



Ministry for Primary Industries

# Wood Availability Forecast – Western and Eastern Southern North Island 2021

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## PREFACE

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We trust our report proves useful to you and we would be pleased to provide assistance to you again on future assignments.



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Appendix 2 – Western SNI Wood Availability Forecasts from 2021 to 2060
Appendix 3 – Eastern SNI Wood Availability Forecasts from 2021 to 2060

## **1 INTRODUCTION**

This report presents the findings of a wood availability study for the Western Southern North Island (Western SNI) and Eastern Southern North Island (Eastern SNI) planted exotic forest estate. This is based on the Ministry for Primary Industries (MPI) National Exotic Forest Description (NEFD) as at 1 April 2020 which was rolled forward to January 2021. The forecasts then project annualised woodflows for 40 years thereafter. The study was commissioned by MPI with support from the major plantation forest owners in the region. The modelling, analysis, and report preparation for the study was undertaken by Margules Groome Consulting Ltd (Margules Groome).

Margules Groome prepared four scenarios for radiata pine wood availability and one for Douglas-fir availability. The scenarios indicate how the forest resource in each of the Western and Eastern SNI regions could be harvested from 2021 to 2060. The scenarios are based on the NEFD data which shows the available standing resource and potential yield for each stand. This was modelled to forecast regional log yield subject to a series of forecasting assumptions. Only radiata pine and Douglas-fir were included in the scenarios and wood availability forecasts. The forecasts for other exotic tree species are not included in the regional availability forecasts but are included in the New Zealand national forecast.

The forecasts incorporate the harvesting intentions of the region's large-scale forest owners. Large-scale owners are defined as exotic plantation owners:

- with 3 000 ha or more of forest in the region of interest; and
- with more than three age classes; and
- not a part of a syndicate.

In some regions, particularly those with only a few large-scale owners, some forest owners with just under 3 000 ha were also included.

In addition, discussions with forest managers and consultants were held to ensure the scenarios represented a realistic range of future wood availability.

The scenarios clearly show there are different ways for the regional resource to be harvested. The timing of each forest harvest is driven by a range of factors, including individual forest owner's objectives, forest age, log prices, demand by local wood processing plants, and perceptions about future log prices and future wood supply. A model can only predict how woodflows may occur subject to assumptions that drive individual forest harvest.

In examining the scenarios, it is important to recognise that forests are normally managed in a way that maximises the benefits to the owners, and such benefits are not easily modelled particularly as prevailing market conditions will change. Each owner has their own harvesting strategy based on the woodflow objectives and forest revenue. Any change in harvesting strategies by forest owners affects the age structure and maturity of the forests they own. This in turn feeds back into future wood availability.

A key issue is the timing of harvesting by small-scale forest owners. The harvest age can vary markedly, even between neighbouring properties. While the volumes forecasted by larger forest owners are subject to alteration because of changes in harvesting intentions or changes in the resource description (for example, areas and yields), a higher level of confidence can generally be assumed for these owners than for the small-scale owners. Harvest intentions are less clear for small-scale owners who are more reactive, and resource descriptions tend to be less accurate.



## 2 SCENARIOS

Four wood availability scenarios have been modelled for radiata pine for each region and one for Douglas-fir. These scenarios show the range of potential ways the forests in each region could be harvested in the future.

The scenarios were developed by the NEFD Steering Committee. Margules Groome undertook initial modelling of the scenarios, and these were presented to the major forest owners and consultants in the Western and Eastern SNI wood supply region. Their feedback was considered in the final derived profiles.

There are around 6 358 ha of species other than radiata pine and Douglas-fir in the Southern North Island region. The volumes from these species are not included in the regional wood availability forecasts but are included in a national forecast.

### 2.1 Scenario 1: Large-scale Owners Harvest at Stated Intentions, Small-scale Owners Harvest at Age 26

Large-scale owners' wood availability is based on stated harvest intentions for the period 2021 to 2031 (calendar year estimates, 11-years only). After 2031, the modelling assumption is that the wood availability from large-scale owners will not decrease and the target rotation age is 30. Small-scale owners are assumed to harvest their forest holdings at age 26.

The total volume in this scenario has been capped at six million cubic metres per year for presentation purposes<sup>1</sup>.

### 2.2 Scenario 2: Non-declining Yield (NDY) – Target Rotation 30 / 26 Years

Large-scale owners' wood availability is assumed to be at stated harvest intentions for the period 2021 to 2031. From 2031, the wood availability from large-scale owners is assumed not to decrease (as for Scenario 1). The total wood availability of radiata pine is also assumed to not decrease.

### 2.3 Scenario 3: Split NDY – Target Rotation 30 / 26 Years

This is the same as Scenario 2 except that the total wood availability of radiata pine from the region is allowed to increase and decrease by the following amounts for the given periods for each sub-region:

**Table 2-1:  
Western SNI Constraints**

Year	Large-scale Owners	All
2021-2028	Harvest intentions	NDY
2028-2039	Harvest intentions	20% increase/decrease
>2039	NDY	NDY

<sup>1</sup> For the purposes of graphical representation, illustrating smoothed peak periods, a maximum annual harvest level of 6 million m<sup>3</sup> was introduced. The limit is purely academic as the total annual harvest in the Western SNI and Eastern SNI region is unlikely to ever reach this level.

**Table 2-2:  
Eastern SNI Constraints**

Year	Large-scale Owners	All
2021-2029	Harvest intentions	NDY
2029-2033	Harvest intentions then NDY	20% increase/decrease
>2033	NDY	NDY

## 2.4 Scenario 4 (A & B): Target Rotation Age Variations

These are the same as Scenario 3 except in Scenario 4A the target rotation age is decreased by two years and in Scenario 4B it is increased by two years.

## 2.5 Scenario for Douglas-fir

The large-scale Douglas-fir resources for the Western SNI are harvested at stated intentions up until 2028. The total Douglas-fir volume from small-scale owners in the Western SNI is limited to 60 000 cubic metres per year while the total Douglas-fir volume from small-scale owners in the Eastern SNI is limited to 30 000 cubic metres per year. There are no large-scale owner harvest intentions for Douglas-fir in the Eastern SNI.

## 2.6 Discussion of Radiata Pine Scenarios

In Scenario 1, the forests owned by small-scale owners are assumed to be harvested at age 26. The scenario shows the “potential” availability of mature forest from small-scale owners in any given year. This scenario directly reflects the area of forest in the small ownership category in each age class in the Western and Eastern SNI region. For practical reasons, it is unlikely that the future harvesting would occur this way. The intention of this scenario is to show the potential magnitude of harvesting under favourable market conditions in any given year.

Scenarios 2 and 3 are based on yield regulation and avoid the large year-to-year fluctuations in volume seen in Scenario 1. Yield regulation refers to where, when, and how these recoverable volumes should be extracted, and provides a more orderly harvesting volume profile that, to some degree, reflects logistical and market constraints. Under Scenario 2, the future harvesting is constrained to be non-declining (where possible): that is, each year the volume must either be the same or higher than in the previous year. However, this can lead to large fluctuations in the average rotation ages and is unlikely to be a realistic outcome.

The constraints placed on Scenario 3 are designed to keep the average rotation age close to the target rotation age while maintaining a more realistic flow of wood.

A fundamental property of the forests in Western and Eastern SNI (like many regions in New Zealand) is the large area of forests established during the early 1990s, followed by very little new planting after that period. The remaining forest area planted during the 1990s has now either been harvested or will be harvested in the next five to seven years. This is leading to record harvest levels in most

regions. Once this harvesting has been completed, Scenario 3 lets the volume decline again.

The main limitation of all scenarios is that log prices and other market factors are a significant determinant of 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 log prices, yet it is important to note how prevailing market conditions will be a significant determinant in how the actual woodflows occur.

### **3 DATA AND METHODOLOGY**

#### **3.1 Development of Forest Areas**

The forest areas were primarily sourced from the NEFD as at 1 April 2020.

A mapping study carried out by the University of Canterbury in 2020 for the Western and Eastern SNI<sup>2</sup> showed that the small-scale owners' resource NEFD area was understated (specifically those with less than 1 000 ha). Of the small-scale owners with less than 1 000 ha, the study showed the mapped area for the Eastern SNI was 102% of the area reported in the NEFD, and the mapped area for the Western SNI was 101% indicating only a slight anomaly.

The likely error in the NEFD comes from data on forest owners with less than 40 ha. These owners were not surveyed in the NEFD process; instead, data for these forests is collected from three sources:

1. New planting imputations from 1992 to 2006.
2. A survey of small forest growers from 2004.
3. Forests previously surveyed for the NEFD but which have dropped to below 40 hectares.

The Southern North Island region has a large portion of the area (~25%) which is assigned as either "new planting imputations" or from the "2004 Small Forest Owner Survey"; both were designed at the time to improve the accuracy of the NEFD.

The new planting imputation was estimated by subtracting the known new area planting (in the NEFD survey) from an estimate of total new planting calculated from the annual MPI nursery survey. The estimated new planting was calculated by dividing a nominal planting stocking (for radiata plantation development) into the total number of seedlings sold.

In 2004, AsureQuality ran a survey of small forest owners with less than 40 ha (2004 Small Forest Owner Survey). The survey results were subsequently included in the NEFD area statement alongside the New Planting Imputation.

It is Margules Groome's understanding that the NEFD does not currently have a process for harvesting and replanting of these areas as would typically occur in forest management. As such, these NEFD areas remain unchanged from 2004 which is highly unlikely in reality.

While much further work is required to improve the accuracy of small-scale forest ownership in New Zealand, to improve the area description for the purpose of wood availability forecasting in the Western and Eastern SNI region, Margules Groome has made the following adjustments:

1. The "New Planting Imputations" and "2004 Small Forest Owner Survey" areas have been increased slightly so that the total area of the small-scale owners'

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<sup>2</sup> Manley, B., Morgenroth, J., Xu, C. Map of the small-scale forest estate of New Zealand. New Zealand Journal of Forestry, May 2021, Vol 66, No. 1.

resource less than 1 000 ha is 102% (Eastern SNI) and 101% (Western SNI) of the area of the reported NEFD as at 1 April 2020.

