

# Auckland wood availability forecasts for the period 2008–2040

To assist with regional planning, the Ministry of Agriculture and Forestry (MAF) has compiled wood availability forecasts for the Auckland region, covering the period 2008 to 2040. These forecasts have been made in association with the region's major forest owners. The forecasts show the range of harvest volumes potentially available from the planted forest estate of both large and small-scale growers.

The forecasts indicate that the availability of radiata pine from the Auckland region forest estate is expected to decline over the next three years and then remain constant, around 800 000 cubic metres per annum, until 2019. After 2019 wood availability is expected to return to current levels of around 1 million cubic metres per annum from 2022.

## Contents

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Printed copies of this report are not available. This report forms a section in the *Auckland Forest Industry and Wood Availability Forecasts* (to be published in the future).

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## Acknowledgements

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The Ministry of Agriculture and Forestry thanks the forest owners, managers and consultants who provided the forest resource and harvesting intentions data that were essential for producing the wood availability forecasts, and for providing input at a workshop on an earlier version of the forecasts.

## 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

Five scenarios have been modelled to indicate the potential wood availability from the planted production forests in the Auckland region for the period 2008 to 2040.

The Auckland wood supply region includes the Waikato and Matamata-Piako districts in the south, the Coromandel Peninsula, Franklin district and the large urban area of the Auckland isthmus and its surrounding cities.

The wood availability forecasts are intended to describe the possible range of harvest volumes available from the Auckland region. They 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 following large-scale forest owners (those with 1000 hectares of forest or more):

- Matariki Forests;
- Ernslaw One;
- NZ Forestry Group;
- NZ Super Fund;
- Viking/OTPP;
- Crown Forests (MAF).

The forecasts incorporate the views of the region's forest owners, managers and consultants to ensure they represent a realistic range of future wood availability scenarios.

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 presented indicate there are many different ways for the forest estate in the Auckland region to be harvested. It should be recognised that the forests are managed to maximise the benefits to the enterprises that own them. Each enterprise has its own harvest strategy based on the forest owners' objectives, market conditions and the forest estate that it owns or manages. Any change in harvesting strategy 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 uncertainty are associated with the wood availability from each component of the estate. The volumes forecast from the large-scale owners' estates are also subject to change because of changes in harvest intentions or in the resource description (areas and yields). Yet, they have greater certainty than the forecast of availability from the small-scale estate. Not only are harvest intentions less clear for small-scale owners, the resource description is potentially less accurate also.

# Introduction

## Scenarios for radiata pine

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

The scenarios were developed following consultation with the National Exotic Forest Description (NEFD) Steering Committee and feedback from interested parties who own the forests in the Auckland region, to ensure they were reasonable.

The scenarios include only radiata pine. Unless otherwise stated, calendar years have been used in this report.

### Scenario 1: Harvest all forests at age 30

The estate of all owners is assumed to be harvested 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 at age 30

Large-scale owners' wood availability is assumed to be at stated harvest intentions for 2007 to 2013, thereafter the availability is regulated. From 2014 to 2017 total volume was modelled to not exceed the 2013 level. From 2018 on it was constrained to be non-declining. The estate of small-scale owners is assumed to be harvested 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 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 constrained to be non-declining for the current rotation (through to 2034). Thereafter a reduction is permitted.

### Scenario 5: Target rotation age variations

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

## 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 latter.

In scenarios 1 and 2 (Figures 1A and 1B), forests owned by small-scale owners are assumed to be harvested at a fixed age of 30 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 Auckland region. For practical reasons already described, it is unlikely that 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) are based on yield regulation. Under these scenarios, future harvesting is generally constrained to be non-declining, that is, each year the volume harvested must either be the same or higher than 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 Auckland region (as in many other regions in New Zealand) is the large 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 has been harvested, the model lets the volume decline again.

The main limitations of scenarios 3 to 5 is that market factors such as log prices are significant determinants of harvesting in any given year. When log prices increase, harvesting will generally increase and vice versa. 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 the availability profiles of varying harvest ages).

Figure 1A – Scenario 1 example: harvest all trees at age 30

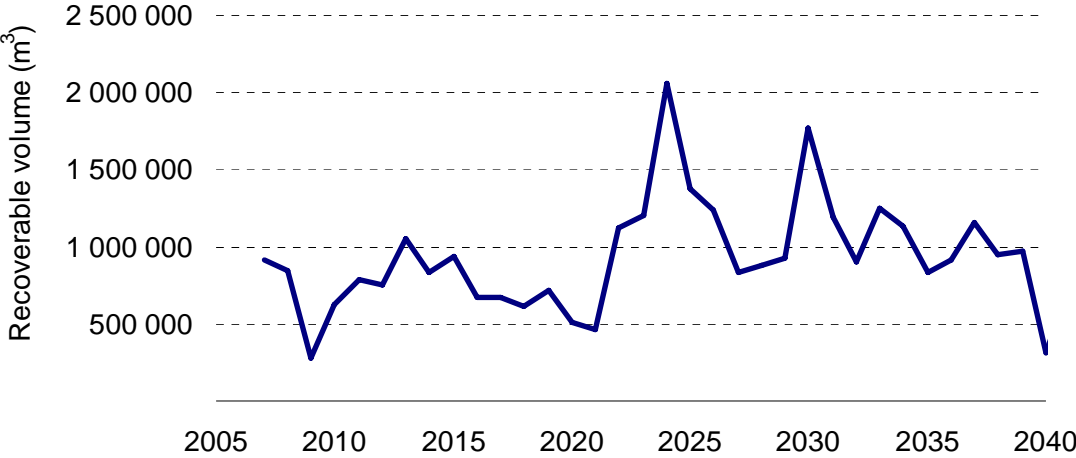


Figure 1B – Scenario 2 example: large-scale owners harvest at stated intentions, small-scale owners harvest trees at age 30

