

Central North Island wood availability forecasts for the period 2008–2040

Contents

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Disclaimer

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

While every effort has been made to ensure the accuracy of the information contained in this publication, the Ministry of Agriculture and Forestry (MAF) accepts no liability for any errors or omissions. The information does not necessarily represent the views of individual members of the National Exotic Forest Description (NEFD) Steering Committee nor the Ministry of Agriculture and Forestry.

Overview

These forecasts show the range of harvest volumes potentially available from the planted production forests in the Central North Island region for the period 2008–2040.

The wood availability forecasts are based on the region's forest resource and the forecasting assumptions described later in this report. The forecasts have been developed incorporating the harvesting intentions of the regions' large-scale forest owners (those with 1000 hectares of forest or more):

- Hancock Natural Resource Group;
- Kaingaroa Timberlands;
- Winstone Pulp International;
- Lake Taupo and Rotoaira Forestry Trusts;
- Crown Forestry;
- Matariki;
- Global Forest Partners;
- Blakely Pacific;
- Taharoa C Incorporation.

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.

Five scenarios have been modelled to indicate the potential range of future wood availability. 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.

The scenarios indicate there are many different ways for the forest estate in the Central North Island to be harvested. 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 it owns. This in turn feeds back directly into future wood availability.

Different levels of certainty are 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 harvest intentions or changes in the resource description (areas and yields). Yet they have greater certainty than those forecast from the small-scale owners' forests. Not only are harvest intentions less certain for small-scale owners, the resource description is also likely to be less accurate.

Introduction

Scenarios for radiata pine

Five wood availability scenarios have been modelled for radiata pine in this analysis. They show a range of potential ways for harvesting the forests in the region in the future.

To ensure the scenarios used in this analysis are reasonable, they were developed in consultation with the National Exotic Forest Description (NEFD) Steering Committee, and feedback was received from major forest owners and consultants in the Central North Island wood supply region.

Unless stated otherwise calendar years have been used in this report.

Scenario 1: Harvest all forests at age 28

All owners are assumed to harvest their forests at age 28. This scenario shows the potential future harvest in any given year, based on the area of radiata pine forest that reaches the assumed rotation age in that year.

Scenario 2: Large-scale owners harvest at stated intentions, small-scale owners harvest at age 30

Large-scale owners' wood availability is assumed to be at stated harvest intentions for 2008 to 2015. After 2015, the large-scale owners' wood availability is modelled 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 constrained 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 projected.

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. Future harvesting from the small-scale owners is generally less certain than for the large-scale owners.

In scenarios 1 and 2 (Figures 1A and 1B, respectively), forests owned by small-scale owners are assumed to be harvested at a fixed age – 28 years in scenario 1 and 30 years in scenario 2. In scenario 1 all forests (large and small-scale) are harvested at 28 years. These two scenarios show the “potential” availability of mature forest in any given year and directly reflect the area of forest in each age class in the Central North Island region. For practical reasons already described, it is unlikely that the future harvesting would occur like this. These two scenarios simply show the potential magnitude of harvesting under favourable market conditions in any given year.

Scenarios 3 to 5 (Figures 1C and 1D, respectively) are based on yield regulation. Under these scenarios, future harvesting 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 into account, to some extent, logistical and market constraints.

These scenarios avoid the large year-to-year fluctuations seen in scenario 1. A fundamental property of the forests in the Central North Island (although not as pronounced as in many other regions in New Zealand) is the increased area of forests established by small-scale owners during the 1990s. Scenarios 4 and 5 allow for harvesting 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 is that log prices and other market factors are significant determinants of harvesting in any given year. When log prices increase, harvesting will generally increase. When log prices fall, the level of harvesting will generally fall. It is beyond the scope of this analysis to predict future log prices.

Figure 1 shows the sequence of models (scenarios) that are presented throughout the remainder of this report.

Figure 1: The sequence of wood availability scenarios presented in this report for radiata pine. (Scenario 5 is the same as scenario 4 except it shows wood availability profiles of varying harvesting ages)

Figure 1A – Scenario 1 example: harvest all trees at age 28.

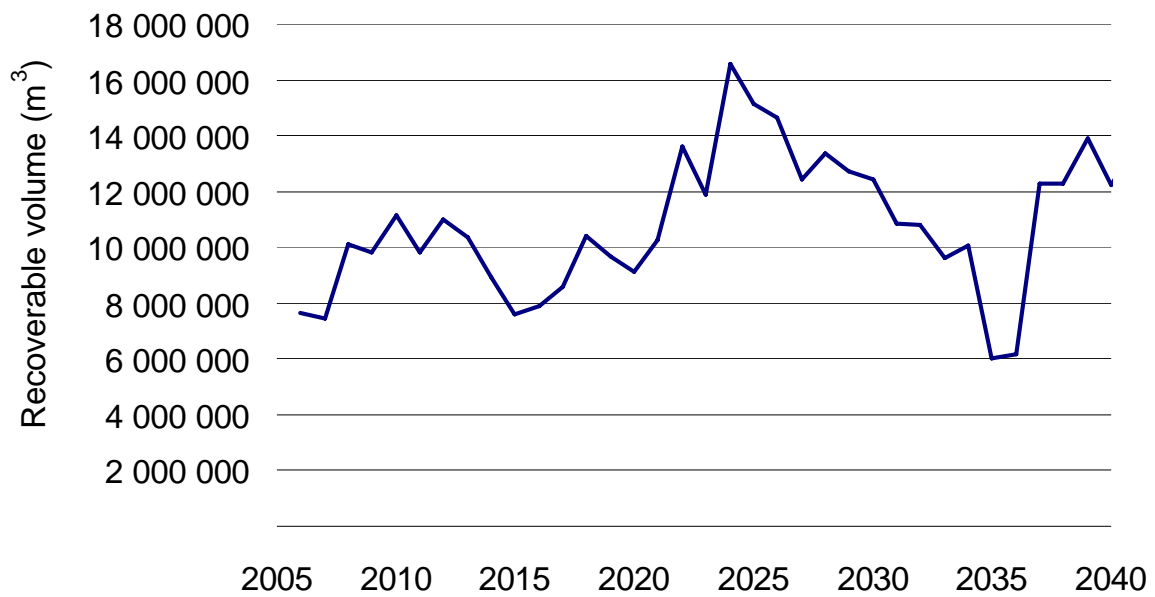


Figure 1B – Scenario 2 example: large-scale owners harvest at stated intentions, small-scale owners harvest trees at age 30.

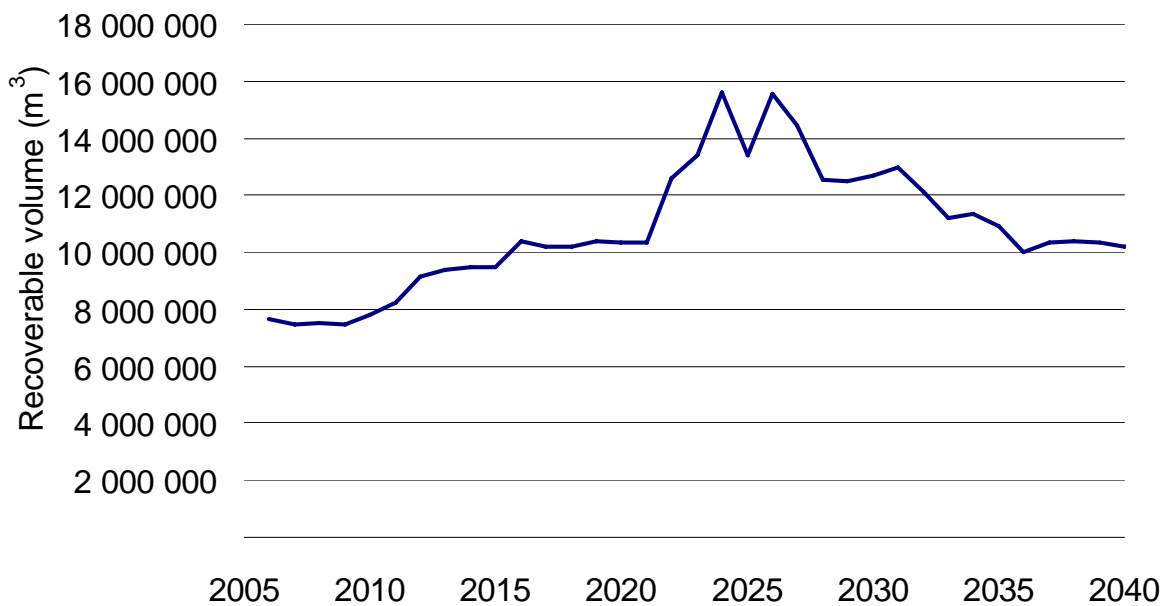


Figure 1C – Scenario 3 example: non-declining yield with target rotation 30 years.