2. All standing forests derived from “new planting imputations” and “2004 Small Forest Owner Survey” with an age equal to or greater than 24 years were assumed to be harvested and removed from the NEFD data. The residual area (less 13% deforestation<sup>3</sup> for each sub-region) was assumed to have been replanted in equal amounts over the last five years.

The area for the small-scale owners with area between 1 000 ha and 3 000 ha, and large-scale owners was unadjusted for the purpose of modelling.

### **3.2 Development of Yield Tables**

The 2015 NEFD yield tables were used for the wood availability forecasts. These yield tables supplied by MPI were originally developed in the following way:

- Large-scale forest owners provided yield tables for their forest estates.
- The large-scale owner yield tables were averaged on an area-weighted basis to derive regional yield tables for each crop-type.
- The area-weighted average regional yield tables for “old” radiata pine (planted before 1990), and Douglas-fir were calibrated to match the harvest intentions data provided by large-scale owners. The assumption is that the harvest intentions data is the most accurate information available, as it is based predominantly on detailed inventory.
- The area-weighted average regional yield tables for “young” radiata pine crop-types (planted in 1990 and later) were adjusted based on consultation with large-scale owners.
- The area-weighted average regional yield tables developed for the large-scale owners’ estate were applied to the small-scale forest owners’ estate under the assumption that large-scale owner data is regionally representative across all sizes of forest owner.

As part of these forecasts, the 2015 NEFD yield tables were calibrated against the yields (m<sup>3</sup>/ha) calculated from the large-scale owners’ harvest intentions. In the case of Western SNI, the pruned yield tables were adjusted down by 2% and the unpruned yield tables were adjusted down by 14%. The yield table for the Eastern SNI were left unadjusted. As there were no NEFD Douglas-fir yield tables for the SNI, these were based on the East Coast Douglas-fir yield tables, which were considered a reasonable surrogate, particularly given the small size of the Douglas-fir resource in the region.

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<sup>3</sup> The deforestation assumption was sourced from the 2015-2016 Ministry for the Environment deforestation mapping report (Ministry for the Environment. 2018. Deforestation Mapping 2015 & 2016 – Final Report. Submitted by Indufor Asia Pacific for the Ministry for the Environment).



### 3.3 Large-scale Owners' Harvest Intentions

Large-scale owners were asked to provide details of their projected harvest volumes for all species for the period 2021 to 2041. The survey specifically asked for:

- Radiata pine:
  - Domestic grades – pruned, unpruned, pulp
  - Export grades – A, K, KI, KIS
  - Split by pruned/unpruned area if possible
- Other Species:
  - Douglas-fir domestic and export grades
  - Other Softwoods and Hardwood: Sawlog, pulp
- Additional questions to assist with modelling

The area covered by the large-scale owners covered 26% of the total NEFD area. Inclusion of the actual levels of intended harvest by the large-scale owners is considered a critical step, as it provides the best estimate of future wood availability for the first twenty years (2021-2041) of the forecast horizon.

It should also be noted that there was some disparity between the area reported by the large-scale owners who provided harvest intentions in the region and the areas included in the NEFD data for those owners. For the Southern North Island, this disparity resulted in areas associated with several large-scale owners being defined as small-scale owners. The harvest intentions for these owners were included in the model as a minimum requirement for the small-scale owner resource.

### 3.4 Modelling Assumptions

In addition to the modelling assumptions specific to each scenario, the wood availability forecast for the Western and Eastern SNI region is based on the following modelling assumptions:

- Radiata pine area in the large-scale owners' estate aged over 35 years is assumed to be non-commercial and therefore will not be harvested.
- Radiata pine area in the small-scale owners' estate aged over 40 years is assumed to be non-commercial and therefore will not be harvested.
- Douglas-fir area in all estates aged over 60 years is assumed to be non-commercial and therefore will not be harvested.
- A downwards adjustment of 5% was applied to all areas aged 1 to 4 to reflect losses in stocked area due to factors such as erosion, slips, and various setbacks.
- An area awaiting restocking of 2 035 ha (Eastern SNI) and 1 650 ha (Western SNI) is added to the model area based on MPI data. All areas are replanted, with a regeneration lag of one year. Replanting rules are as follows:

#### Western SNI

- Large-scale forest owners:
  - Five percent of all pruned areas will be replanted as a pruned regime with 95% transferring to an unpruned regime.
  - Ten percent of Douglas-fir areas are replanted into Douglas-fir and 90% is replanted into radiata pine.
  - All other species are replanted into radiata pine.
- Small-scale forest owners:
  - Fifty percent of all pruned areas will be replanted as a pruned regime with 50% transferring to an unpruned regime.
  - Ten percent of Douglas-fir areas are replanted into Douglas-fir and 90% is replanted into radiata pine.
  - All other species are replanted into radiata pine.

#### Eastern SNI

- Large-scale forest owners:
  - Fifty percent of all pruned areas will be replanted as a pruned regime with 50% transferring to an unpruned regime.
  - Ten percent of Douglas-fir areas are replanted into Douglas-fir and 90% is replanted into radiata pine.
  - All other species are replanted into radiata pine.
- Small-scale forest owners:
  - Thirty five percent of all pruned areas will be replanted as a pruned regime with 65% transferring to an unpruned regime.

- Ten percent of Douglas-fir areas are replanted into Douglas-fir and 90% is replanted into radiata pine.
- All other species are replanted into radiata pine.
- The total harvest for 2021 has been constrained to be no greater than 3.79 million m<sup>3</sup>.
- The model assumes no future afforestation and deforestation.

## 4 WOOD AVAILABILITY FORECASTS FOR WESTERN SOUTHERN NORTH ISLAND

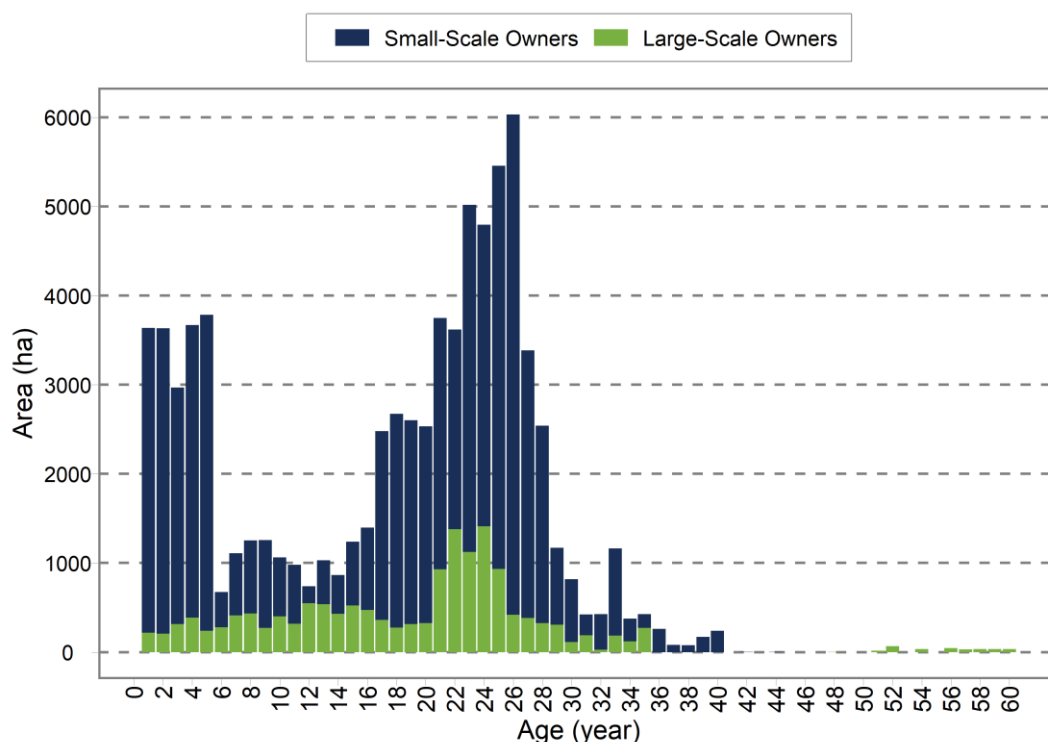
### 4.1 Western SNI Region Area Description

The Western SNI region has a plantation resource of 91 358 ha. Of this, 85 756 ha consists of radiata pine, and 862 ha of Douglas-fir – as reported by the NEFD as at 1 April 2020. After adjustments are applied to the NEFD area (see Section 3.4), the modelled area reduces to 86 112 ha.

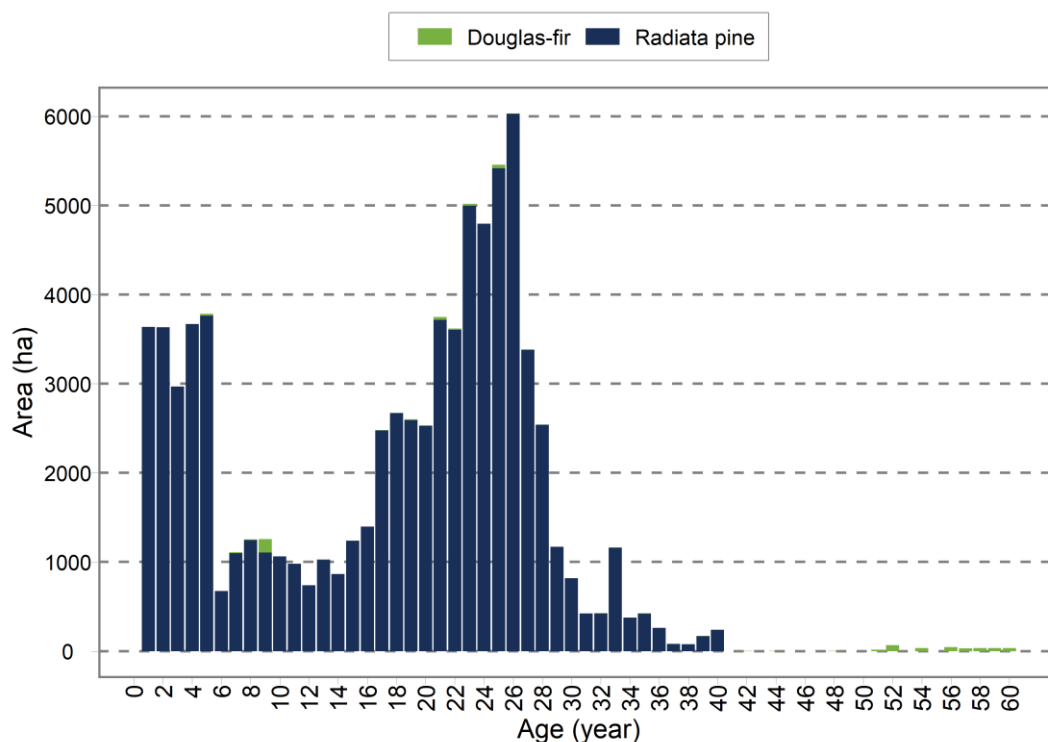
The modelled resource consists entirely of radiata pine and Douglas-fir. Figure 4-1 shows the age-class distribution for the Western Southern North Island estate by owner size. Large-scale owners held 19% of the modelled resources, and small-scale owners held 81%.