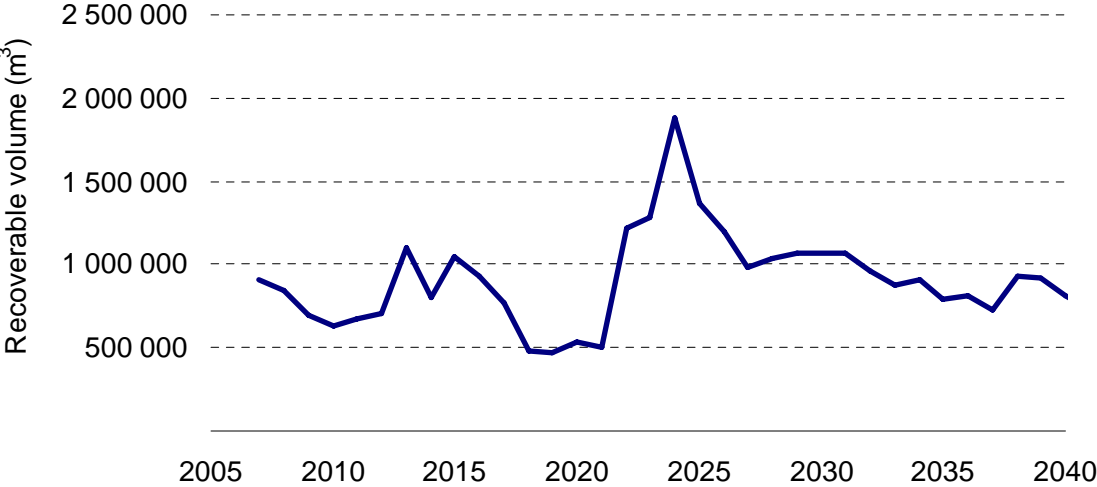


Figure 1C – Scenario 3 example: non-declining yield with target rotation 30 years

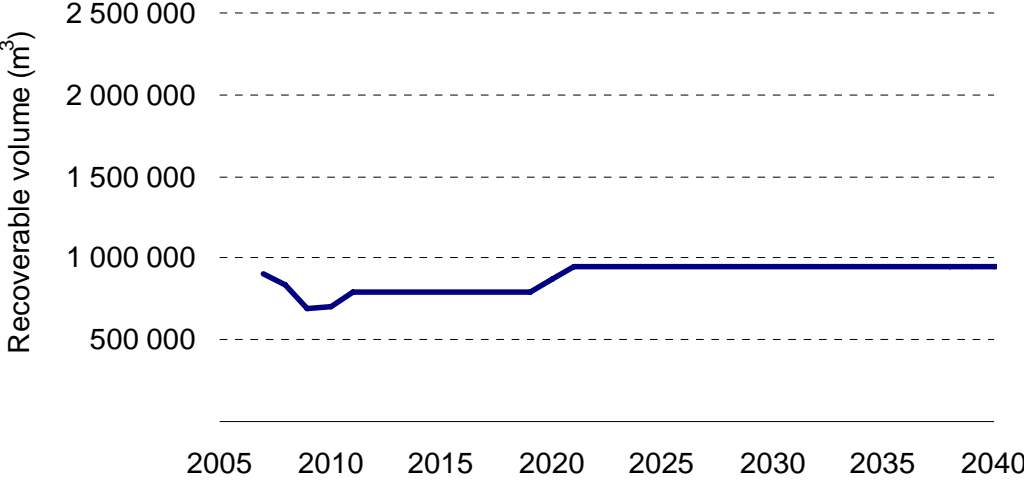
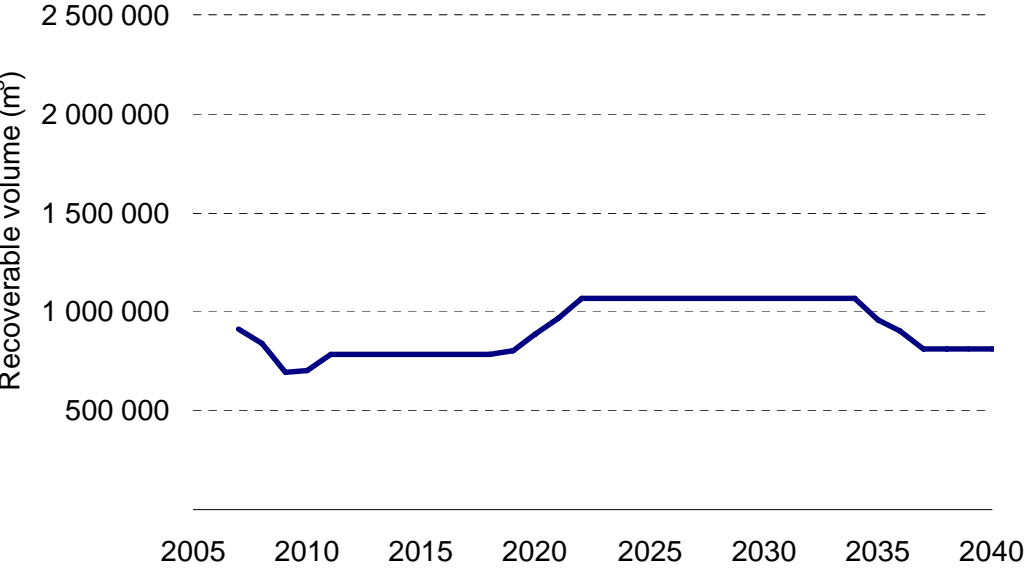


Figure 1D – Scenario 4 example: split non-declining yield with target rotation 30 years



# Data

## Method used to obtain forest areas

The areas were obtained from the *NEFD as at 1 April 2007* (Ministry of Agriculture and Forestry, 2008). To reflect the regime split in the harvest intentions data provided by the large-scale owners, 1600 hectares was transferred from the old pruned croptype into the old unpruned croptype.

In addition, the small-scale owners' estate was 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.

## Method to develop yield tables

In 2007 new yield tables for the Auckland region 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 18+ years, planted in 1989 and earlier) radiata pine 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 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 volume by log grade and area from 2007 to 2015. The harvest intention values for 2007 to 2013 were then included at the beginning of the forecasts to provide the most realistic wood availability forecasts over this period. The original intentions provided for 2014 and 2015 had a significant spike in volumes. Following review of these with the companies concerned, it was decided to cap the volumes for 2014 to 2018 at the 2013 level.