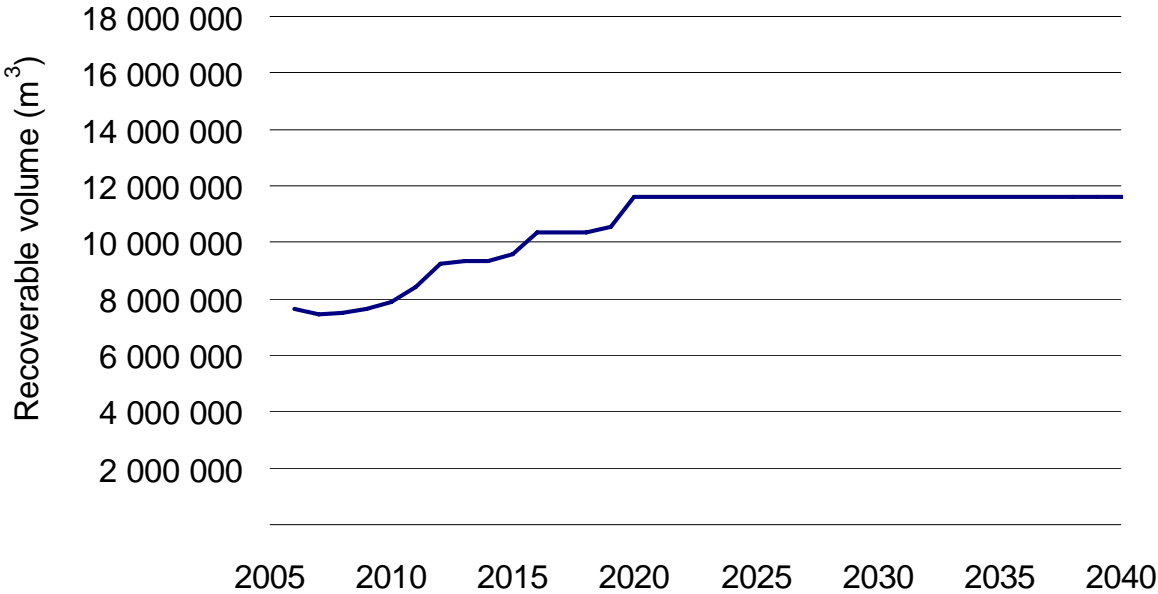
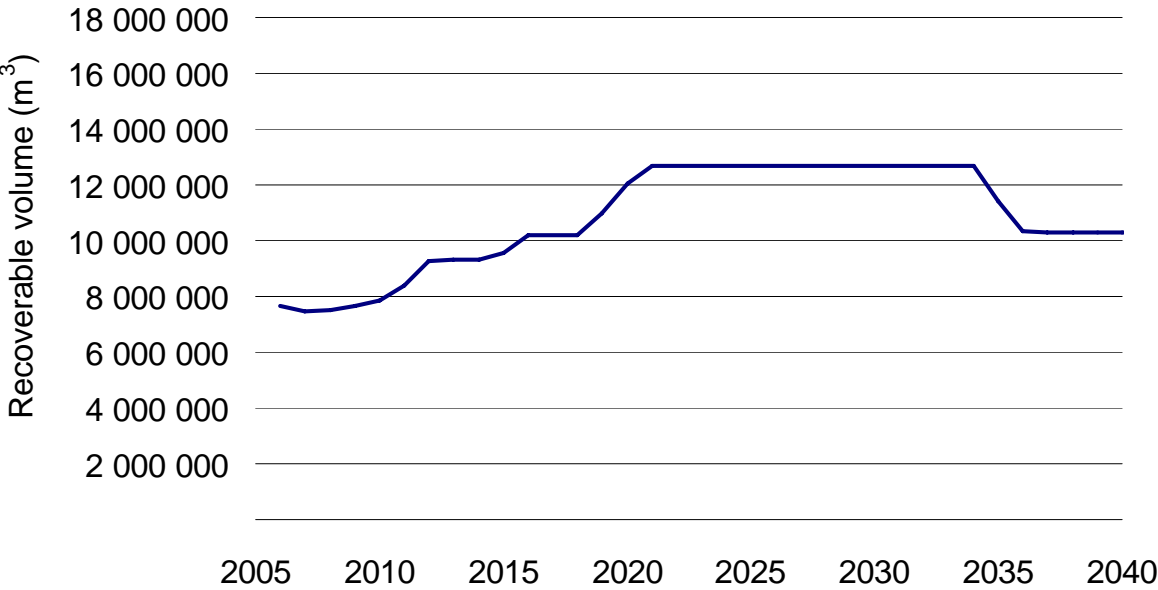


Figure 1D – Scenario 4 example: split non-declining yield with target rotation 30 years.



Scenarios for Douglas-fir

One scenario is presented for Douglas-fir (all owners): this is similar to scenario 3 for radiata pine. It is based on the harvest intentions of large-scale owners for 2006 to 2015 with yield regulated in subsequent years. Target rotation age is 45 years for Douglas-fir.

Wood availability from other species has not been modelled.

Data

Method used to obtain forest areas

- Forest areas by croptype were obtained from the *NEFD as at 1 April 2006*. The following reductions in area were made:
 - 6000 hectares in young age-classes was removed to allow for deforestation of young stands between 1 April 2006 and 31 December 2007.
 - The small-scale owners' forest areas (apart from that of the investment syndicates and other professionally managed forests) were reduced by 15 percent. This was done because the area in this ownership category is often reported on the basis of gross area rather than net stocked area.

In addition some minor changes in croptyping were made based on information received from forest owners. For instance one large-scale owner noted that it assigns all replanted area to the NEFD minimum tending – without production thinning – croptype and reallocates to other croptypes once tending has been done.

Method to develop yield tables

In 2007 new yield tables for the Central North Island were developed in the following manner:

- large-scale owners provided yield tables for their estate;
- 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; that is, the assumption is that the harvest intentions data is 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 using the same percentage adjustments used for older stands;
- 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 volume by log grade and area from 2006 to 2015. These harvest intention values were then included at the beginning of the forecasts to provide the most realistic wood availability forecasts over this period.

Wood availability forecasts for the Central North Island

Assumptions

The wood availability forecasts for the Central North Island are based on the following assumptions:

- Replanting – All area in the large-scale owners' estate that is clearfelled is replanted (with a regeneration lag of 1 year) apart from 8000 hectares in 2006 and 2007 combined. It is assumed that 90 percent of area clearfelled in the small-scale owners' estate is replanted.
 - The area awaiting replanting as at 31 March 2006 is included as area at age 0, that is, area to be replanted in the 2006 planting season.
 - Species/Regime – Area is replanted into the same species. Following harvest of old radiata pine croptypes, replanting was assumed to be in proportion to the area in young radiata pine croptypes, that is, future silviculture was assumed to reflect what is currently being applied.

The total volumes of radiata pine and Douglas-fir harvested by large and small-scale owners in 2006 and 2007 are shown in Table 1.

Table 1: Volumes harvested in 2006 and 2007.

Harvest year	Species	Large-scale owners (m ³)	Small-scale owners (m ³)
2006	Radiata pine	7 120 000	524 000
	Douglas-fir	266 000	10 000
2007	Radiata pine	6 918 000	533 000
	Douglas-fir	303 000	10 000

These harvest figures differ from roundwood removal estimates by region as reported in MAF's statistics (2008 – <http://www.maf.govt.nz>). The difference is attributed to the fact that the roundwood removal estimates are derived from regional mill outputs and log export volumes; the harvest figure indicated above are from a direct survey of growers within the region. This difference indicates a net flow of logs into the region for processing or export.

Overmature stands – it was assumed that any area of radiata pine in the small-scale owners' estate over 40 years would not be harvested. This resulted in the removal of 134 hectares.

Scenario 1 – Harvest all forest at age 28

The scenario with all forest harvested at age 28 indicates the “pure” (that is, unconstrained) availability of wood from the Central North Island. It is essentially a translation of the age-class distribution into volume. Figure 2 shows the age-class distribution of radiata pine in the Central North Island, while Figure 3 shows the wood availability. The high point at 2024 in Figure 3 occurs because of the large area (24 187 hectares) at age 10 (planted in 1996) in Figure 2.