Figure 4-2 shows the age-class distribution for the Western Southern North Island by species. Most of the estate is radiata pine, of which 64% is recorded as managed under a pruned regime. A small amount of production thinning is undertaken in the Western Southern North Island region, mostly by one of the large-scale owners and has been modelled where appropriate.

**Figure 4-1:**  
**Western Southern North Island Modelled Age-class Distribution for All Species**



**Figure 4-2:**  
**Western Southern North Island Modelled Age-class Distribution by Species**



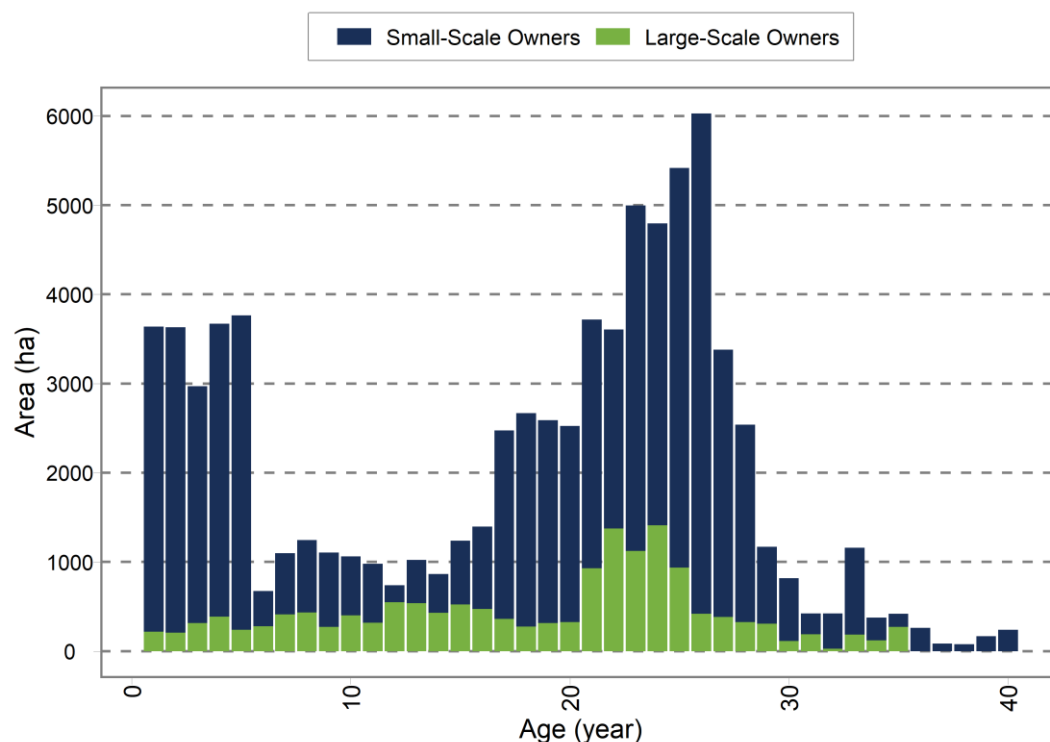
## 4.2 Scenario 1

In Scenario 1, large-scale owners are modelled to harvest according to their stated intentions and small-scale owners are modelled to harvest their forests at age 26. Figure 4-3 shows the age-class distribution for the Western Southern North Island radiata pine estate for both large-scale and small-scale owners combined.

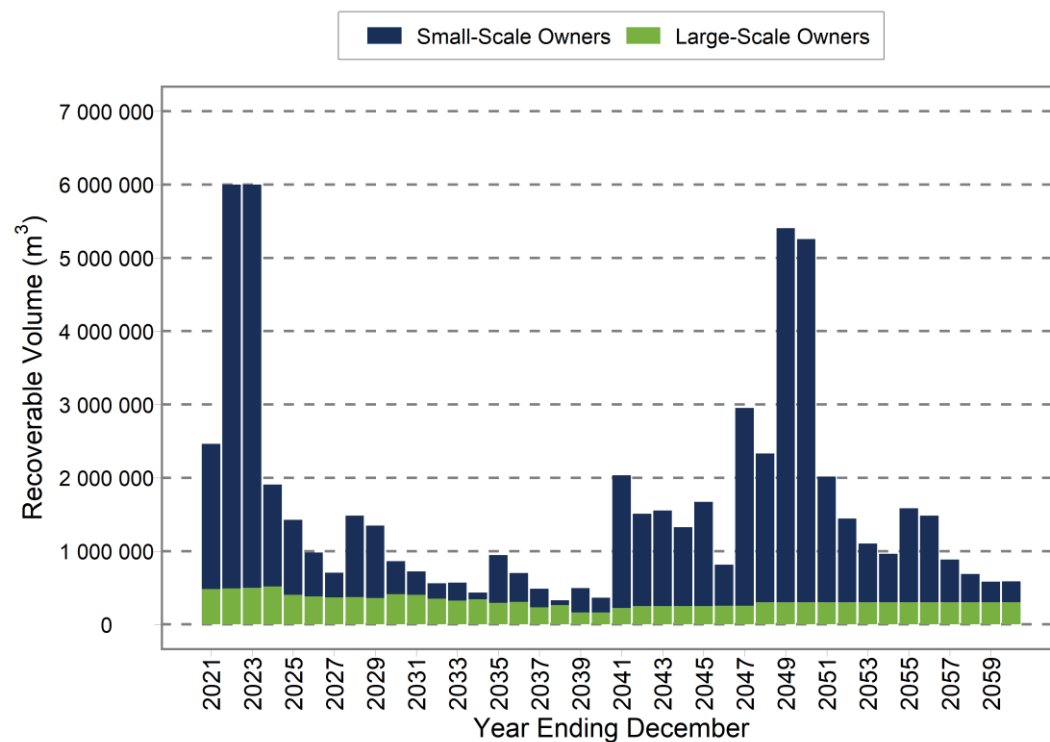
The wood availability from all owners in Western Southern North Island under Scenario 1 is presented in Figure 4-4. The estate has the potential to generate a substantial increase in the amount of wood available over the next three to four years, coming mostly from the small-scale owner resource. This volume reduces substantially as the large plantings from the 1992 to 1995 period are harvested.



**Figure 4-3:**  
**Western Southern North Island Age-class Distribution of Radiata Pine**



**Figure 4-4:**  
**Western Southern North Island Radiata Pine Availability under Scenario 1**



### 4.3 Scenario 2

Figure 4-5 shows the radiata pine availability for all owners under Scenario 2. The sustainable yield under a non-declining yield constraint for the Western Southern North Island region is just over 1.6 million m<sup>3</sup>.