# Wood availability forecasts for the Auckland region

## Assumptions

The wood availability forecasts for the Auckland region are based on the following assumptions:

- Replanting – All area is replanted (with a regeneration lag of 1 year).
- The area awaiting replanting as at 31 March 2007 is included as area at age 0, that is, area to be replanted in the 2007 planting season.
- Species/Regime – Area is replanted into the same regime except that only 20 percent of old (planted in 1989 and earlier) pruned area is replanted into the pruned croptype following harvest.

Table 1: Volumes harvested in 2007 and 2008 for radiata pine

Harvest year	Large-scale owners (m <sup>3</sup> )	Small-scale owners (m <sup>3</sup> )	Total (m <sup>3</sup> )
2007	657 000	252 000	909 000
2008	643 000	197 000	840 000

These harvest figures differ from roundwood removal estimates by region as reported in MAF's statistics (<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 difference indicates a net flow of logs out of the region for processing or export.

- Overmature stands – Area that was age 61 years or older (26 hectares total) was removed on the assumption that these trees will not be harvested.

## Scenario 1 – Harvest all forest at age 30

This scenario with all forest harvested at age 30 indicates the “pure” (that is, unconstrained) availability of wood from the Auckland region. It is essentially a translation of the age-class distribution into volume. Figure 2 shows the age-class distribution of radiata pine in the Auckland region, while Figure 3 shows the wood availability. The low point at 2021 in Figure 3 occurs because of the small area (698 hectares) at age 16 (planted in 1991) in Figure 2. Conversely, the high point at 2024 in Figure 3 occurs because of the large area (3177 hectares) at age 13 (planted in 1994) in Figure 2.

Figure 2: Age-class distribution of radiata pine in the Auckland region – combined estate as at 1 April 2007

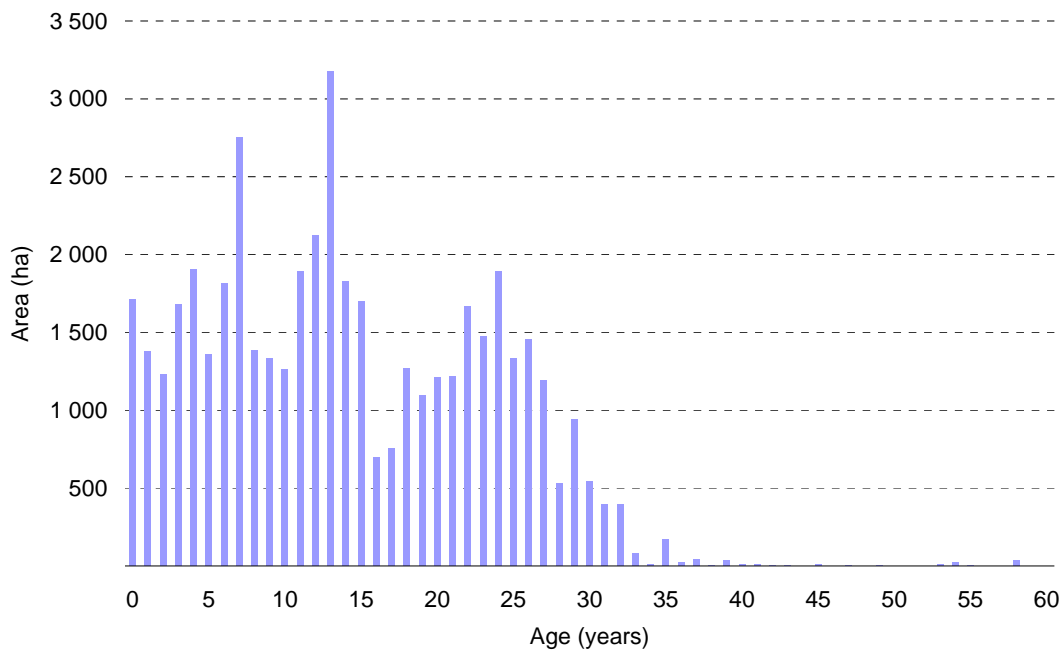
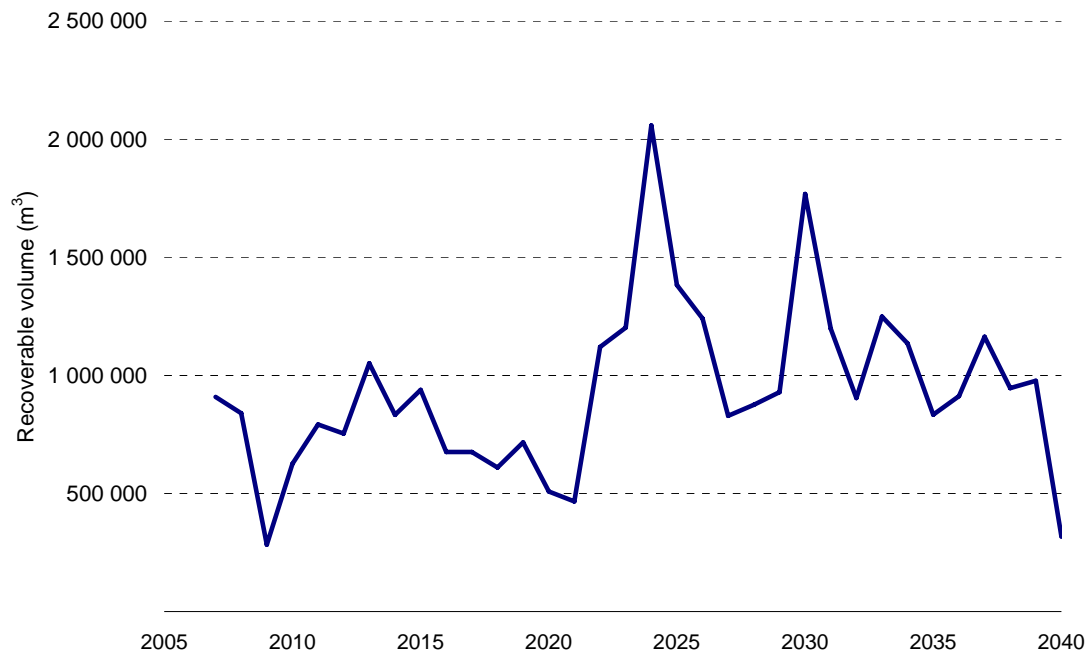