It is worth noting the lift in the wood availability in 2008: it suggests large-scale owners have potential harvest available immediately, but are not currently planning to harvest. Therefore changing market conditions are likely to cause larger owners to depart from their stated intentions within the 2008 to 2015 period. This in turn reflects the relative maturity of the Central North Island forest industry.

Figure 2: Age-class distribution of Central North Island radiata pine – combined estate as at 1 April 2006

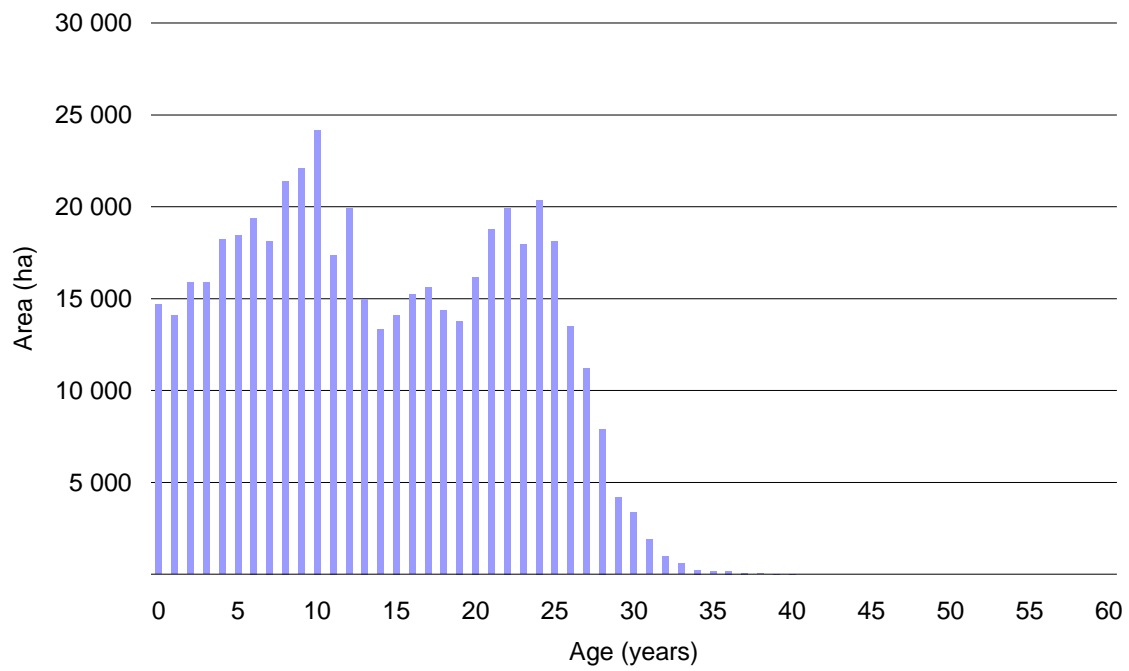
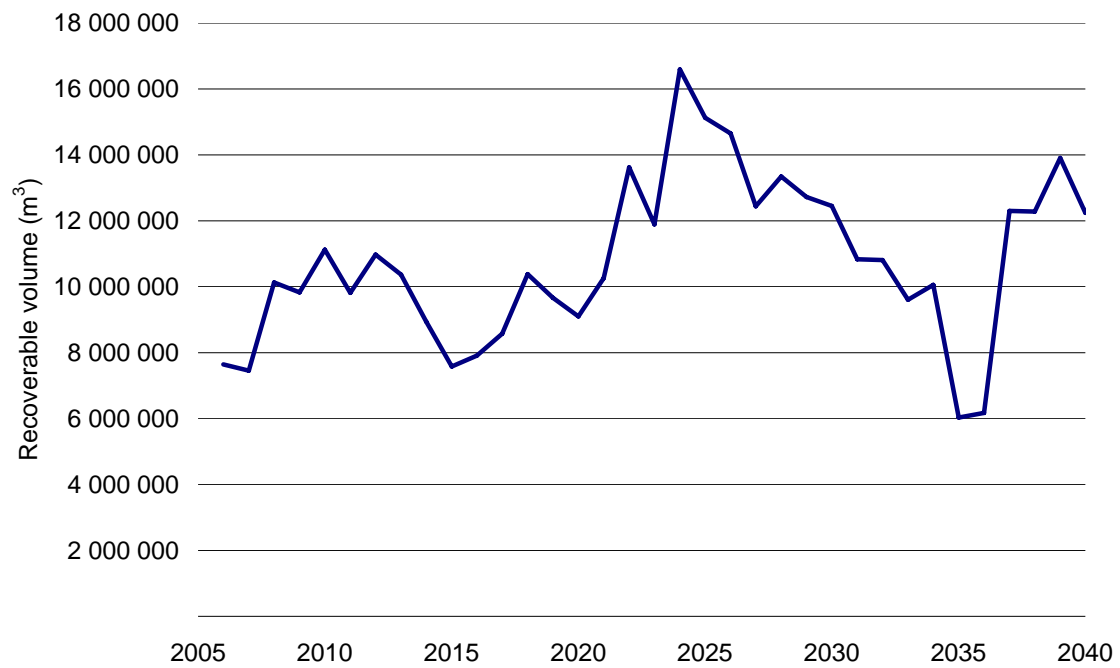


Figure 3: Central North Island radiata pine availability under scenario 1



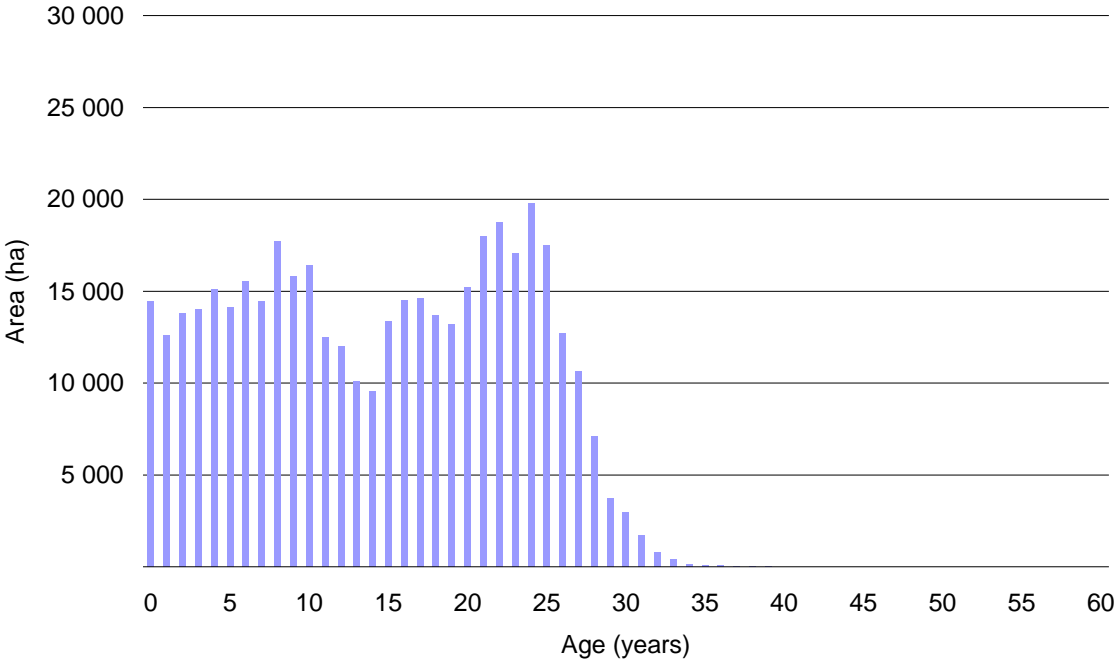
Scenario 2: Large-scale owners harvest at intentions, small-scale owners at age 30

In this scenario, large-scale owners harvest in line with their stated intentions, and small-scale owners harvest trees at age 30.

