of storing up to 50 000 cubic metres of wood chip.

The *2007 Port of Napier Annual Report* (Port of Napier, 2007) noted that forestry products experienced an improved year although results varied across the various sub-groups. Log exports continued a growth phase which began in mid 2006 but there were signs of a slow-down in 2007. In contrast, timber volumes stabilised after cargo owners redirected exports to markets less exposed to the strong dollar, and exports ceased from the now closed Lakesawn Lumber Plant at Taupo. Wood pulp exports were consistent with long-term patterns although woodchips experienced a relatively strong year.

ROAD TRANSPORT

Although there is a relatively good roading network in the Hawkes Bay, the Napier-Wairoa State Highway 2 has some steeply graded and winding sections that slow down traffic flow and is not ideal for heavy commercial vehicles. Increasing logging truck movements in the future will exacerbate this problem and associated safety risks.

Road transport is currently the preferred option for transporting logs in the Hawkes Bay, with relatively short haul distances (less than 100 kilometres) to wood processing facilities and the Port of Napier. The use of road transport reduces expensive and unnecessary double handling at rail links. Likewise the wood processing facilities in the Hawkes Bay do not have dedicated rail sidings at their mill sites, which would also force them into a double-handling situation if they elected to use rail. On top of this, a very scattered small forest network throughout the region favours road transport.

Pressure will increase for road construction materials as the many smaller blocks of forest come on-stream for harvest as well as putting additional pressure on the rural road networks in the Hawkes Bay.

RAIL TRANSPORT

As already mentioned above, the Hawkes Bay is most suited to road transport: the existing rail services are not considered to be of significance to either the current or future forestry operations. The Napier to Gisborne rail link could become viable only if it handled a high proportion of the Wairoa and Gisborne District forestry output of logs or processed wood products. As long as the Eastland Port can economically cope with the increasing production in that region, very little wood should need to be sent south to Wairoa or Napier by rail.

The rail link south of the Port of Napier is of a reasonably high standard, and links through the Woodville junction to either Palmerston North or to the Wairarapa.

ENERGY

The Hawkes Bay is connected to the national generation capacity via the national grid from Wairakei (220 kV). The grid extends south from the Redclyffe interconnecting transformer to Fernhill and Waipawa on two 110-kV circuits that connect with the central North Island Regional Grid via Woodville, and north to the East Coast also on 110-kV lines (Transpower New Zealand Ltd, 2008). Two 220/110 kV interconnecting transformers at Redclyffe supply the majority of the Hawkes Bay load (except Whirinaki and Whakatu which are supplied from the 220 kV system).

Generation capacity in the Hawkes Bay consists of the Waikaremoana hydro system generating 146 MW, and the Whirinaki thermal plant used as emergency capacity (160 MW). The Hawkes Bay power generation and usage forecasts suggest that supply and demand are adequately catered for out to 2018.

The Hawkes Bay has natural gas available via a pipeline through the Manawatu Gorge to Hastings and Napier.

Napier container port with log storage area in background.

9 OPPORTUNITIES AND CONSTRAINTS

GENERAL CONSTRAINTS

A number of factors are constraining the development of the forest industries across New Zealand; most of these are not specific to the Hawkes Bay. The most prominent include: skill shortages; distance from markets; requirements under the Resource Management Act 1991; compliance costs; increasing fuel costs; high ocean freight costs; the strength of the New Zealand dollar; the fragmentation of the industry; increased competition from low-cost overseas producers; non-tariff barriers; and the increased competition from wood substitutes.

Particular constraints which the Hawkes Bay Forestry Group (HBFG) is addressing are described below.

AVAILABILITY OF LABOUR

Retention of skilled forestry contractors and wood processing employees is an ongoing concern. The situation is not helped by the volatile and internationally competitive export log market, and the ability of the forest industry to pay competitive wages. Future labour availability and skills could become an issue when wood availability increases after 2016, suggesting an ongoing need for basic and advanced forestry skills training. Currently there is a good supply of silvicultural workers in the region although this labour pool is often drawn to the seasonal horticultural labour market.