Figure 3: Radiata pine availability in the Auckland region under scenario 1



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

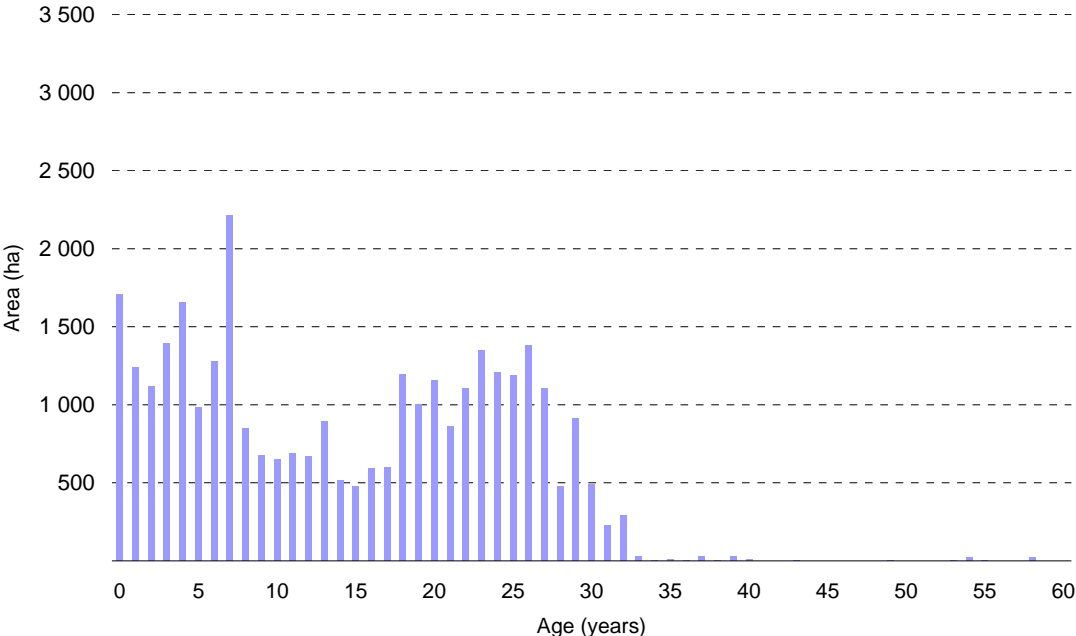
In this scenario, large-scale owners harvest in line with their stated intentions until 2013 and small-scale owners harvest trees at age 30.

### Large-scale owners

The age-class distribution of the large-scale owners’ estate (Figure 4) indicates that there is a large variation in the area in age-classes. There is relatively little area in age-classes 14 to 17 years because of limited planting in 1990 to 1993.

The area at age 0 is the area awaiting replanting as at 31 March 2007; that is area to be replanted in the 2007 planting season.

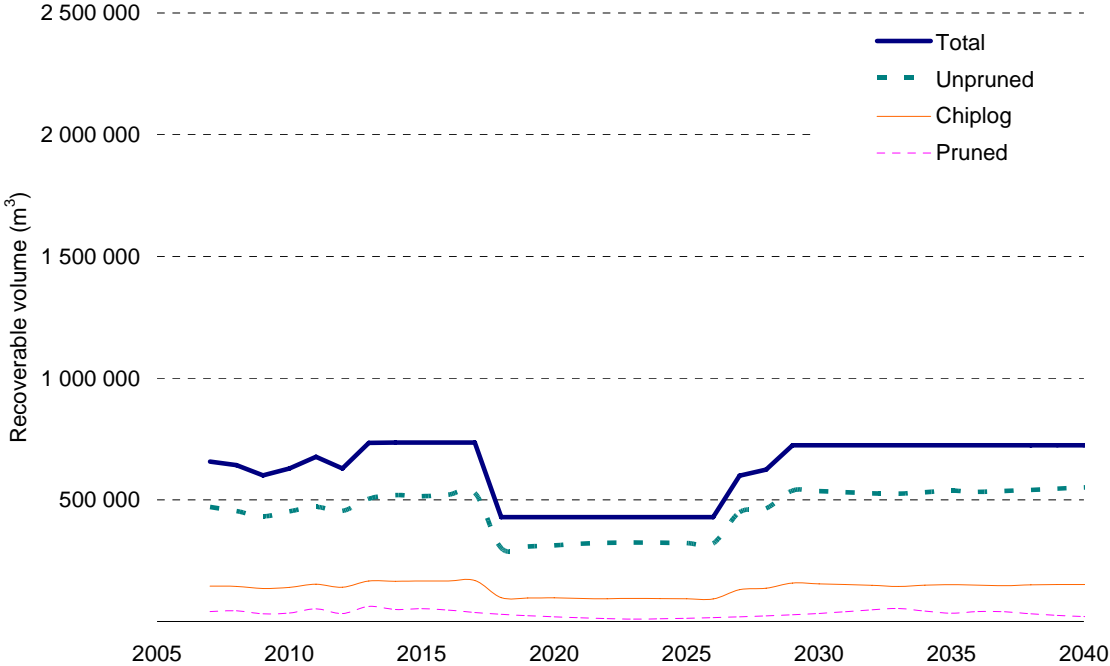
Figure 4: Age-class distribution of the radiata pine estate in the Auckland region – large-scale owners as at 1 April 2007



For this scenario the availability of wood from large-scale owners is based on stated harvest intentions for 2005 to 2013, with the volumes for 2014 to 2018 capped at the 2013 level. From 2018 on 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 be at a lower level from 2018 to 2026. This is partially a consequence of the relatively small areas planted from 1990 to 1993. However, a more important factor is that a number of large-scale owners will be harvesting less volume from their Auckland region forests during this period and more volume from their forests in the Central North Island region. The reality is that companies manage their total estate without consideration of whether they are in the Auckland or Central North Island regions.