Large-scale owners

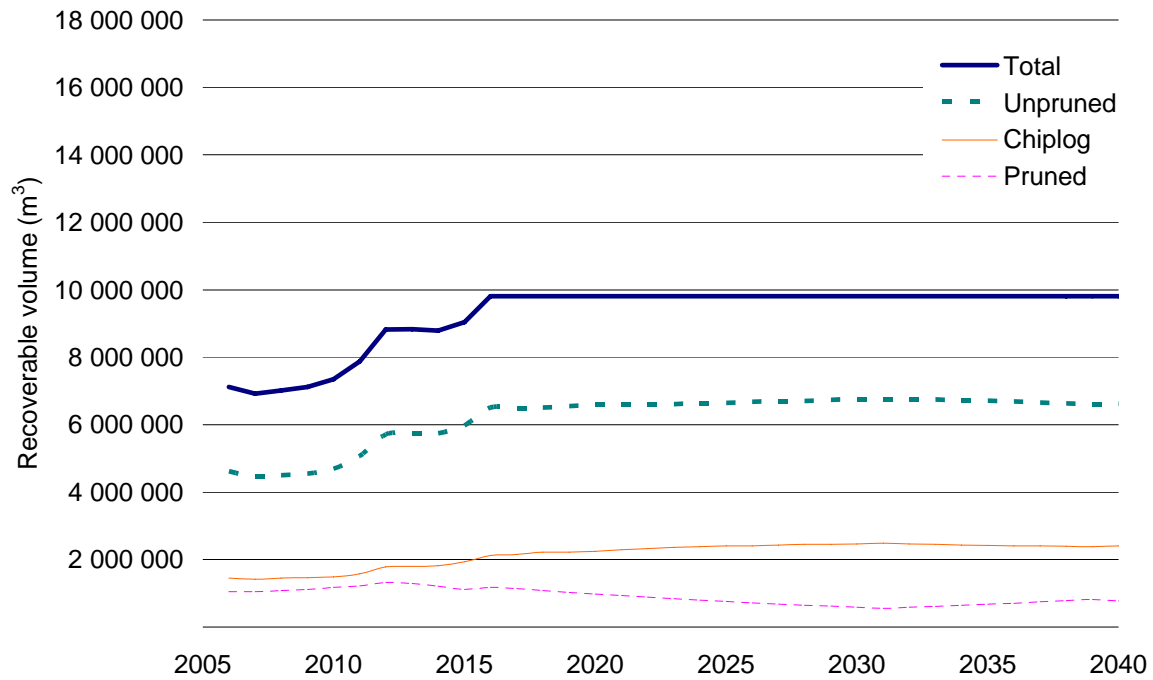
The age-class distribution of the large-scale owners' estate (Figure 4) is reasonably uniform at least between ages 0 and 26. The area at age 0 is the area awaiting replanting as at 31 March 2006 (that is, area to be replanted in the 2006 planting season).

Figure 4: Age-class distribution of the Central North Island radiata pine estate – large-scale owners as at 1 April 2006



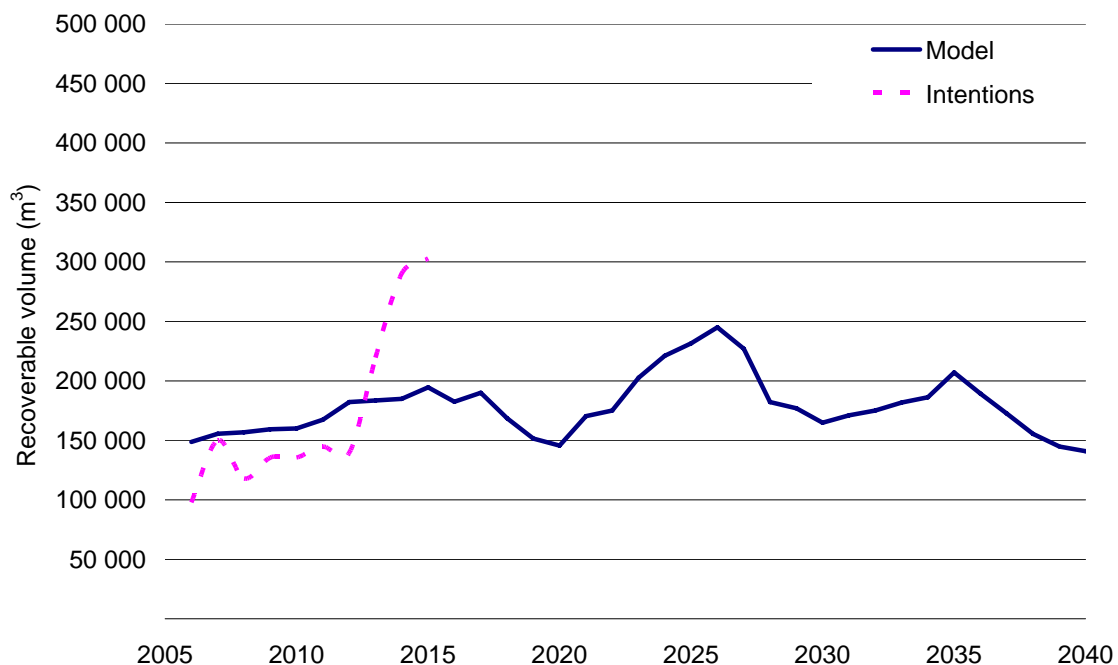
For this scenario the availability of wood from large-scale owners is based on stated harvest intentions for 2006 to 2015. Thereafter the availability is constrained to be non-declining with a target rotation age of 30 years. The wood availability of large-scale owners (Figure 5) is forecast to increase until it reaches 9.8 million cubic metres per year from 2016. The increase between 2015 and 2016 reflects the higher yields (cubic metres/hectare) that owners expect to get from young stands when they mature.

Figure 5: Central North Island radiata pine availability under scenario 2 – large-scale owners



The volumes shown in Figure 5 are for clearfelling only. Production thinning volumes were compared for large-scale owners in the wood availability model, with stated intentions (Figure 6). Production thinning volumes are low compared to clearfell volumes.

Figure 6: Radiata pine production thinning volumes available under scenario 2 – large-scale owners as at 1 April 2006



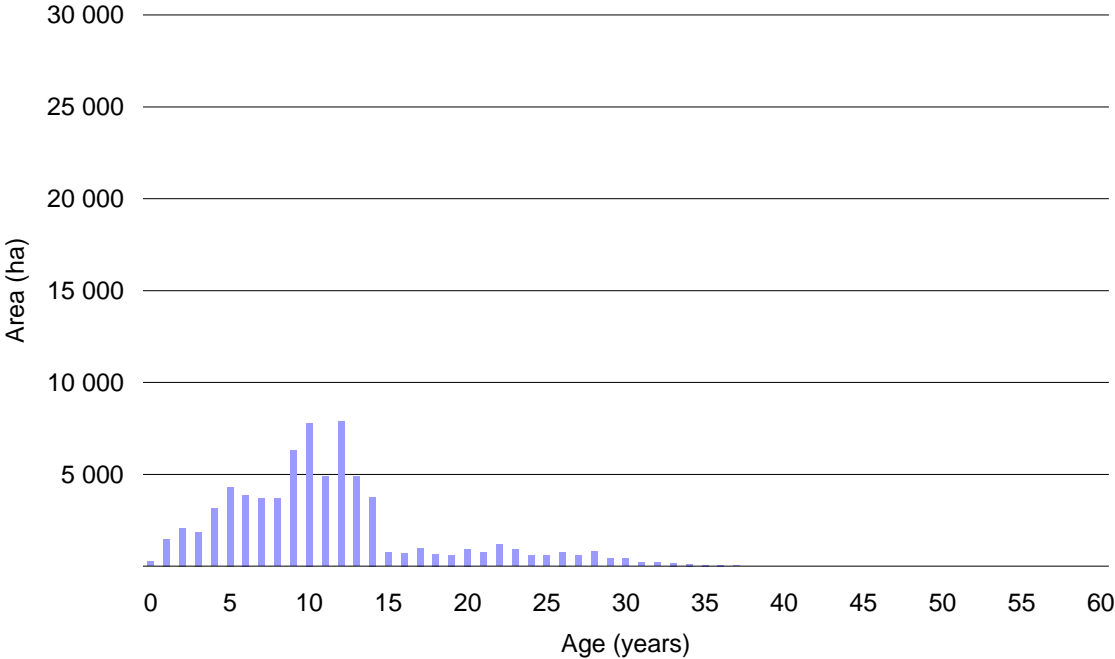
Small-scale owners' estate

The age-class distribution of the small-scale owners' estate (Figure 7) is very irregular with greater areas between ages 4 to 14 years, particularly ages 9 to 12 years (planted in 1994 to 1997), and much less area in other age-classes. The key issue is how to forecast the

availability from this estate. In particular, whether the large area of younger stands will be harvested:

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

Figure 7: Age-class distribution of the Central North Island radiata pine estate– small-scale owners as at 1 April 2006