The forest industry in Hawkes Bay is probably better off than some other forestry regions as there is a reasonable population base in the area, although companies regularly employ contractors from outside the area because of the difficulty recruiting suitable workers in some places. Travel distance to work is becoming a disincentive to many potential forestry workers: it is nowadays an exception that workers from outside the region want to stay on-site in forestry accommodation. Some local workers are travelling long distances to and from work to Napier and Hastings.

TRANSPORT INFRASTRUCTURE

While the Hawkes Bay has generally good road and rail infrastructure with particularly good road links to Taupo and Wellington, there is ongoing concern about the long-term maintenance and upgrade of local roading networks. Some of the feeder highway infrastructure to the north of Napier needs to be upgraded over the next eight years, otherwise there will be an impact on the development of the forest harvest in the Wairoa District. In-forest roading requirements will also create demand for road construction crews and material.

RESOURCE MANAGEMENT ACT 1991 (RMA)

The regional and district council administration of the Resource Management Act 1991 (RMA) in the Hawkes Bay is excellent and generally very receptive to forestry as a land use. The HBFG was formed to ensure a good working relationship was developed with the regional and district councils, and to ensure RMA guidelines and rules were being regularly and consistently adhered to.

The RMA, under the regional and district plans set out by the regional council and three district councils, provides the framework for the development of future harvesting and forest product processing operations. The greenfields development of processing facilities requires ongoing monitoring and compliance efforts, and the consent process inevitably involves a lengthy and expensive planning process. These processes are often adversarial and involve objections from nearby land owners and other affected parties.

The challenge facing the governing bodies of the Hawkes Bay region will be to provide for the development of the increased harvest and processing capacity that it could support, in a timely manner that minimises conflict within the community.

› ENERGY COSTS

Increasing fluctuations in non-hedged spot electricity prices are making it more difficult for manufacturers of energy-intensive forest products to purchase their energy off the national grid and still be internationally competitive. Many of the options using wood fibre for added value manufacturing require substantial energy inputs – for example, high-yield pulps, medium density fibreboard, which has been talked about as a possible future option in the Hawkes Bay, and, to a much lesser degree, lumber – all require substantial electricity inputs in their manufacture. Increasing electricity prices can drive behaviours such as exporting unprocessed raw materials and selling energy back to the national grid in times of high spot prices.

› CLIMATIC IMPACTS

Projected changes in climate are expected to adversely impact the Hawkes Bay resulting in greater drought severity and frequency during summer, and more frequent and severe cyclonic events such as Cyclone Bola in 1988. Forestry can be sustained in these conditions, and is often a better land use on some classes of land than pastoral farming. Yet, risks are greater because of the increased likelihood of wind damage to newly planted and near-mature forests, and loss of growth, decline in forest health and severity of fire risk during drought periods.

»» OPPORTUNITIES

› WOOD AVAILABILITY

With a flat supply curve over the next decade, the focus for the industry is likely to be on improving the utilisation of the existing resource, identifying efficiencies in the manufacturing and supply chains, and developing new product lines. In the Hawkes Bay, forest products have a competitive advantage if they are manufactured as close as possible to the forest being harvested, to ensure the radiata pine maintains its whiteness after harvest. Much of this resource is in close proximity to existing and potential processing facilities.

Most of the potential increase in wood availability after 2016 will come from the region's small-scale forests established during the 1990s. The actual timing of the harvest from these forests will depend on market conditions and the decisions of a large number of small-scale owners.

Wood availability is predicted to increase by about 1 million tonnes per year from 2021; much of this supply will be uncommitted to existing processing facilities. Some owners will be motivated to harvest early while others may decide to grow their forests on longer. It is therefore likely that the harvesting of the post-1990 forest plantings will be spread out over a longer period than would be the case if the forests were harvested at rotation age. Greater harvesting during the post-2016 period of more plentiful wood availability could have the effect of dampening log prices. However, if international log prices increased during this period of increasing wood availability, harvesting rates could quickly rise to meet demand.