**Figure 4-5:**  
**Western Southern North Island Radiata Pine Availability under Scenario 2**

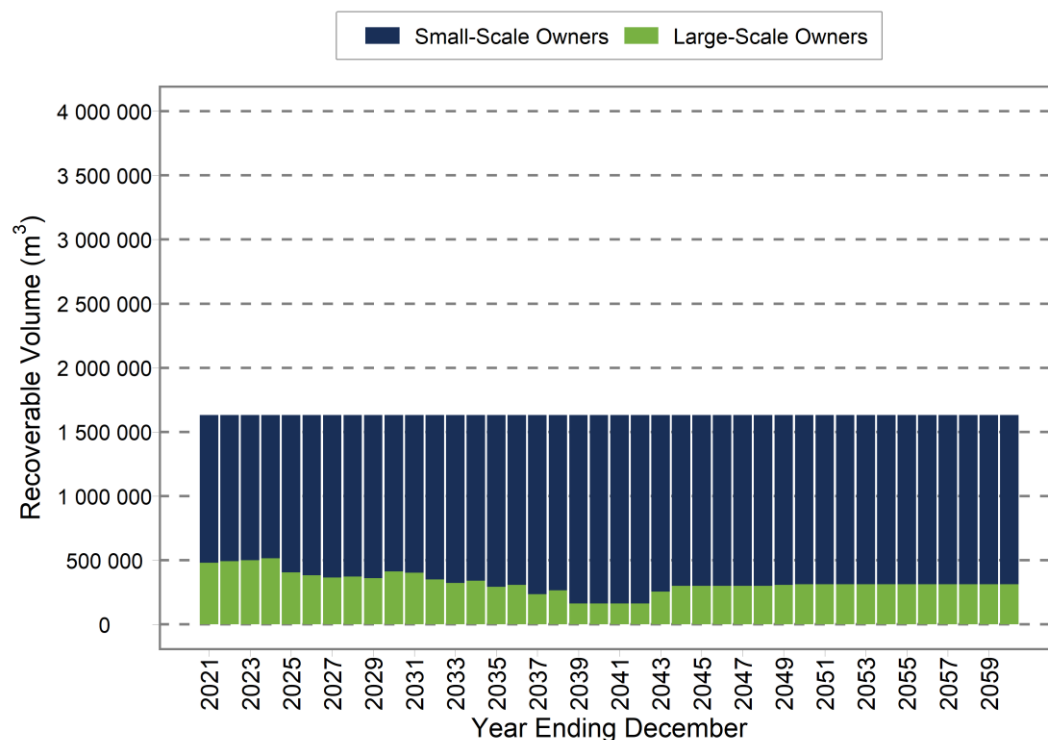
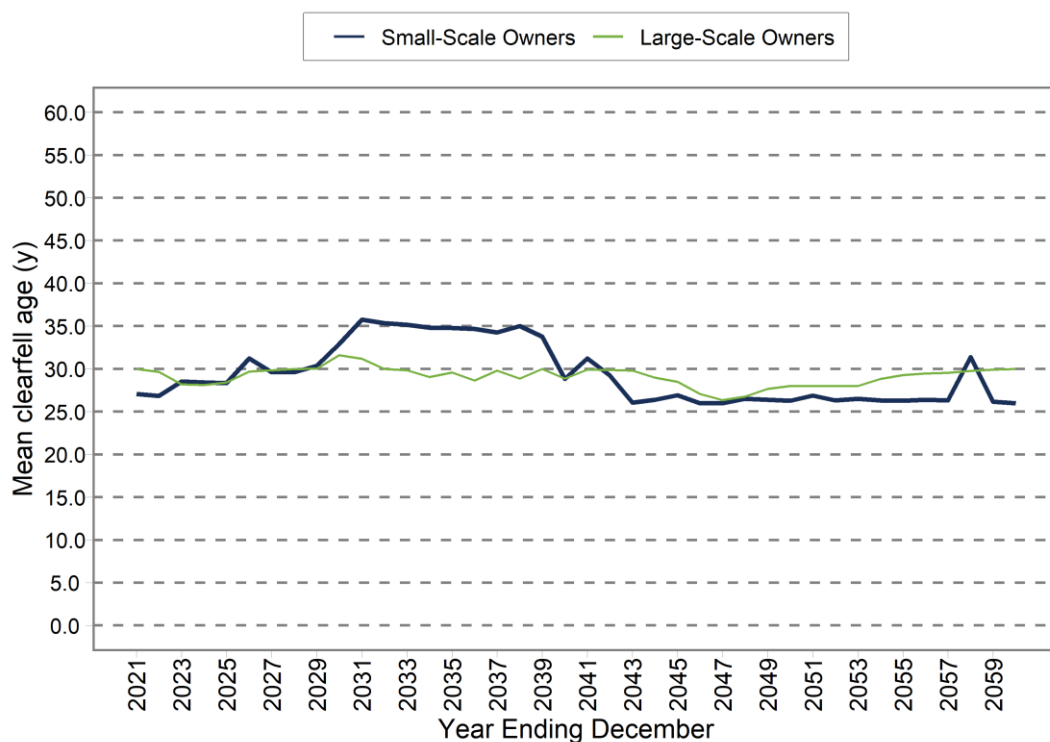


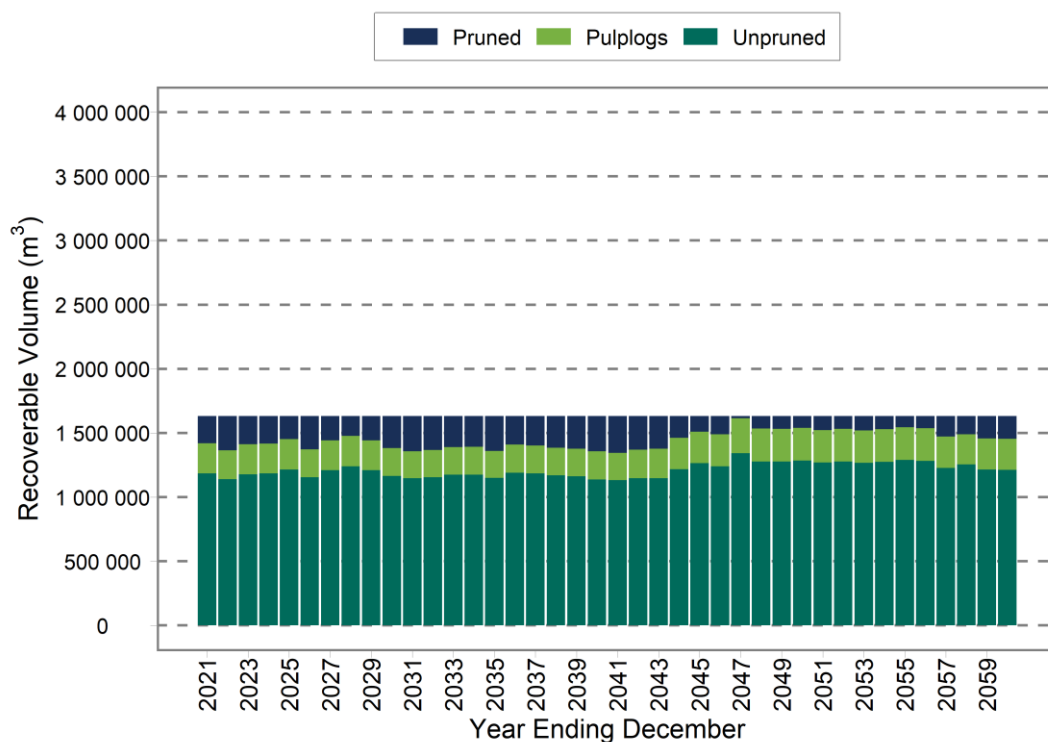
Figure 4-6 shows that the harvest age varies from the target rotation ages of 26 and 30 (small- and large-scale owners respectively) under the constraints of Scenario 2.

**Figure 4-6:**  
**Western Southern North Island Average Radiata Pine Clearfell Age under Scenario 2**



The harvest volume forecast under Scenario 2 is shown by log grade in Figure 4-7.

**Figure 4-7:**  
**Western Southern North Island Radiata Pine Availability by Log Grade under Scenario 2**



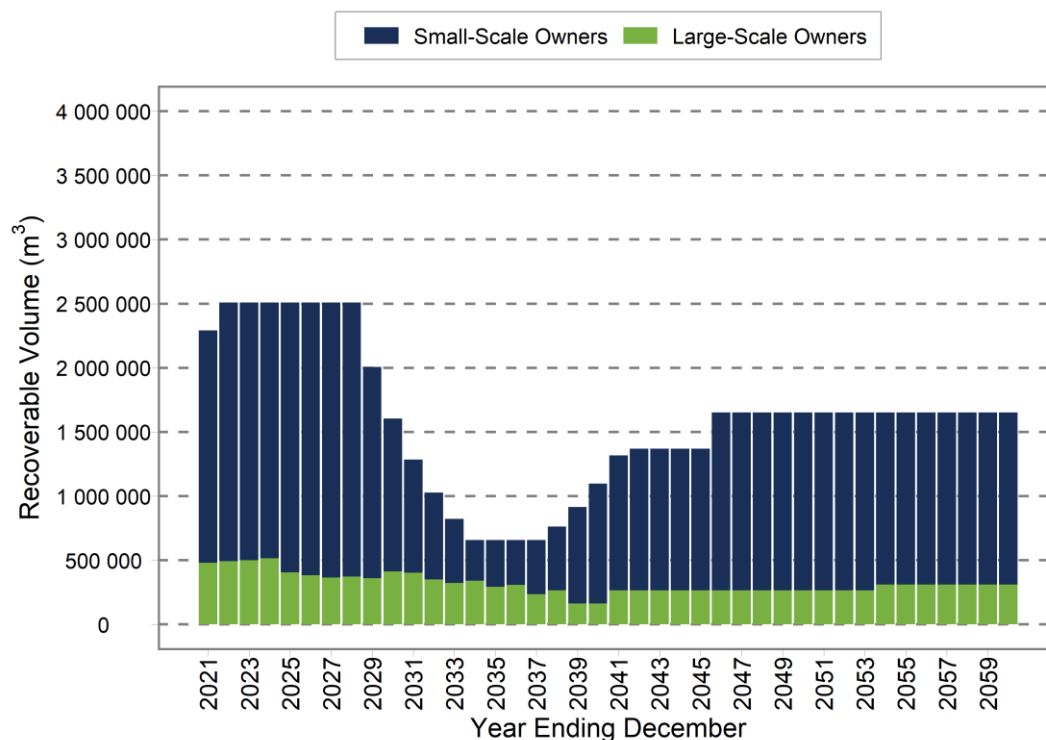
#### 4.4 Scenario 3

The Scenario 3 model assumes large-scale owners' resources are harvested in-line with their harvesting intentions between 2021 and 2040, and then a non-declining yield constraint is applied after 2040. The total yield for all owners has been regulated in a manner that tries to maintain the target rotation age of large-scale owners at 30 years and small-scale owners at 26 years.

Figure 4-8 shows the radiata pine availability from all owners. The total volume increases to around 2.5 million m<sup>3</sup> per year for seven years, then drops to around 0.65 million m<sup>3</sup> for a period of four years. The volume then increases back up to a sustainable annual cut of just under 1.6 million m<sup>3</sup>.

Figure 4-9 shows the radiata pine average clearfell age by ownership. Under this scenario the average rotation age of small-scale owners' resource is maintained closer to the target rotation than in Scenario 2.