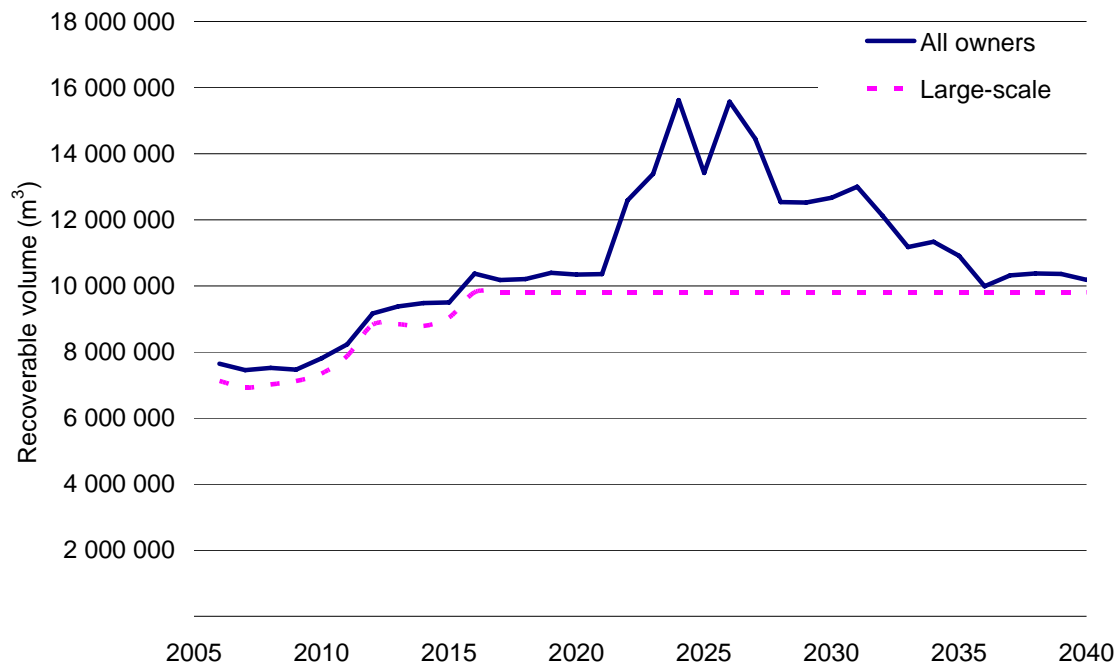


Combined estate

The wood availability from all owners is presented in Figure 8, with that of large-scale owners being the same as in Figure 5. In this scenario 2, all forest in the 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 8) occurs when the large areas from the small-scale owners’ estate in young age-classes are harvested. For example, the increase in 2022 results from the 3769 hectares planted by small-scale owners in 1992 (age 14 in Figure 7) being harvested at age 30 years.

Figure 8: Central North Island radiata pine availability under scenario 2 – combined estate



Fluctuations in harvest volumes of the magnitude shown in Figure 8 would be impractical because of marketing and logistics realities (for example, the immediate availability of logging crews, transport capacity, and wood processing capacity).

Scenario 3 – NDY (target rotation 30 years)

The third scenario assumes a non-declining yield, with a target rotation age of 30 years. Figure 9 indicates that when the small-scale owners' estate is harvested to complement the large-scale owners' estate, the total volume (radiata pine) has the potential to increase to 11.6 million cubic metres per year from 2020. The model was constrained to ensure that the total volume harvested did not increase by more than 10 percent annually.

This scenario is similar to the base case scenario adopted in the 2000 NEFD wood supply forecasts. However, it results in the small-scale owners' estate being harvested at rotation ages that differ markedly from 30 years (Figure 10).

Figure 9: Central North Island radiata pine availability under scenario 3

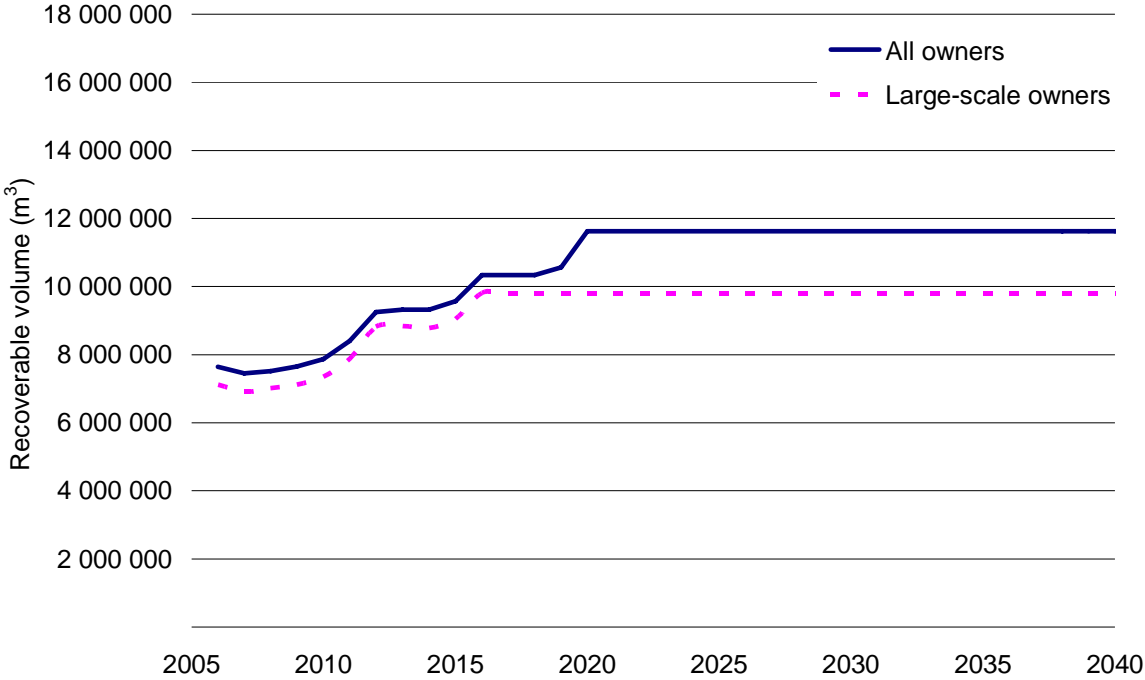
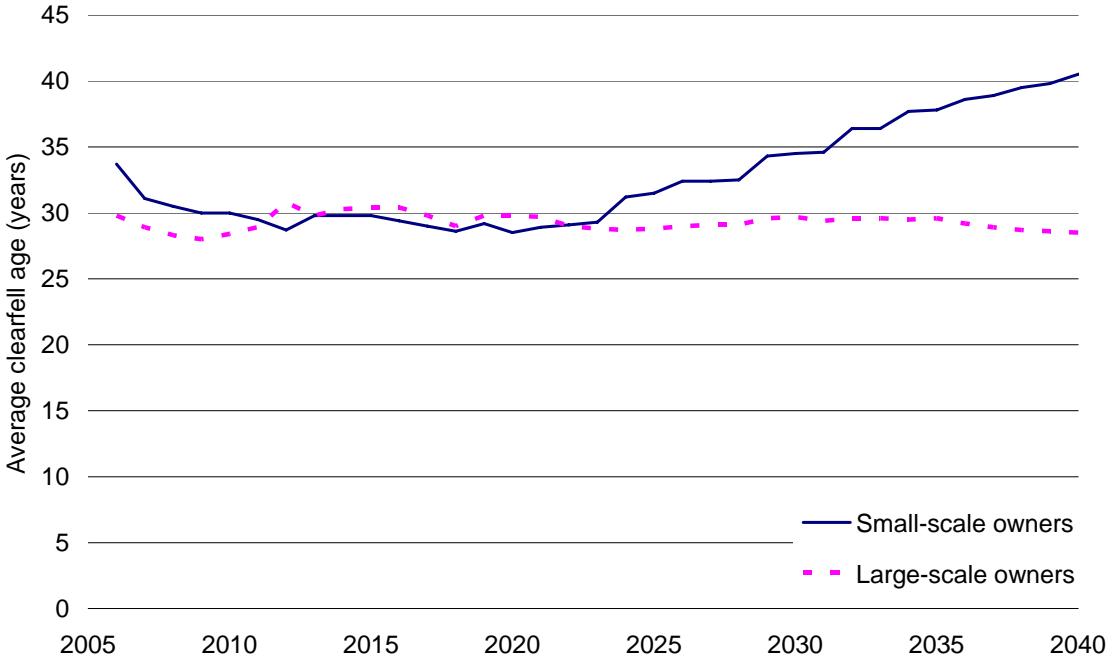


Figure 10: Average radiata pine clearfell age by ownership category under scenario 3



Scenario 4 – Split NDY (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 2018 (Figure 11). Wood availability increases to 12.7 million cubic metres per year from 2021 before reducing to 10.3 million cubic metres per year from 2036.