› NEW PROCESSING OPPORTUNITIES

From about 2017 to 2021, an additional 180 000 cubic metres per year increase of radiata pine sawlogs provides potential opportunities for existing wood processing plants to increase sustainable production, and for development of new wood processing facilities within the region. The combined additional volume is sufficient to support two 350 000 cubic metre per year roundwood input wood processing ventures. Over this same five-year period, significant volumes of pulpwood could also become available, averaging approximately 46 000 cubic metres per year. Currently Pan Pac brings significant amounts of wood fibre from outside the region such as the Wairarapa area, and utilises all the locally produced

pulpwood from the Hawkes Bay. Using this pulpwood is the most cost-effective option for Pan Pac, so any extra pulpwood produced locally will be preferred over transporting pulpwood from more distant locations.

New processing facilities will only be established if their products can compete in the international market. Economies of scale, increased wood processing efficiency, the use of innovative technology, improved productivity and reduced costs are all important factors, as are the types of products.

While increasing energy costs increase production costs, they also present opportunities for forest owners to supply harvest residues to energy generation plants – either stand-alone electricity generators or integrated steam and electricity generation facilities. Limitations to the scale of these operations are that the terrain on which the forests are planted has limited access to flatter land on which to recover forest residues, and the transportation costs of these residues.

› ENERGY EFFICIENCY

The government, through the Energy Efficiency Conservation Authority, is actively investigating means to reduce forest processing facilities' reliance on electricity from the national grid. Several case studies completed to date have highlighted how significant facilities can largely meet all their energy needs through conversion of mill wastes and by-products to steam and electricity for on-site use and sale on energy markets. Some regions of New Zealand are already successfully recovering waste material from landings and skids, and at least one company is currently starting trials to recover forest residues for energy generation.

› NZ EMISSION TRADING SCHEME

The impact of the Emission Trading Scheme (ETS) on energy prices is currently a matter of speculation, yet there is no doubt that fossil fuel-based energy costs will continue to rise. As fuel prices rise, alternative generation methods will inevitably become more viable. Regions with increasing resources of forest-based fuels may benefit from cheaper and more reliable future energy sources and possibly gains from carbon offset credits.

The inclusion of forestry into the ETS and schemes such as the Permanent Forest Sink Initiative and the Afforestation Grant Scheme provide encouragement to landowners to plant forests, and in some cases may allow them to benefit from trading carbon credits.

»» CONCLUDING COMMENTS

The wood availability forecasts indicate that harvested volumes from Hawkes Bay plantation forests are likely to remain relatively static until after 2016, followed by significant increases in available wood. The impact of increasing volumes of wood from small-forest owners is going to be significant.

Although Pan Pac Forest Products is the dominant forest grower and wood processor in the Hawkes Bay, there will be new opportunities for further investment in the primary and secondary wood processing to take advantage of increasing wood flows after 2016.

Overall the Hawkes Bay is an attractive area to grow production forests. Not only has it the potential to expand the existing resource on marginal pastoral country, it also has good infrastructure, favourable council regulations and lifestyle attributes that stand out for this forestry region. The region will experience a period of stable wood availability which should be utilised to prepare for increasing regional wood availability post-2016.

The region is also surrounded by the central North Island and East Coast wood supply regions from which increasing wood flows will shortly become available.

WEBSITE ADDRESSES 10

FOR MORE INFORMATION

FOREST OWNERS/MANAGERS

Pan Pac Forest Products Ltd
www.panpac.co.nz/forest/forests_home/index.htm

Matariki Forests
www.rayonier.com

Roger Dickie (NZ) Ltd
www.rogerdickie.co.nz

Hancock Natural Resources Group
www.hancocktimber.com

Forest Enterprises Ltd
www.forestenterprises.co.nz

Hikurangi Forest Farms Ltd
www.hff.net.nz

P F Olsen Ltd
www.pfolsen.com

WOOD PROCESSORS

Pan Pac Forest Products Ltd
www.panpac.co.nz/lumber/lumber_home/index.htm
www.panpac.co.nz/pulp/pulp_home/index.htm