**Figure 4-8:**  
**Western Southern North Island Radiata Pine Availability under Scenario 3**



**Figure 4-9:**  
**Western Southern North Island Average Radiata Pine Clearfell Age under Scenario 3**

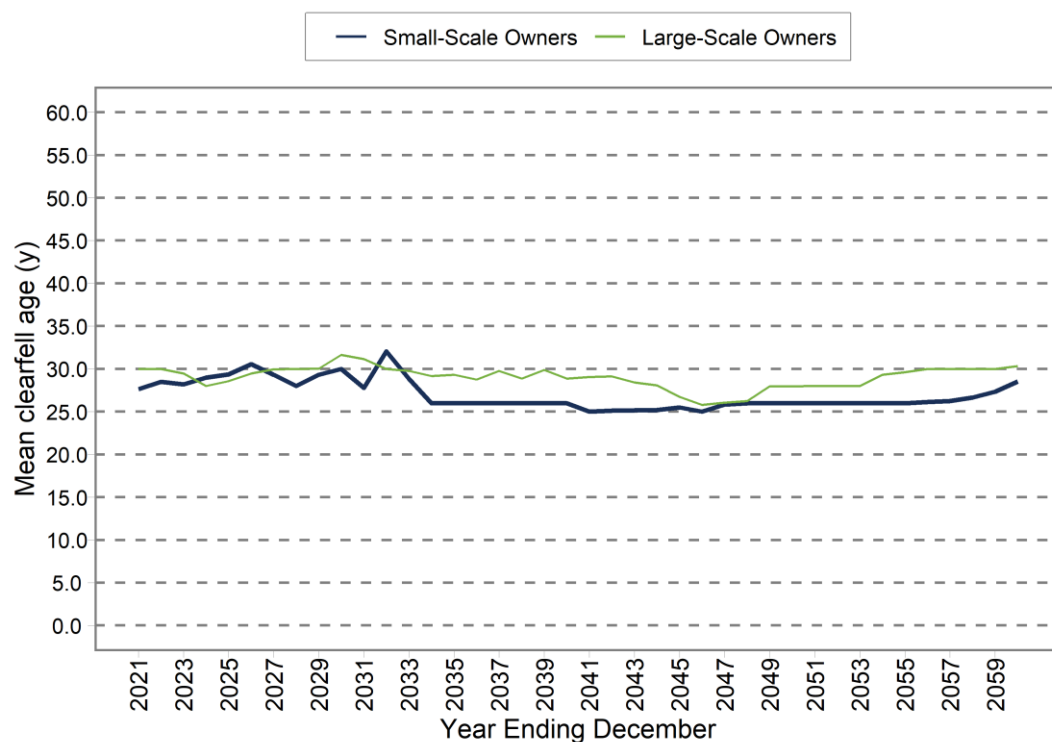
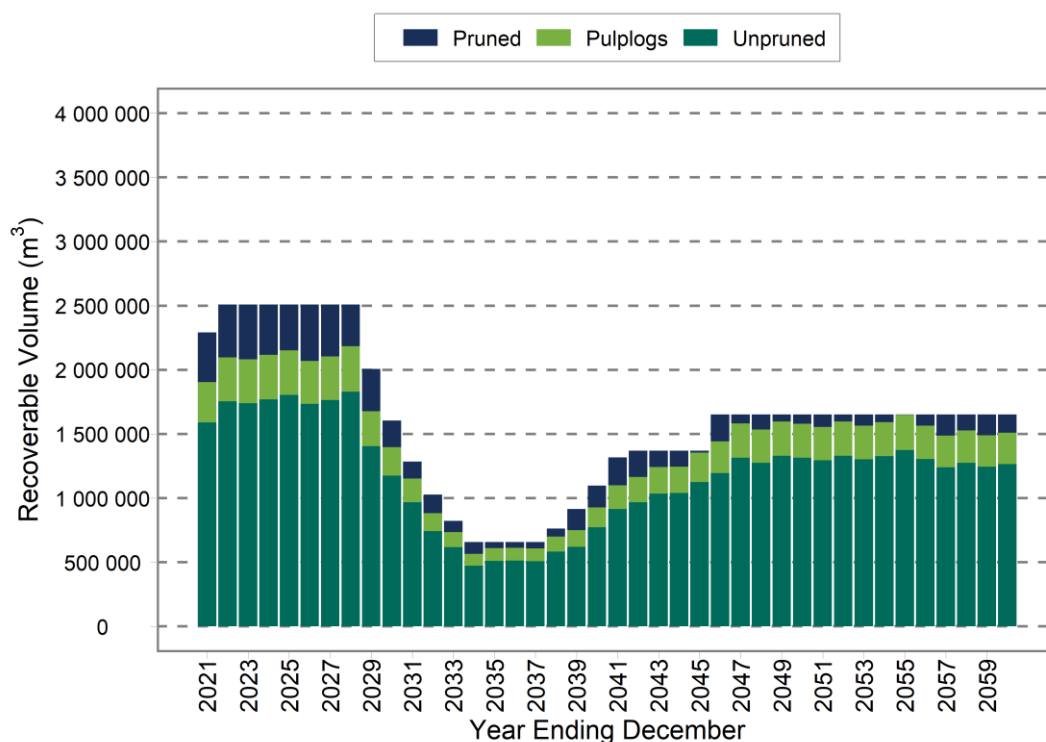


Figure 4-10 shows the radiata pine availability by log grade for all owners under Scenario 3.



**Figure 4-10:**  
**Western Southern North Island Radiata Pine Availability by Log Grade under Scenario 3**

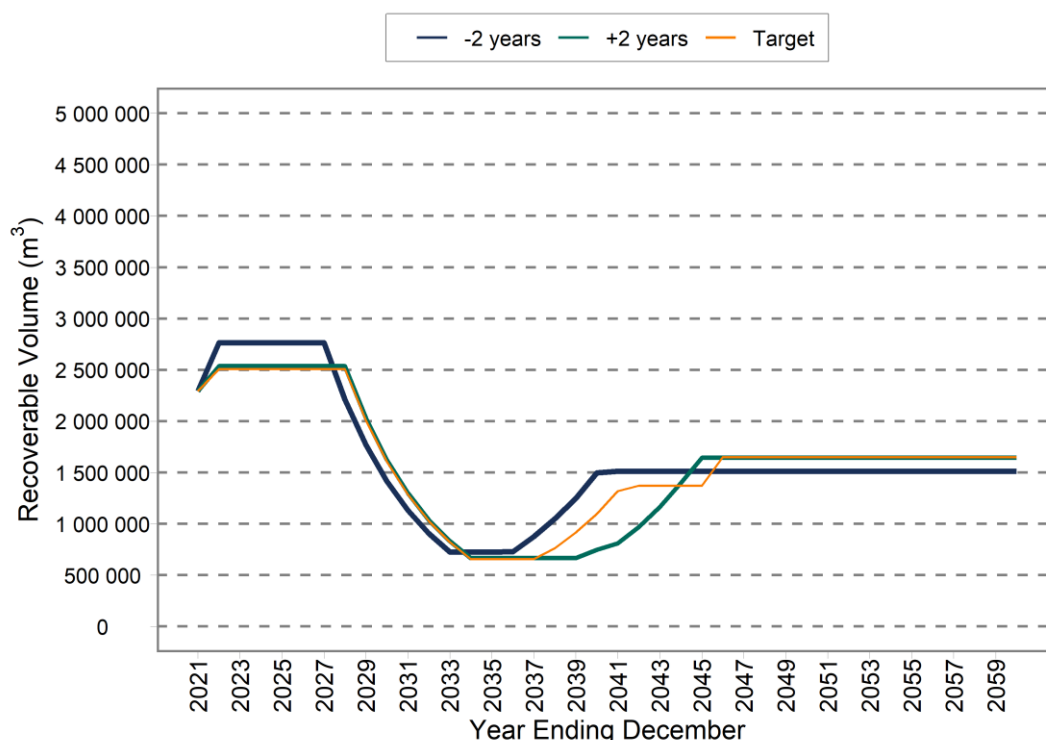


## 4.5

### Scenario 4

In Scenario 4, target rotation ages of 24 or 28 years are used for small-scale owners (rather than 26 years) and 28 or 32 for large-scale owners, and the same constraints are applied as in Scenario 3. Figure 4-11 shows the woodflows for the different target rotation ages are not significantly different. The older target rotation age results in a slight delay in volume harvested, particularly after the decline in harvest volume. Likewise, a younger rotation age results in increased near-term volume and an earlier recovery from woodflow decline.

**Figure 4-11:**  
**Western Southern North Island Radiata Pine Availability by Target Rotation Age**  
**under Scenario 4**



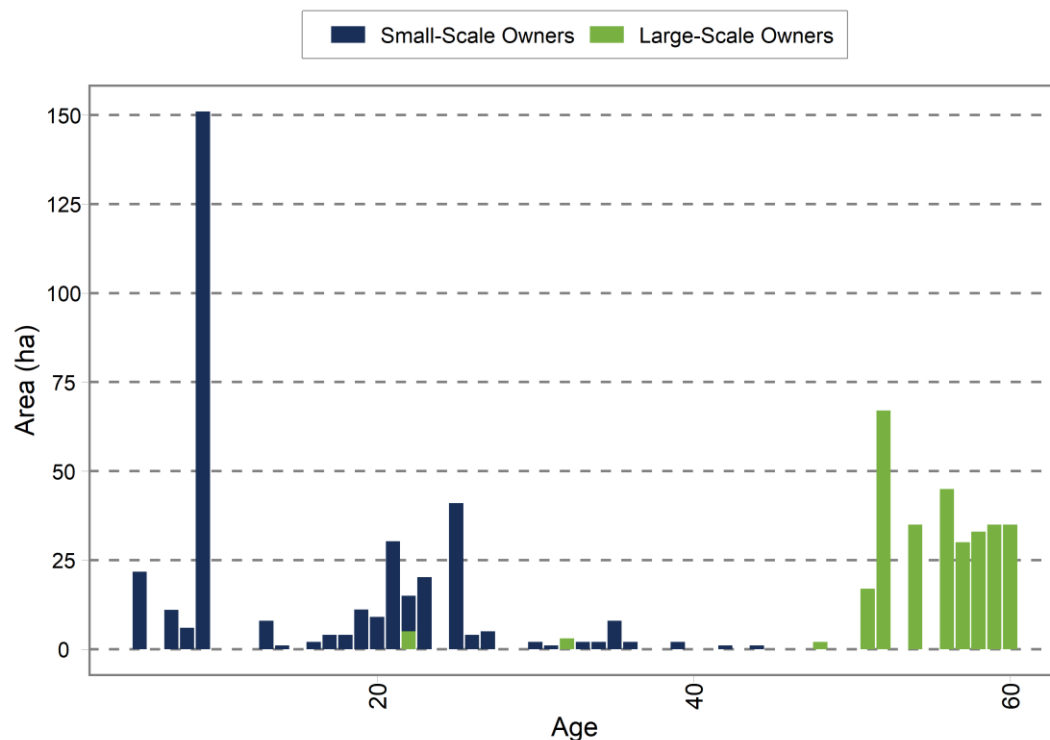
#### 4.6 Douglas-fir

The area of Douglas-fir in the Western Southern North Island is 862 ha. The age-class distribution of Douglas-fir in the Western Southern North Island is uneven with a large area planted in the last 10 years by small-scale growers, as shown in Figure 4-12. The model requires 90% of the Douglas-fir area to be replanted into radiata pine, and 10% to be replanted back into Douglas-fir.