The potentially available volume from the large-scale owners’ estate increases to over 700 000 cubic metres per year from 2029.

Figure 5: Radiata pine availability in the Auckland region under scenario 2 – large-scale owners

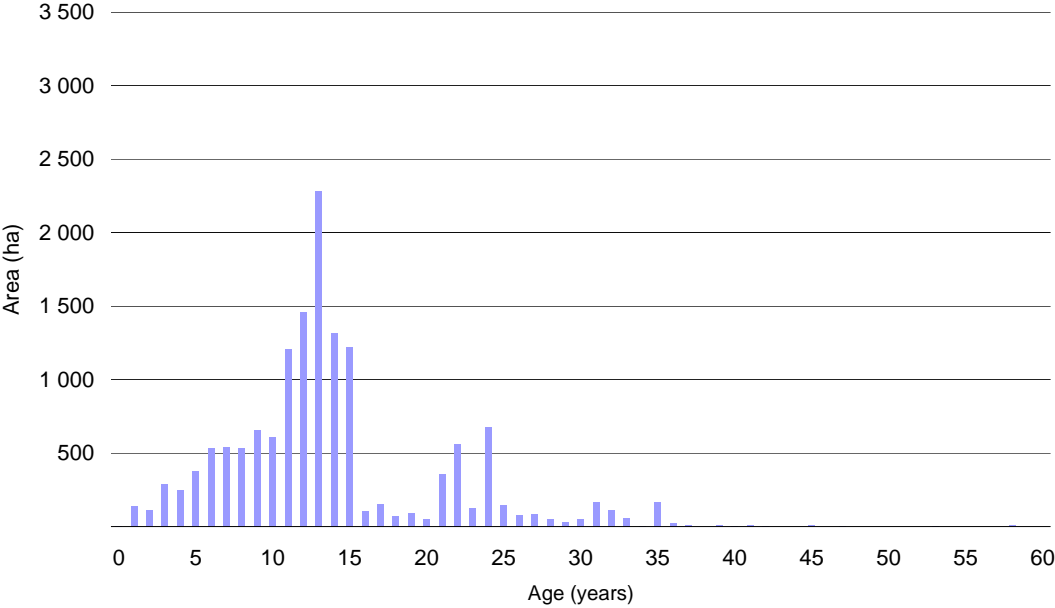


Small-scale owners' estate

The age-class distribution of the small-scale owners' estate (Figure 6) is very irregular with over 1200 hectares in each of the ages 11 to 15 years (planted in 1992 to 1996) and much less area in all other age-classes. The key issue is how to forecast the availability from this estate. In particular whether the large area in ages 11 to 15 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 6: Age-class distribution of the radiata pine estate in the Auckland region – small-scale owners only



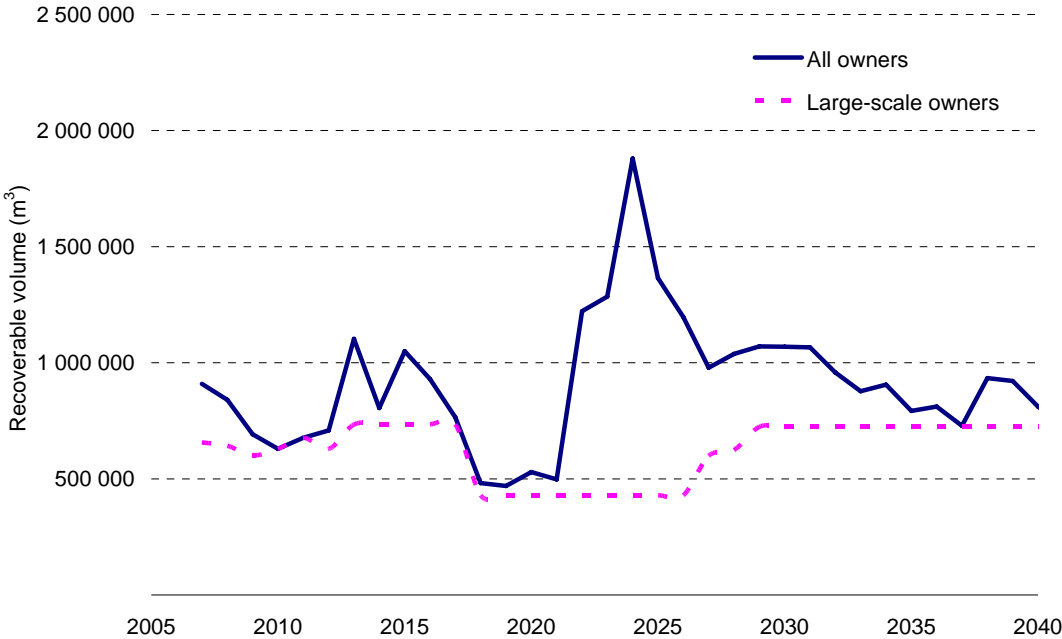
Combined estate

The wood availability from all owners is presented in Figure 7, with that of large-scale owners being the same as in Figure 5. In this scenario 2, 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 7) occurs when the large areas from the small-scale owners’ estate in young age-classes (11–15) is harvested. For example, the increase in 2022 results from the 1223 hectares planted by small-scale owners in 1992 (age 15 in Figure 6) being harvested at age 30.

Following the 2007 and 2008 harvests, there is limited area of age 30 or older in the small-scale owners’ estate available for harvest in 2009 to 2012.

Figure 7: Radiata pine availability in the Auckland region under scenario 2 – combined estate



Fluctuations in harvest volumes of the magnitude shown in Figure 7 would be impractical because of marketing and logistics realities (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 8 indicates that, when the small-scale owners’ estate is harvested to complement the large-scale owners’ estate, the potential total volume is almost 800 000 cubic metres per year from 2011 and increases to 950 000 cubic metres per year from 2021. An extra constraint was added so the total volume was not allowed to increase by more than 10 percent annually.