Pacific Wood Products
www.pwp.co.nz

Napier Pine Ltd
www.napierpine.co.nz

Waitane Mill Ltd
www.v3wood.co.nz/manufacturing/process/waitane.asp

Watts to Mill/The Kiwibackyard Company
www.kiwibackyard.co.nz

Tumu Timber Group
www.itm.co.nz/tumuhastings/index.html

PORT COMPANY

Port of Napier
www.portofnapier.co.nz

HAWKES BAY FOREST INDUSTRY ORGANISATIONS

Hawkes Bay Forestry Group
Chairman: Bob Pocknall
email: bob.pocknall@pfolsen.com
Secretary: Brett Gilmore
email: brett.gilmore@panpac.co.nz

New Zealand Farm Forestry Association – Hawkes Bay Branch
Secretary: Brent McNabb
email: brent.mcnabb@panpac.co.nz
www.nzffa.org.nz

New Zealand Institute of Forestry – Hawkes Bay section
Secretary: Barry Keating
email: keating@xtra.co.nz
www.nzif.org.nz

EDUCATION AND TRAINING

Forest Industries Training Education Council (FITEC)
www.fitec.org.nz

Tairāwhiti Polytech
www.tairawhiti.ac.nz

GOVERNMENT DEPARTMENTS

Department of Conservation
www.doc.govt.nz

Ministry of Agriculture and Forestry – Home Page
www.maf.govt.nz/mafnet/index.htm

Ministry of Agriculture and Forestry – Forestry Statistics
www.maf.govt.nz/statistics/forestry/index.htm

Statistics New Zealand
www.stats.govt.nz/default.htm

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Ministry of Forestry (1997). *New Zealand's Forest Growing and Wood Processing Sector Regional Studies HAWKES BAY,* Ministry of Forestry, June.

Port of Napier (2007). *2007 Port of Napier Annual Report,* Port of Napier, October. Accessed 6 August 2008 via: http://www.portofnapier.co.nz/AnnualReports_2007/index_2007.asp

Transpower New Zealand Ltd (2008). *Annual Planning Report 2008 (Incorporating the Grid Reliability Report and the Grid Economic Investment Report)*, Transpower New Zealand Limited, March 2008.

APPENDIX 12

TABLE 1: HAWKES BAY HARVEST INTENTIONS SURVEY RESULTS, LARGE-SCALE OWNERS

	EXPECTED HARVEST 2005	HARVEST INTENTIONS FOR SUBSEQUENT 10 YEARS									
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RADIATA PINE											
Pruned (m^3)	190 366	208 251	188 158	200 800	201 590	189 258	174 217	169 713	160 267	179 292	176 236
Unpruned (m^3)	724 431	948 708	946 012	1 038 648	1 035 504	1 010 995	825 920	849 083	833 504	788 191	788 448
Pulp (m^3)	319 043	403 558	379 477	384 230	378 056	347 146	343 204	292 809	291 448	274 202	273 128
Total (m^3)	**1 233 840**	**1 560 518**	**1 513 647**	**1 623 678**	**1 615 150**	**1 547 399**	**1 343 341**	**1 311 605**	**1 285 219**	**1 241 686**	**1 237 812**
Area radiata (ha)	2 152	2 752	2 564	2 693	2 676	2 528	2 093	2 082	2 023	1 920	1 915
DOUGLAS-FIR											
Unpruned (m^3)	9 392	5 043	19 640	10 963	5 043	5 961	671	671	671	671	671
Pulp (m^3)	7 454	889	9 876	6 809	889	2 011	111	111	111	111	111
Total (m^3)	**16 846**	**5 931**	**29 515**	**17 771**	**5 931**	**7 971**	**782**	**782**	**782**	**782**	**782**
OTHER SPECIES											
Unpruned (m^3)	10 095	8 793	6 930	5 583	0	0	0	0	0	0	0
Pulp (m^3)	19 780	19 056	19 954	16 380	45	0	0	0	0	0	0
Total (m^3)	**29 875**	**27 849**	**26 884**	**21 962**	**45**	**0**	**0**	**0**	**0**	**0**	**0**
Total all species (m^3)	**1 280 561**	**1 594 298**	**1 570 047**	**1 663 411**	**1 621 126**	**1 555 370**	**1 344 123**	**1 312 387**	**1 286 000**	**1 242 468**	**1 238 594**

TABLE 2: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 1 (UNCONSTRAINED CUT), FOR ALL OWNERS