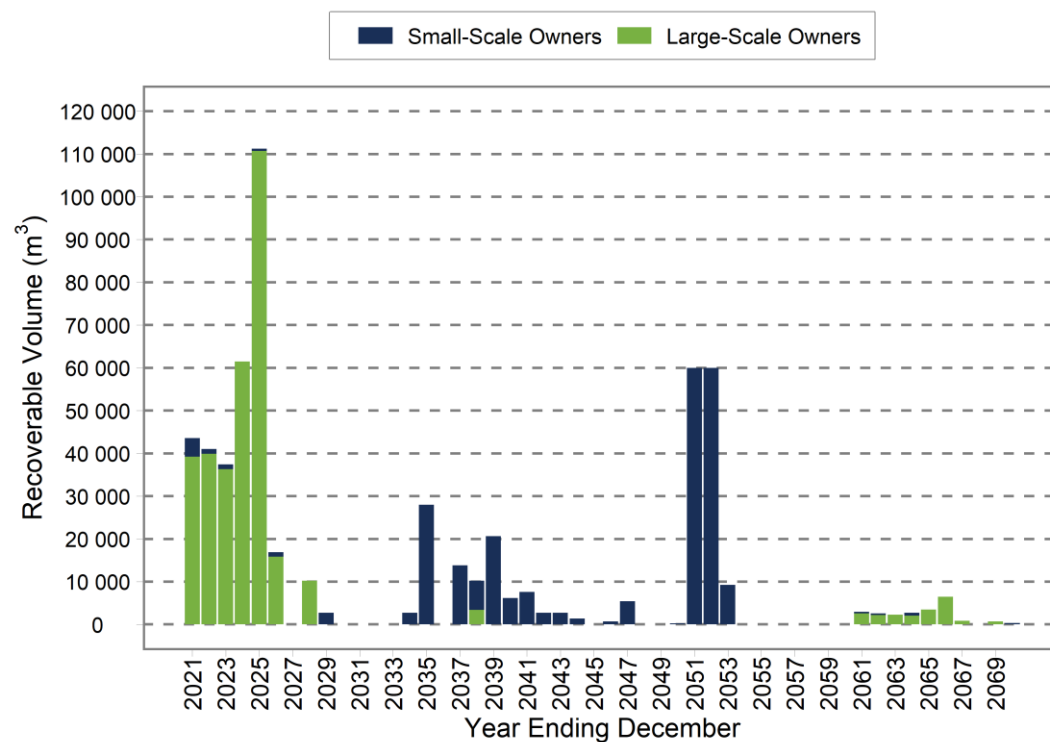
The Douglas-fir harvest for the large-scale owners' estate is based on intentions for 2021 to 2028. From 2029, the Douglas-fir availability from small-scale owners is limited to an upper limit of 60 000 m³ per year (Figure 4-13).

The target rotation age is 40 years for both the small-scale and large-scale owners of Douglas-fir. The average clearfell age of the Douglas-fir estate in the Western Southern North Island region is presented in Figure 4-14.

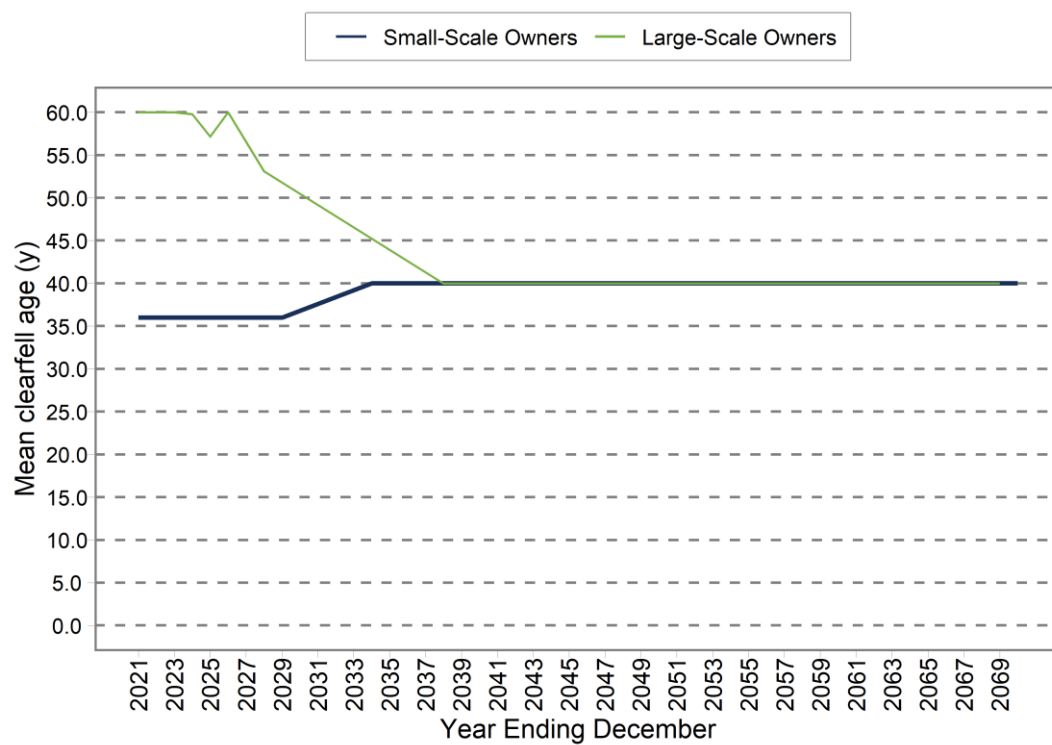
**Figure 4-12:**  
**Western Southern North Island Age-class Distribution of Douglas-fir**



**Figure 4-13:**  
**Western Southern North Island Douglas-fir Availability**



**Figure 4-14:**  
**Western Southern North Island Average Douglas-fir Clearfell Age**



## 5 WOOD AVAILABILITY FORECASTS FOR EASTERN SOUTHERN NORTH ISLAND

### 5.1 Eastern Southern North Island Region Area Description

The Eastern Southern North Island region has a plantation resource of 76 360 ha. Of this, 74 553 ha consists of radiata pine, and 189 ha of Douglas-fir – as reported by the NEFD as at 1 April 2020. After adjustments are applied to the NEFD area (see Section 3.4), the modelled area reduces to 72 397 ha.

The modelled resource consists almost entirely of radiata pine. Figure 5-1 shows the age-class distribution for the Eastern Southern North Island estate by owner size. Large-scale owners held 35% of the modelled resources, and small-scale owners held 65%.

**Figure 5-1:**  
**Eastern Southern North Island Modelled Age-class Distribution for All Species**

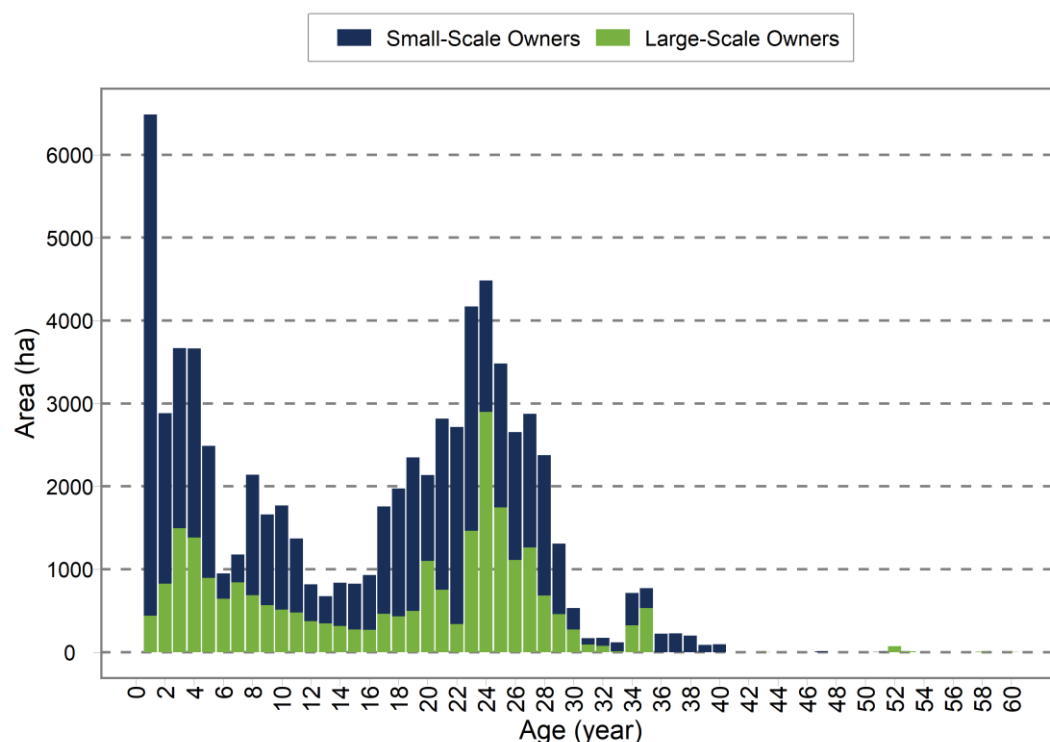
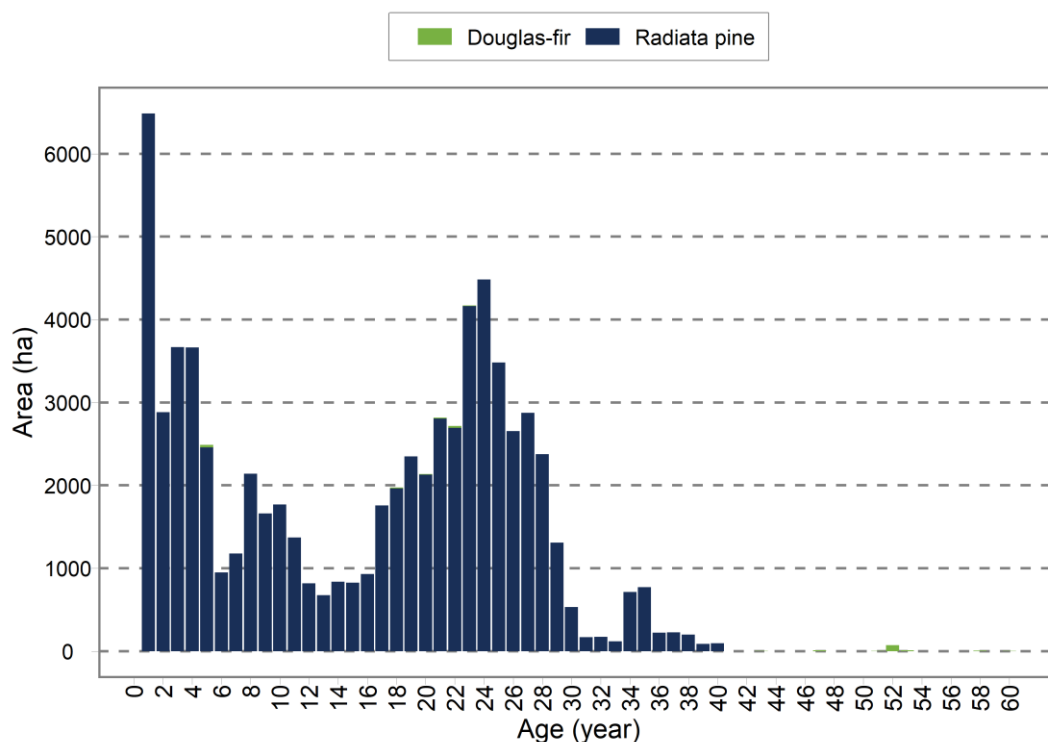