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. The total volume was modelled to be non-declining from 2007 to 2034, that is, for the current rotation. Thereafter an annual reduction of up to 10 percent was allowed before the yield was required 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 (Figure 12) than was the case in scenario 3.

Figure 11: Central North Island radiata pine availability under scenario 4

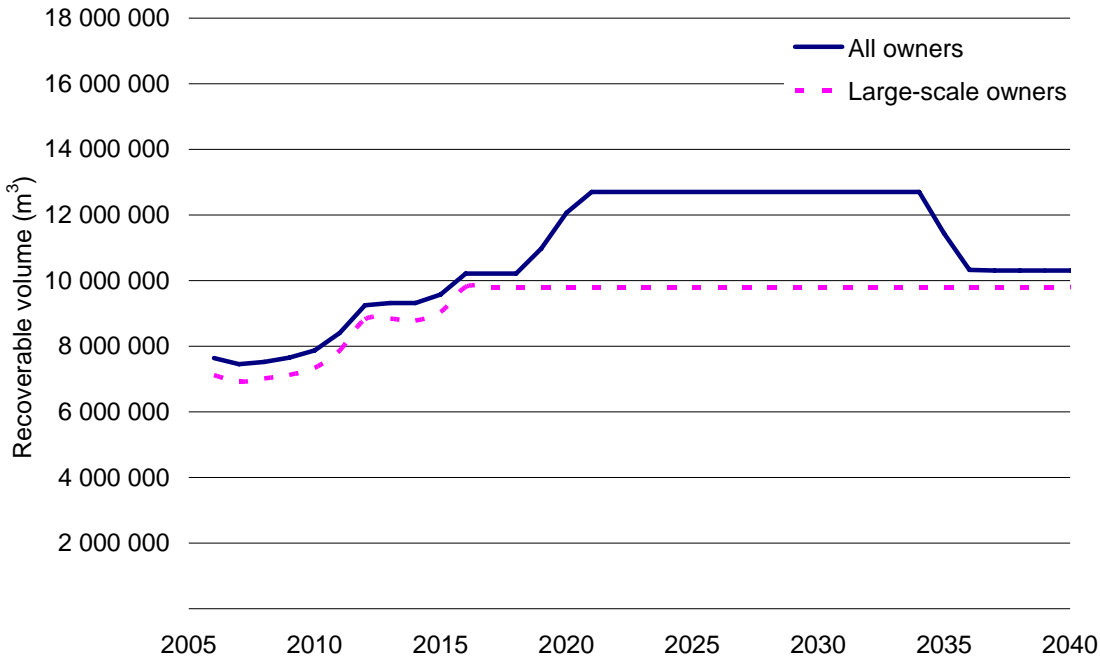
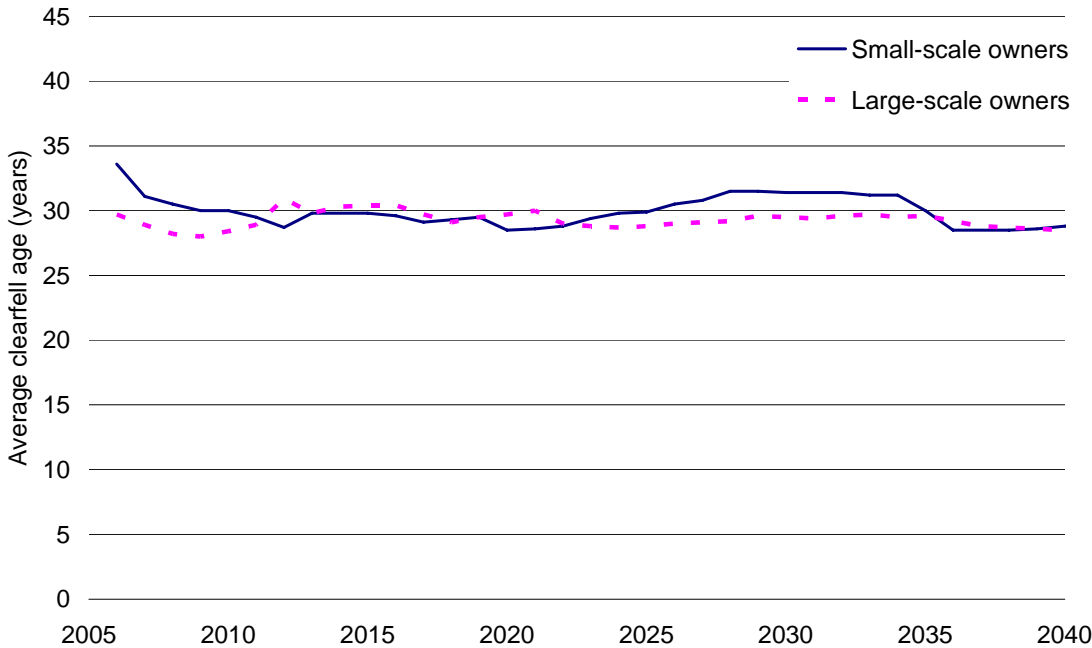


Figure 12: Average radiata pine clearfell age by ownership category under scenario 4



The total volume forecast for scenario 4 is broken down by log grade in Figure 13. Potential volumes from production thinning are shown in Figure 14.

Figure 13: Central North Island radiata pine availability under scenario 4 – by log product

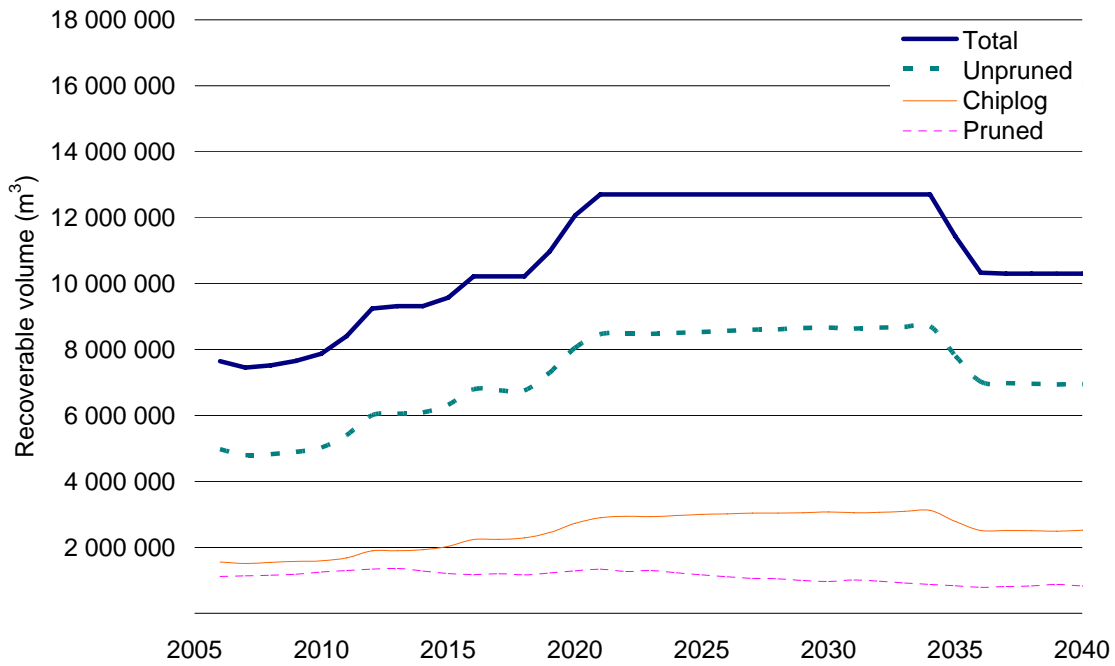
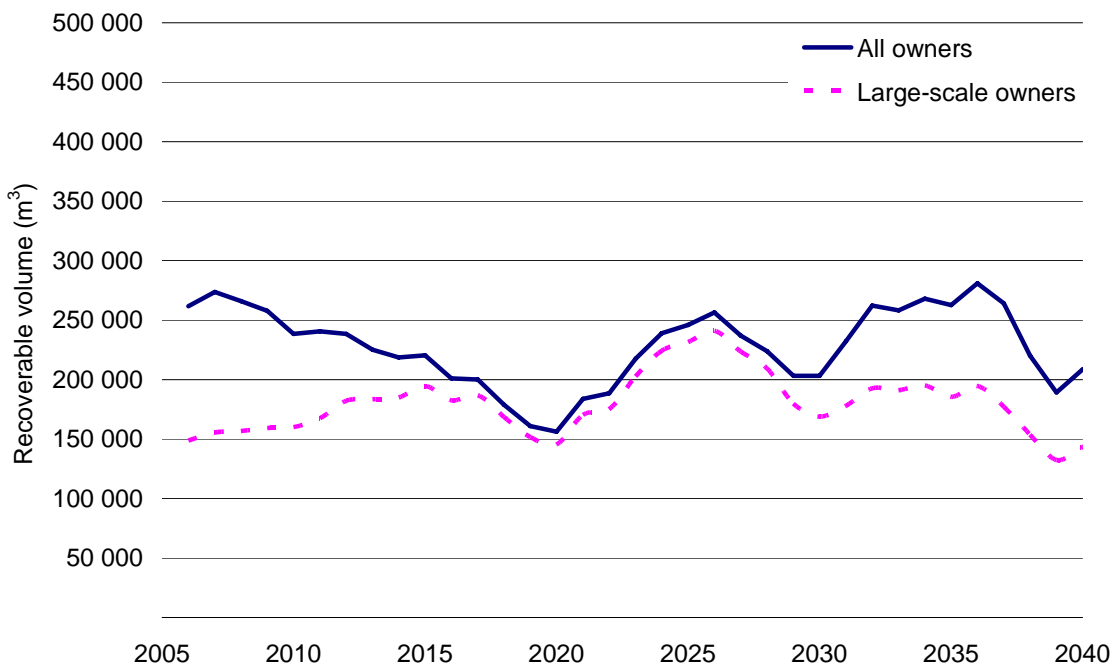