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)
2005	1 314
2006	1 761
2007	1 674
2008	2 053
2009	697
2010	2 143
2011	2 377
2012	2 138
2013	2 495
2014	2 519
2015	2 135
2016	1 663
2017	970
2018	422
2019	866
2020	654
2021	1 133
2022	3 618
2023	4 515
2024	7 777
2025	5 609
2026	6 745
2027	4 781
2028	2 783
2029	1 817
2030	2 582
2031	3 287
2032	3 031
2033	3 358
2034	2 118
2035	746
2036	1 209
2037	1 622
2038	1 461
2039	1 719
2040	701

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE 3: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 2

Assumes that large-scale owners cut at stated intentions, and small-scale owners cut at 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	1 234	80	1 314
2006	1 561	200	1 761
2007	1 514	160	1 674
2008	1 624	706	2 330
2009	1 615	232	1 847
2010	1 547	453	2 000
2011	1 343	429	1 772
2012	1 312	394	1 706
2013	1 285	388	1 673
2014	1 242	274	1 516
2015	1 238	356	1 594
2016	1 318	163	1 481
2017	1 318	107	1 425
2018	1 318	78	1 396
2019	1 318	236	1 553
2020	1 318	180	1 498
2021	1 391	559	1 950
2022	1 530	3 040	4 570
2023	1 531	3 715	5 246
2024	1 531	5 132	6 664
2025	1 531	3 289	4 820
2026	1 531	3 695	5 226
2027	1 531	2 985	4 517
2028	1 531	862	2 393
2029	1 531	701	2 232
2030	1 531	971	2 502
2031	1 531	1 080	2 611
2032	1 531	846	2 378
2033	1 531	445	1 977
2034	1 531	246	1 778
2035	1 531	248	1 779
2036	1 531	58	1 590
2037	1 531	154	1 685
2038	1 531	124	1 655
2039	1 531	578	2 110
2040	1 531	196	1 728

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE 4: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 3

Assumes a non-declining yield with target rotation of 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	1 234	80	1 314
2006	1 561	200	1 761
2007	1 514	160	1 674
2008	1 624	201	1 825
2009	1 615	210	1 825
2010	1 547	278	1 825
2011	1 343	482	1 825
2012	1 312	513	1 825
2013	1 285	540	1 825
2014	1 242	583	1 825
2015	1 238	587	1 825
2016	1 329	496	1 825
2017	1 329	679	2 007
2018	1 329	880	2 208
2019	1 329	1 100	2 429
2020	1 329	1 230	2 558
2021	1 329	1 230	2 558
2022	1 445	1 113	2 558
2023	1 498	1 060	2 558
2024	1 498	1 060	2 558
2025	1 498	1 060	2 558
2026	1 498	1 060	2 558
2027	1 498	1 060	2 558
2028	1 498	1 060	2 558
2029	1 498	1 060	2 558
2030	1 498	1 060	2 558
2031	1 498	1 060	2 558
2032	1 498	1 060	2 558
2033	1 498	1 060	2 558
2034	1 498	1 060	2 558
2035	1 498	1 060	2 558
2036	1 498	1 060	2 558
2037	1 498	1 060	2 558
2038	1 498	1 060	2 558
2039	1 498	1 060	2 558
2040	1 498	1 060	2 558

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE 5: HAWKES BAY RADIATA PINE AVAILABILITY UNDER SCENARIO 4, BY LOG GRADE, FOR ALL OWNERS

Scenario 4 assumes a split non-declining yield with target rotation of 30 years.