Figure 5-2 shows the age-class distribution for the Eastern Southern North Island by species. Most of the estate is radiata pine, of which 63% is recorded as managed under a pruned regime.



**Figure 5-2:**  
**Eastern Southern North Island Modelled Age-class Distribution by Species**

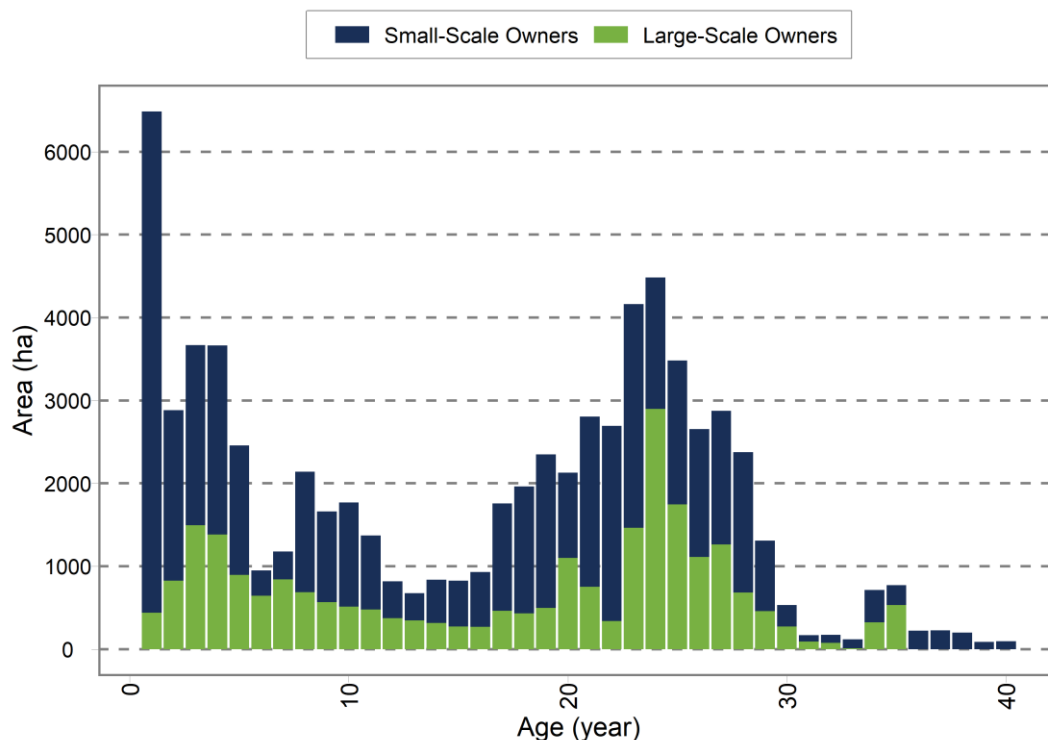


## 5.2 Scenario 1

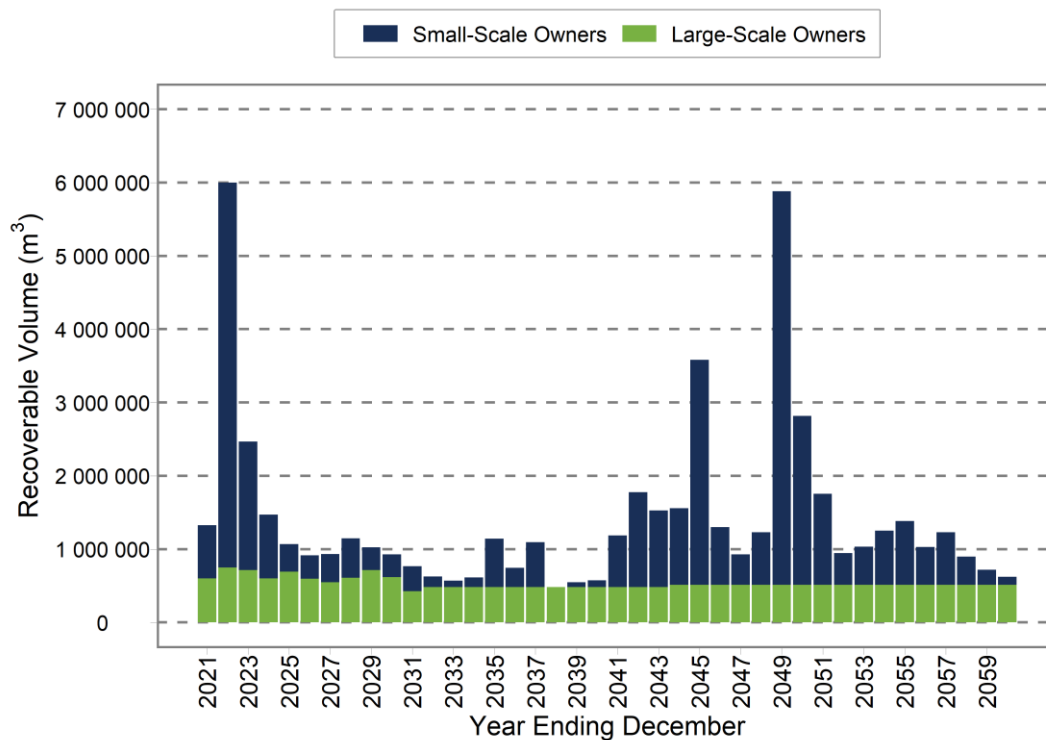
In Scenario 1, large-scale owners are modelled to harvest according to their stated intentions and small-scale owners are modelled to harvest their forests at age 26. The total volume in this scenario has been capped at six million cubic metres per year. Figure 5-3 shows the age-class distribution for the Eastern Southern North Island radiata pine estate for both large-scale and small-scale owners combined.

The wood availability from all owners in Eastern Southern North Island under Scenario 1 is presented in Figure 5-4. The estate has the potential to generate a substantial increase in the amount of wood available over the next two to three years, coming mostly from the small-scale owner resource. This volume reduces substantially as the large plantings from the 1992 to 1995 period are harvested.

**Figure 5-3:**  
**Eastern Southern North Island Age-class Distribution of Radiata Pine**



**Figure 5-4:**  
**Eastern Southern North Island Radiata Pine Availability under Scenario 1**



### 5.3 Scenario 2

Figure 5-5 shows the radiata pine availability for all owners under Scenario 2. The sustainable yield under a non-declining yield constraint for the Eastern Southern North Island region is just over 1.4 million m<sup>3</sup> rising to just under 1.5 million m<sup>3</sup> from 2044.