Figure 14: Radiata pine production thinning volumes available under scenario 4



The production thinning volumes shown above largely result from the croptype allocation in the NEFD; the rise of production thinning post-2030 reflects these areas reaching maturity for the second time. Production thinning in the CNI is influenced by several factors including the profitability of the fibre-using sectors, the demands of the pulp industry, and the silvicultural regimes required to meet these demands. A key feature is that relative to clearfell volumes, production thinning volumes are likely to remain relatively small.

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 15). 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 16).

Figure 15 shows the potential for a significant increase in the Central North Island harvest volumes. There is a range of possibilities for timing the increase and for the level of the potential harvest volume.

Figure 15: Central North Island radiata pine availability under scenario 5

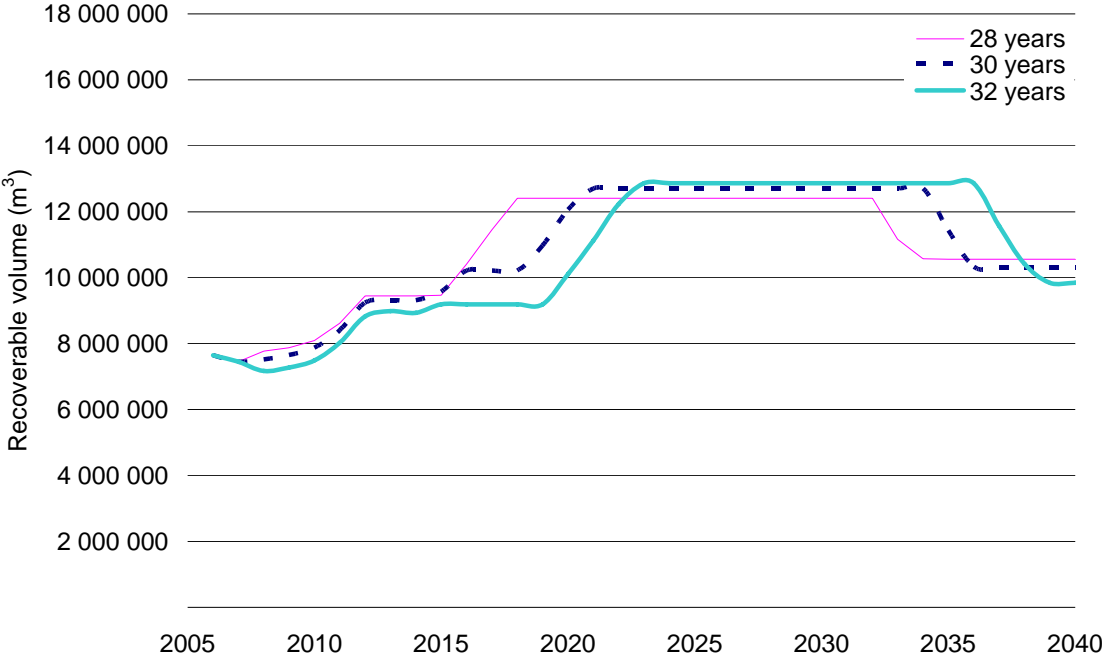
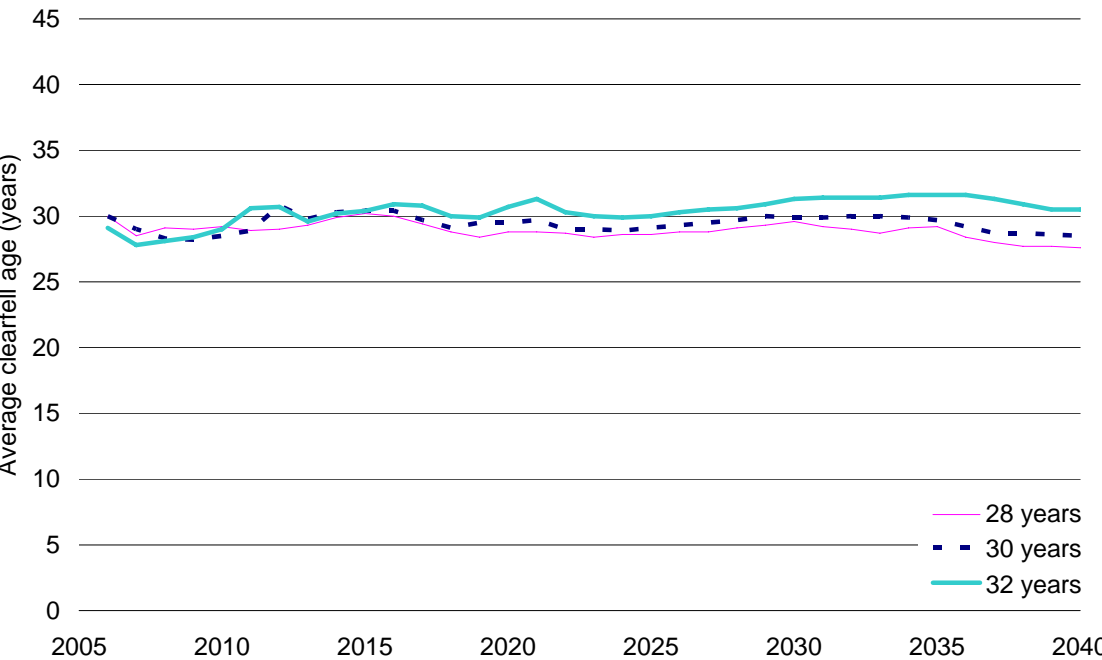


Figure 16: Average radiata pine clearfell age for each target rotation age under scenario 5



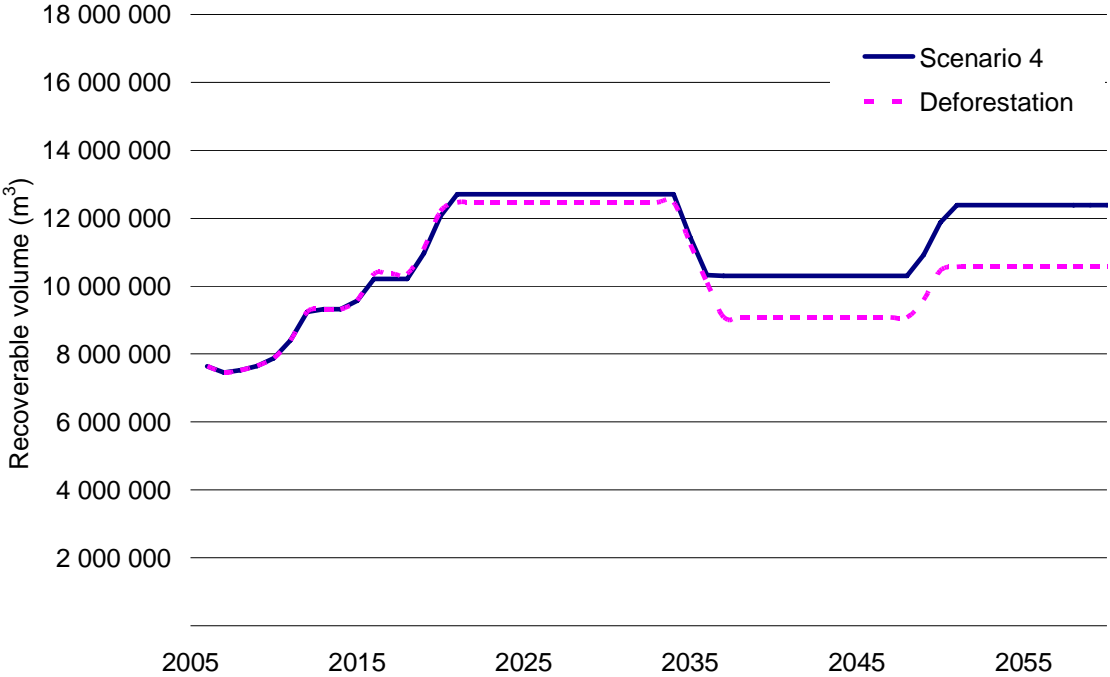
Deforestation scenario

The scenarios presented assume that the recently announced liabilities for deforestation of pre-1990 forests will result in little deforestation from 2008 on. As a variation of this, an additional scenario was modelled in which:

- 50 000 hectares of area in the large-scale owners' estate is not replanted after clearfelling from 2008 on;
- 20 percent of area clearfelled in the small-scale owners estate is not replanted after clearfelling (compared to 10 percent in the previous scenarios).

Wood availability under the deforestation scenario is compared with that under scenario 4 in Figure 17. There is limited impact until 2037.

Figure 17: Central North Island radiata pine availability under a deforestation scenario and scenario 4

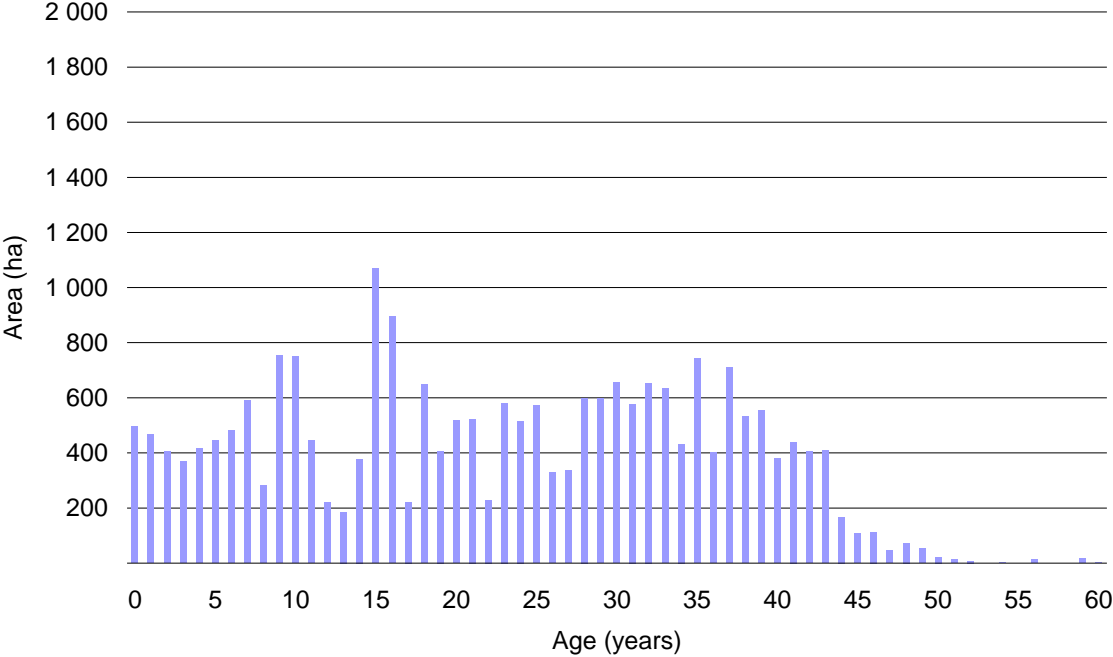


Other species

Douglas-fir

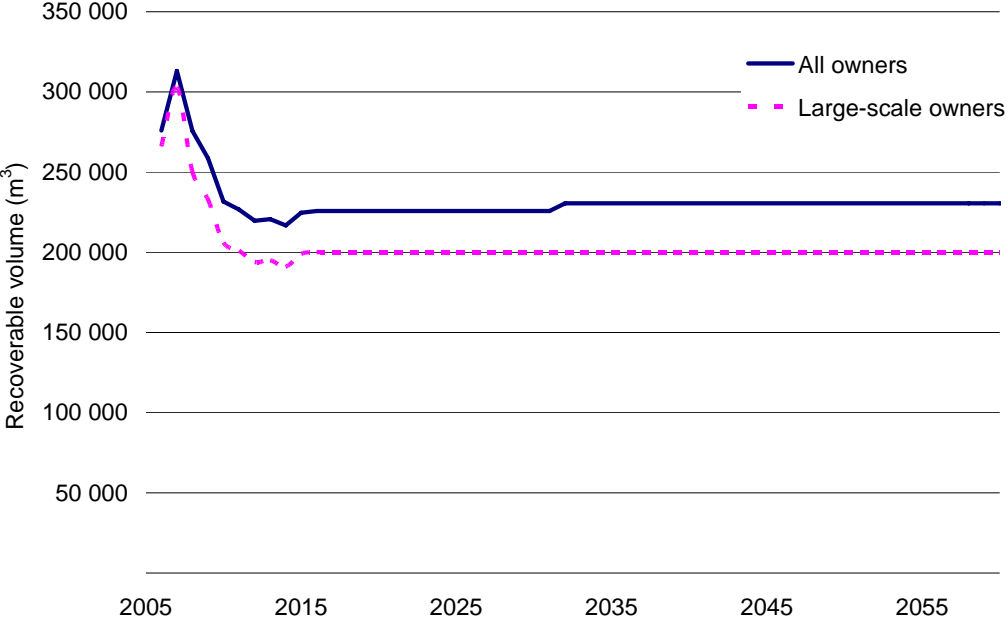
The area of Douglas-fir in the Central North Island is about 23 000 hectares of which 20 000 hectares is in the large-scale owners' estate. The age-class distribution of Douglas-fir is reasonably uniform with an average of 500 hectares in age-classes 0 to 43 years (Figure 18).

Figure 18: Age-class distribution of Central North Island Douglas-fir – combined estate as at 1 April 2006



The Douglas-fir harvest for the large-scale owners' estate is based on intentions for 2006 to 2015 and modelled to be non-declining from 2016 on, and the harvest from the small-scale owners' estate from 2007 on. Long-run volumes are 200 000 cubic metres per year from the large-scale owners' estate and 230 000 cubic metres per year from the combined estate (Figure 19).

Figure 19: Central North Island Douglas-fir availability – combined estate



Concluding comments

The forecasts indicate that the availability of radiata pine from the Central North Island forest estate will steadily increase over the next 12 years. Between 2008 and 2016 there is a gradual increase in the Central North Island regional harvest from 7.5 million cubic metres to around 10.2 million cubic metres per year. After 2016 increases in wood availability are expected to result in increased log supply with the potential for significant volume increases to around 12.7 million cubic metres per year after 2020.

The roundwood removal statistics indicate the current levels of harvest in the Central North Island are up to 2 million tonnes per annum below the volumes harvested in 2006 and 2007. This suggests that most, if not all the projected increases in wood availability during the next 8 to 10 years could be accommodated by the region's existing physical infrastructure, depending on the level of wood flowing into the Central North Island region.

Most of the potential increase in wood availability from 2016 on will come from the region's small-scale forest growers who established forests 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.

Market conditions and logistical constraints (immediate 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 leading up to 2020.

Some owners will be motivated to harvest early while others may decide to grow their forests for longer. This is likely to spread the harvesting of the post-1990 forest plantings out over a longer period than might be the case if the forests were harvested at rotation age. Greater harvesting during this period could have the effect of dampening log prices. On the other hand, if international log prices increased during this period of increasing wood availability, then harvesting rates would rise more quickly to meet international demand.

Depending on the rate of harvesting from the region's post-1990 forests, wood availability is expected to decrease after 2034 leading to a drop in log volumes once the post-1990s forests have been harvested.

The Ministry of Agriculture and Forestry is currently finalising a report on the Central North Island Forestry Industry, in association with the major growers and processors in the region. This report will contain these wood availability forecasts along with descriptions of the region's forests, wood processing industries and infrastructure. This report will also describe the opportunities and constraints facing the forest industry on the Central North Island, and is expected to be published by October 2008.