YEAR ENDING DECEMBER	TOTAL (000 M^3 IB)	RECOVERABLE VOLUME BY LOG GRADE		
		PRUNED LOGS (000 M^3 IB)	UNPRUNED LOGS (000 M^3 IB)	CHIP LOGS (000 M^3 IB)
2005	1 314	197	830	286
2006	1 761	245	1 113	403
2007	1 674	219	1 061	395
2008	1 837	241	1 163	433
2009	1 837	238	1 163	436
2010	1 837	245	1 161	431
2011	1 837	248	1 162	427
2012	1 837	223	1 167	446
2013	1 837	237	1 165	435
2014	1 837	261	1 162	414
2015	1 837	266	1 160	410
2016	1 864	283	1 173	407
2017	2 050	312	1 288	452
2018	2 255	343	1 420	493
2019	2 481	377	1 560	544
2020	2 729	415	1 715	599
2021	3 002	456	1 908	638
2022	3 018	502	1 900	616
2023	3 018	486	1 911	622
2024	3 018	492	1 908	617
2025	3 018	506	1 904	608
2026	3 018	455	1 931	632
2027	3 018	496	1 911	610
2028	3 018	546	1 889	583
2029	3 018	491	1 914	612
2030	3 018	541	1 892	583
2031	3 018	580	1 878	560
2032	3 018	553	1 890	575
2033	3 018	501	1 915	602
2034	3 018	451	1 940	628
2035	2 716	406	1 746	565
2036	2 444	365	1 571	508
2037	2 200	329	1 413	459
2038	2 200	357	1 400	444
2039	2 200	321	1 417	463
2040	2 200	313	1 420	467

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE 6: HAWKES BAY RADIATA PINE RECOVERABLE VOLUME AND AVERAGE CLEARFELL AGE FOR EACH TARGET ROTATION AGE UNDER SCENARIO 5, FOR ALL OWNERS

Scenario 5 assumes a split non-declining yield with target rotations of 28, 30 and 32 years.

	28-YEAR ROTATION		30-YEAR ROTATION		32-YEAR ROTATION	
YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	1 314	31	1 314	31	1 314	31
2006	1 761	31	1 761	31	1 761	31
2007	1 674	30	1 674	30	1 674	30
2008	1 841	30	1 837	30	1 674	30
2009	1 913	30	1 837	30	1 674	30
2010	1 913	30	1 837	30	1 674	30
2011	1 913	30	1 837	30	1 674	31
2012	1 913	31	1 837	31	1 674	31
2013	1 913	31	1 837	31	1 674	31
2014	1 987	30	1 837	31	1 674	32
2015	2 186	29	1 837	31	1 674	32
2016	2 404	28	1 864	30	1 674	32
2017	2 645	29	2 050	30	1 674	33
2018	2 909	29	2 255	29	1 674	32
2019	2 909	29	2 481	30	1 674	31
2020	2 909	28	2 729	29	1 841	31
2021	2 909	28	3 002	28	2 026	30
2022	2 909	28	3 018	29	2 228	29
2023	2 909	29	3 018	29	2 451	30
2024	2 909	29	3 018	30	2 696	31
2025	2 909	30	3 018	31	2 966	32
2026	2 909	30	3 018	31	3 262	33
2027	2 909	31	3 018	31	3 270	33
2028	2 909	31	3 018	32	3 270	33
2029	2 909	31	3 018	32	3 270	34
2030	2 909	32	3 018	32	3 270	34
2031	2 909	32	3 018	33	3 270	34
2032	2 909	31	3 018	33	3 270	35
2033	2 618	31	3 018	33	3 270	35
2034	2 357	32	3 018	34	3 270	35
2035	2 121	32	2 716	34	3 270	36
2036	2 121	31	2 444	34	3 270	37
2037	2 121	30	2 200	33	2 943	37
2038	2 121	30	2 200	33	2 649	37
2039	2 121	29	2 200	33	2 384	36
2040	2 121	29	2 200	33	2 384	36

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE 7: WOOD AVAILABILITY AND AVERAGE CLEARFELL AGE FOR DOUGLAS-FIR IN HAWKES BAY

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	17	48
2006	6	42
2007	30	41
2008	24	44
2009	6	41
2010	9	41
2011	1	41
2012	2	41
2013	1	41
2014	1	0
2015	1	0
2016	30	41
2017	30	0
2018	30	41
2019	30	41
2020	27	41
2021	4	41
2022	0	0
2023	2	41
2024	9	41
2025	5	41
2026	0	0
2027	0	0
2028	0	0
2029	0	41
2030	0	0
2031	7	41
2032	0	0
2033	1	41
2034	0	41
2035	34	41
2036	24	41
2037	4	41
2038	2	41
2039	2	41
2040	0	0

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.