This scenario is similar to the base case scenario adopted in the 2000 wood supply forecasts. However it results in the small-scale owners’ estate being harvested at rotation ages that differ markedly from 30 years (Figure 9).

Figure 8: Radiata pine availability in the Auckland region under scenario 3

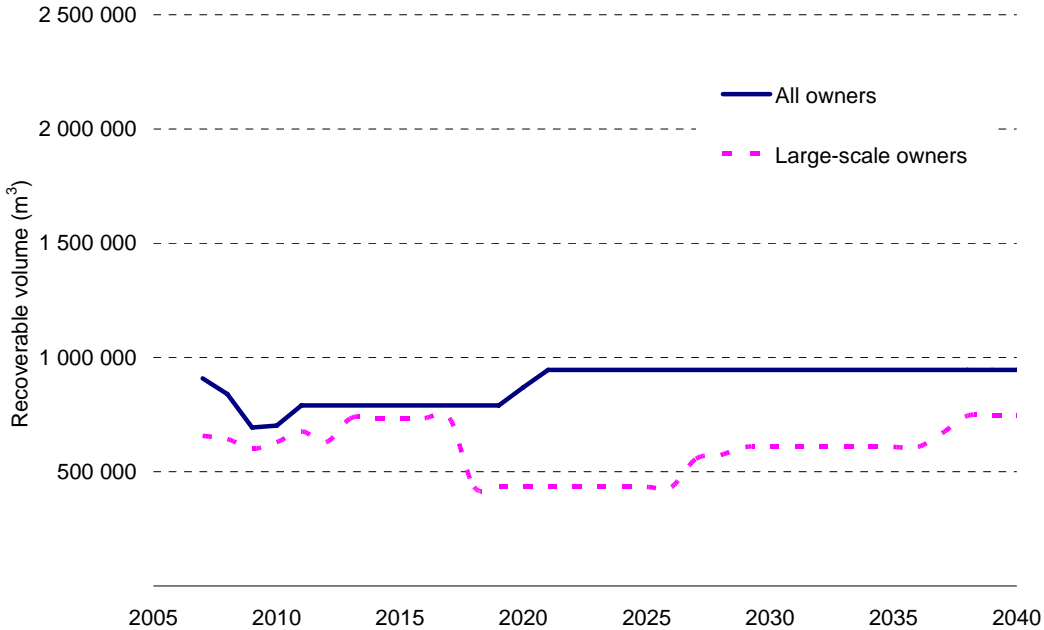
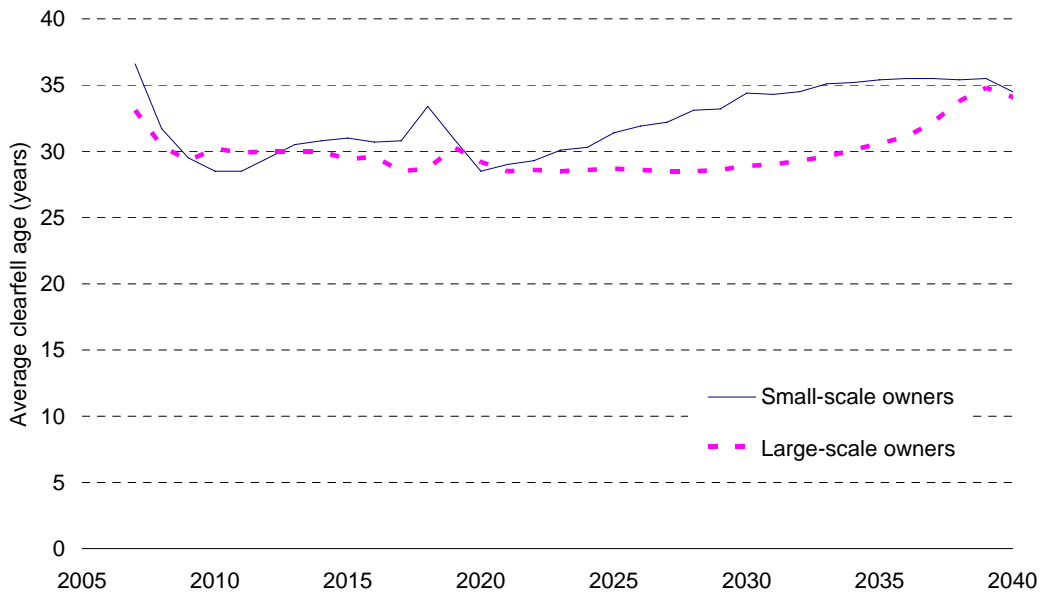


Figure 9: Average radiata pine clearfell age by ownership category under scenario 3



### Scenario 4 – Split NDY (target rotation 30 years)

The fourth scenario (Figure 10) 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 2021. Wood availability increases to 1.07 million cubic metres per year from 2022 before reducing to 0.8 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. The total volume was modelled to be non-declining from 2009 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 on). As a consequence, the average clearfell age for small-scale owners stays closer to the target of 30 years (Figure 11) than was the case in scenario 3.

Figure 10: Radiata pine availability in the Auckland region under scenario 4

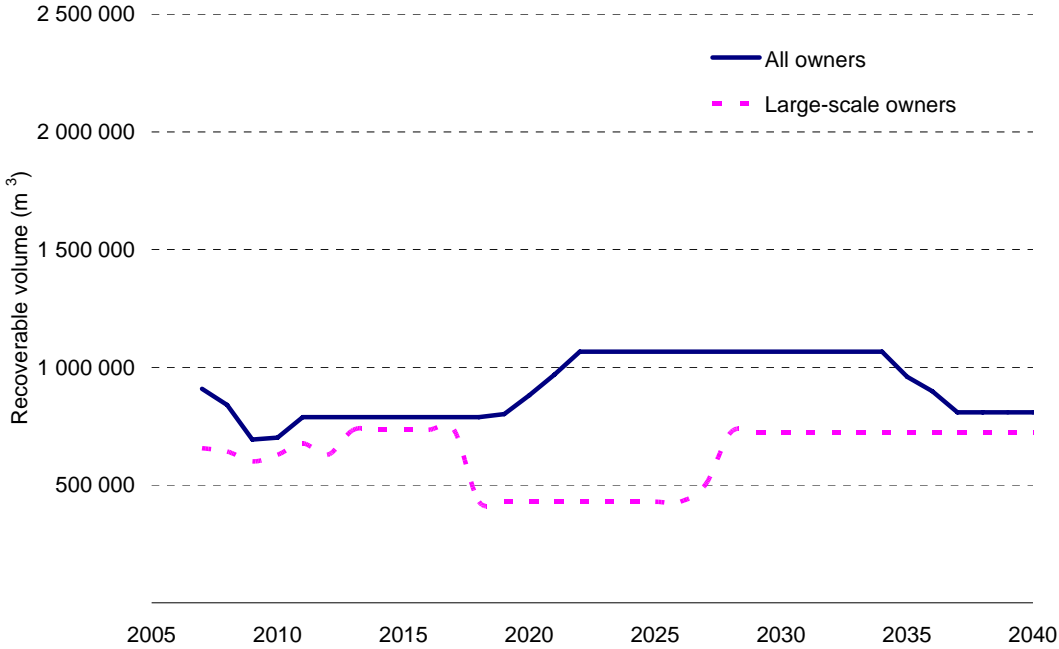
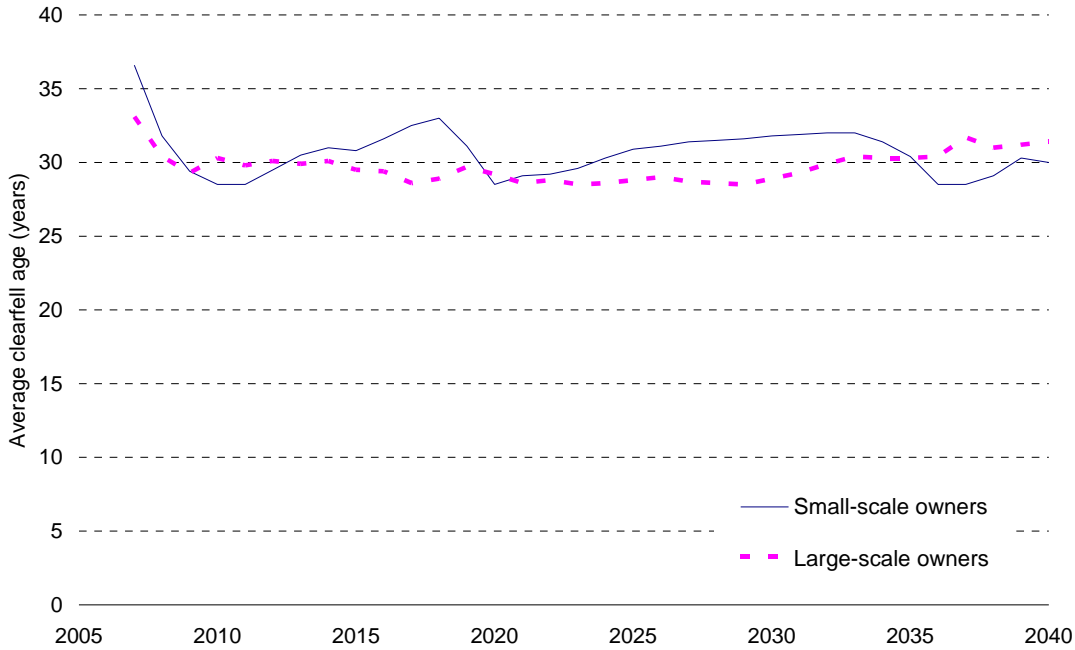
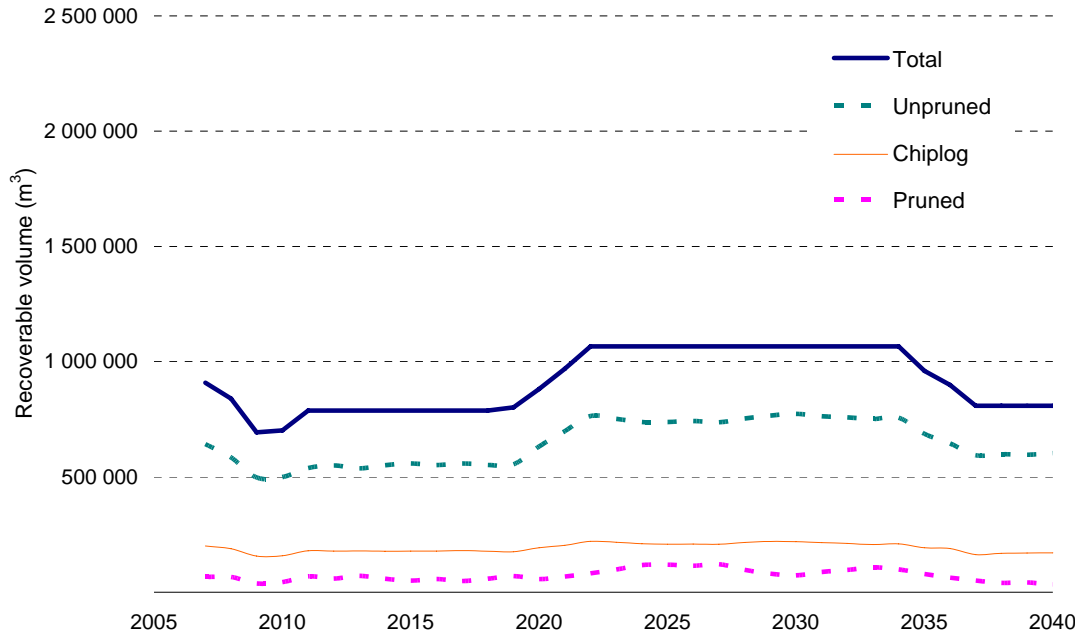


Figure 11: Average radiata pine clearfell age by ownership category under scenario 4



The total volume forecast for scenario 4 is broken down by log grade in figure 12.

Figure 12: Radiata pine availability in the Auckland region under scenario 4, by log product



**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 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 14).

Figure 13 shows wood availability to be broadly in the range 700 000 to 800 000 cubic metres per year until 2016 with the potential for a subsequent increase to over 1 million cubic metres per year. There is a range of possibilities for timing the increase.

Figure 13: Radiata pine availability in the Auckland region under scenario 5

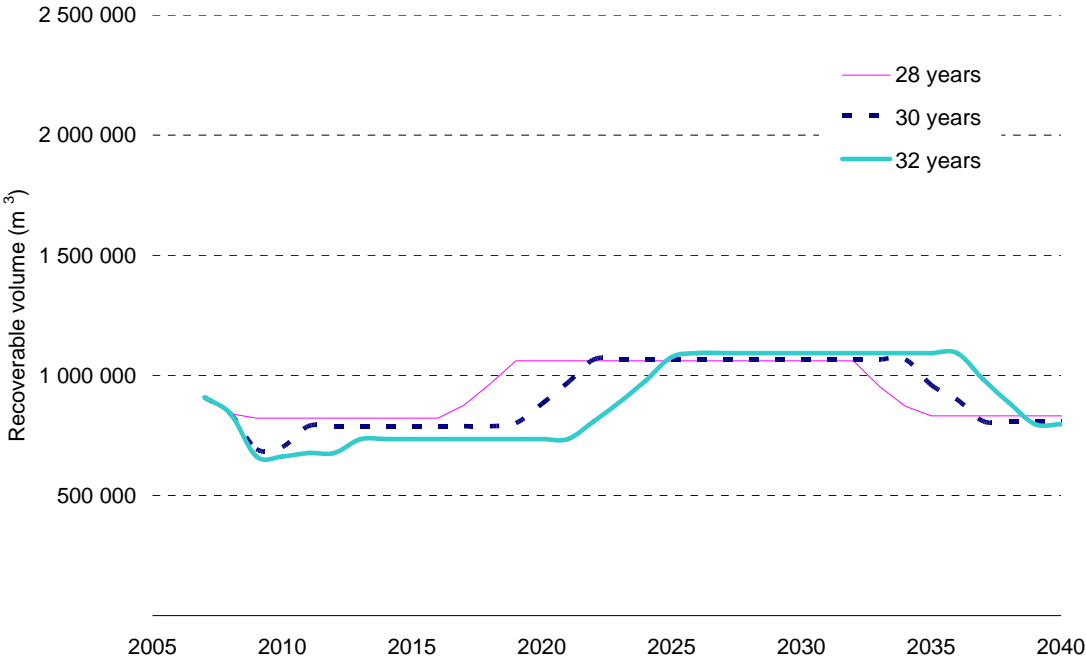
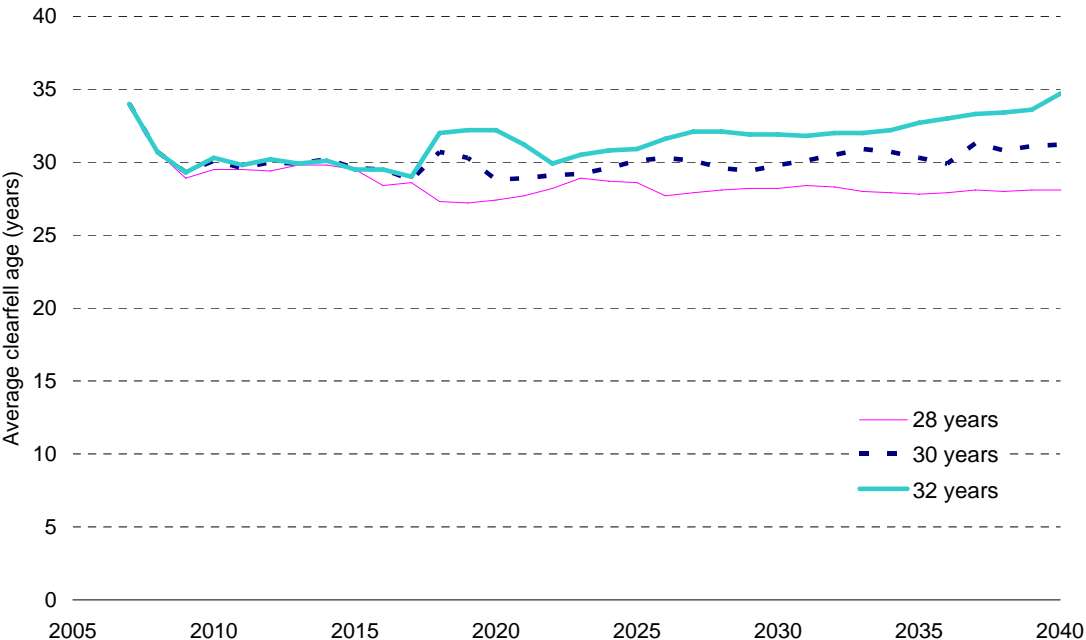


Figure 14: Average radiata pine clearfell age for each target rotation age under scenario 5



## Concluding comments

The forecasts indicate that the availability of radiata pine from the Auckland region forest estate is expected to decline over the next three years, and then remain relatively constant at around 800 000 cubic metres per annum until 2019. After 2019 wood availability is expected to return to current levels of around 1 million cubic metres per annum from 2022.

Most of the wood available from 2019 on will come from the region's small-scale forests that were established in 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. This region is not likely to be as affected by logistical constraints as seen in other wood supply regions, as the increases in wood availability are relatively modest and the logistical constraints in Auckland are not as major as in other regions.

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 forests were harvested at rotation age. Greater harvesting during this period could have the effect of dampening log prices. On the other hand, if domestic log prices increased during this period of increasing wood availability, then harvesting rates would rise more quickly to meet local 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.

MAF is currently finalising a report on the Auckland region forest 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 in the Auckland region.