**Figure 5-5:**  
**Eastern Southern North Island Radiata Pine Availability under Scenario 2**

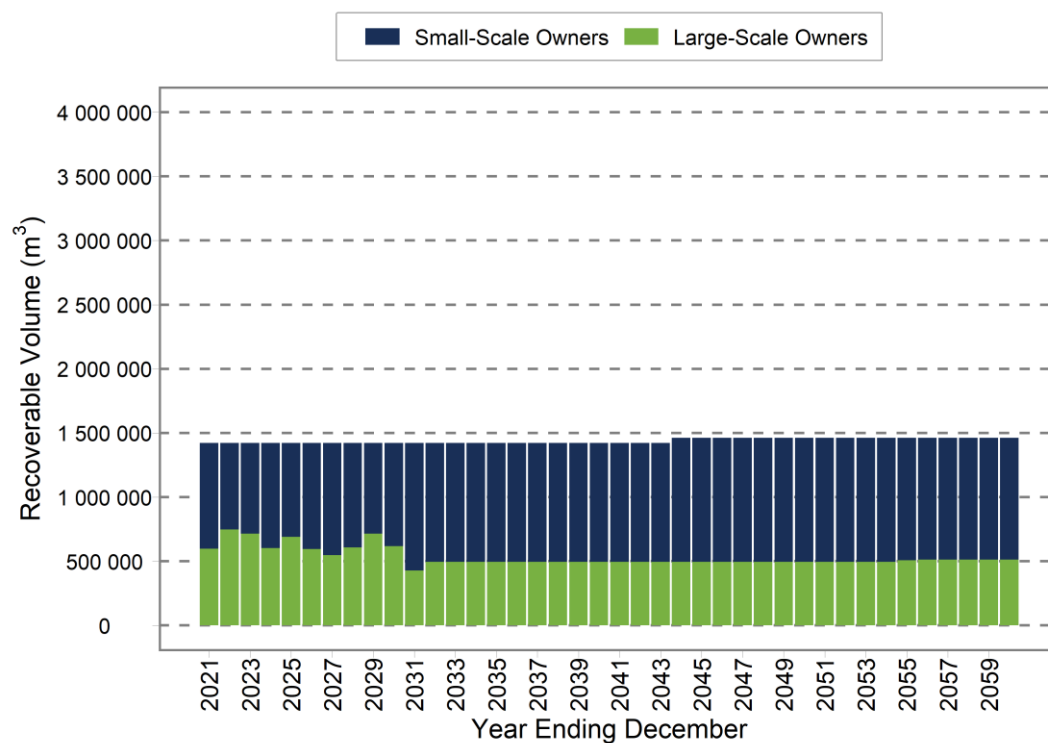
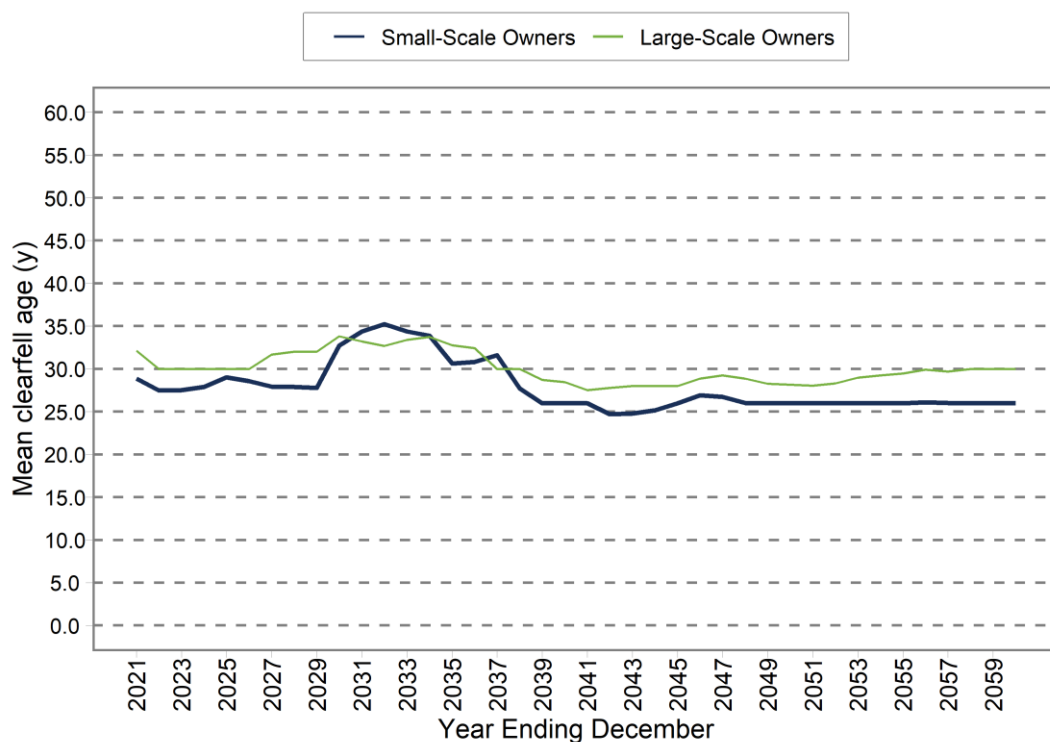


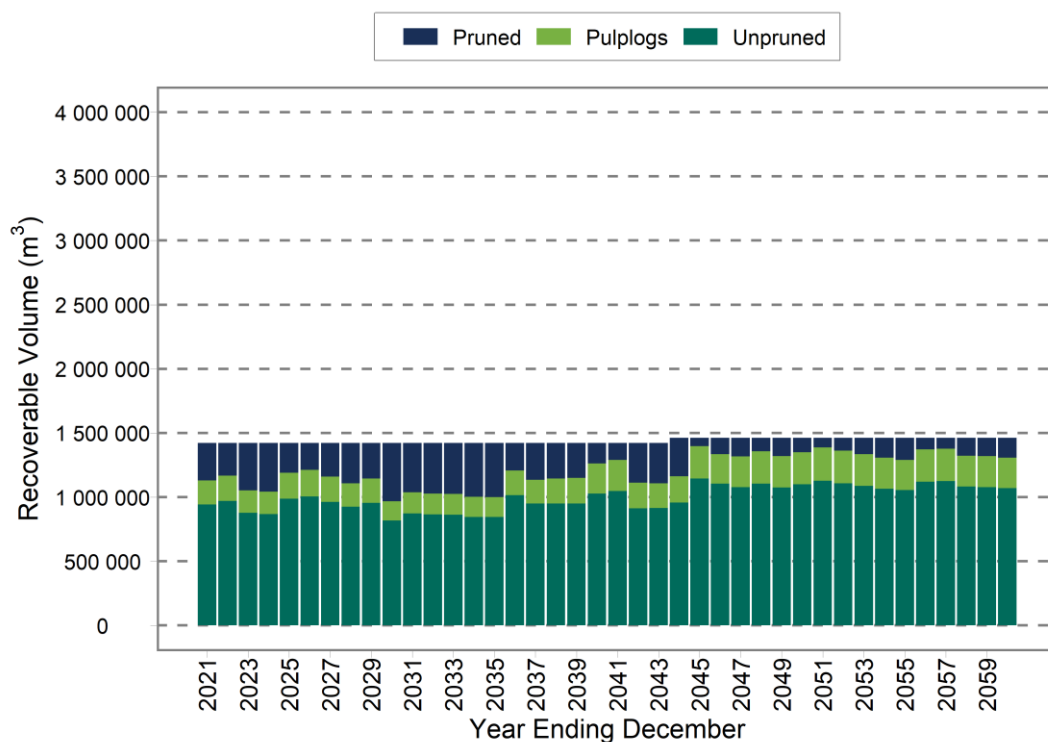
Figure 5-6 shows that the harvest age varies from the target rotation ages of 26 (small-scale owners) and 30 (large-scale owners) under the constraints of Scenario 2.

**Figure 5-6:**  
**Eastern Southern North Island Average Radiata Pine Clearfell Age under Scenario 2**



The harvest volume forecast under Scenario 2 is shown by log grade in Figure 5-7.

**Figure 5-7:**  
**Eastern Southern North Island Radiata Pine Availability by Log Grade under Scenario 2**



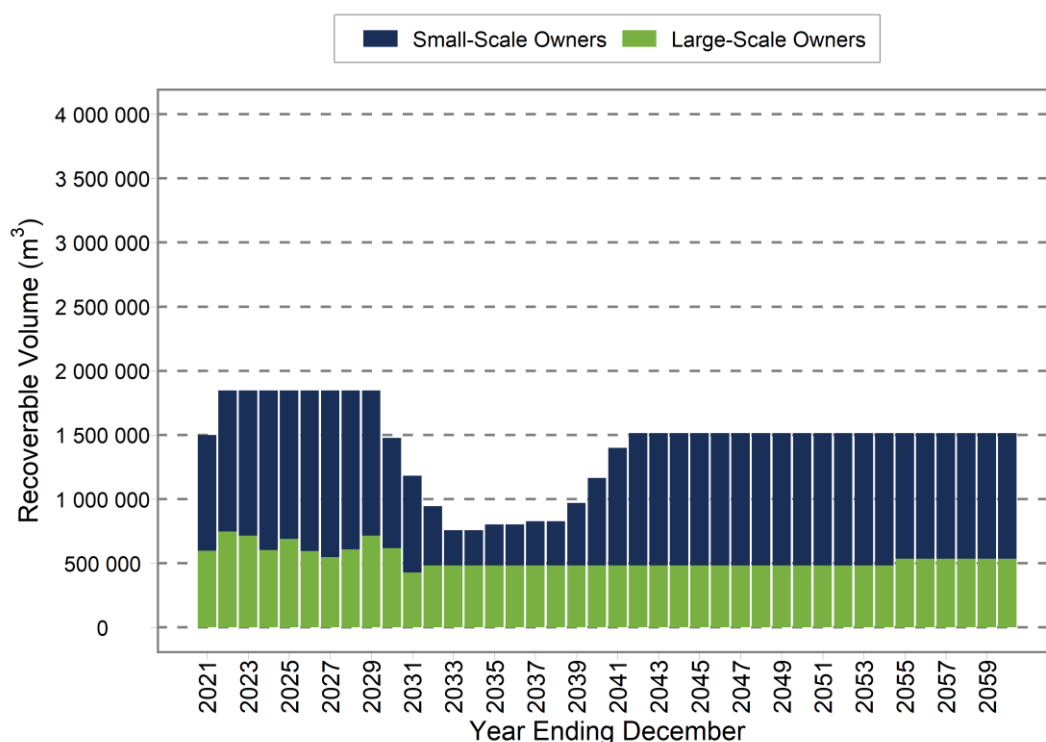
## 5.4 Scenario 3

The Scenario 3 model assumes large-scale owners' resources are harvested in-line with their harvesting intentions between 2021 and 2031, and then a non-declining yield constraint is applied after 2031. The total yield for all owners has been regulated in a manner that tries to maintain the target rotation ages for small-scale owners at around 26 years and for large-scale owners at around 30 years.

Figure 5-8 shows the radiata pine availability from all owners. The total volume increases to around 1.8 million m<sup>3</sup> per year for eight years, then drops to around 0.75 million m<sup>3</sup>. The volume then gradually increases back up to a sustainable annual cut of around 1.5 million m<sup>3</sup>.

Figure 5-9 shows the radiata pine average clearfell age by ownership. Under this scenario the average rotation age of small-scale owners' resource is still higher than the target age to begin with but is overall maintained closer to the target rotation than in Scenario 2.

**Figure 5-8:**  
**Eastern Southern North Island Radiata Pine Availability under Scenario 3**



**Figure 5-9:**  
**Eastern Southern North Island Average Radiata Pine Clearfell Age under Scenario 3**

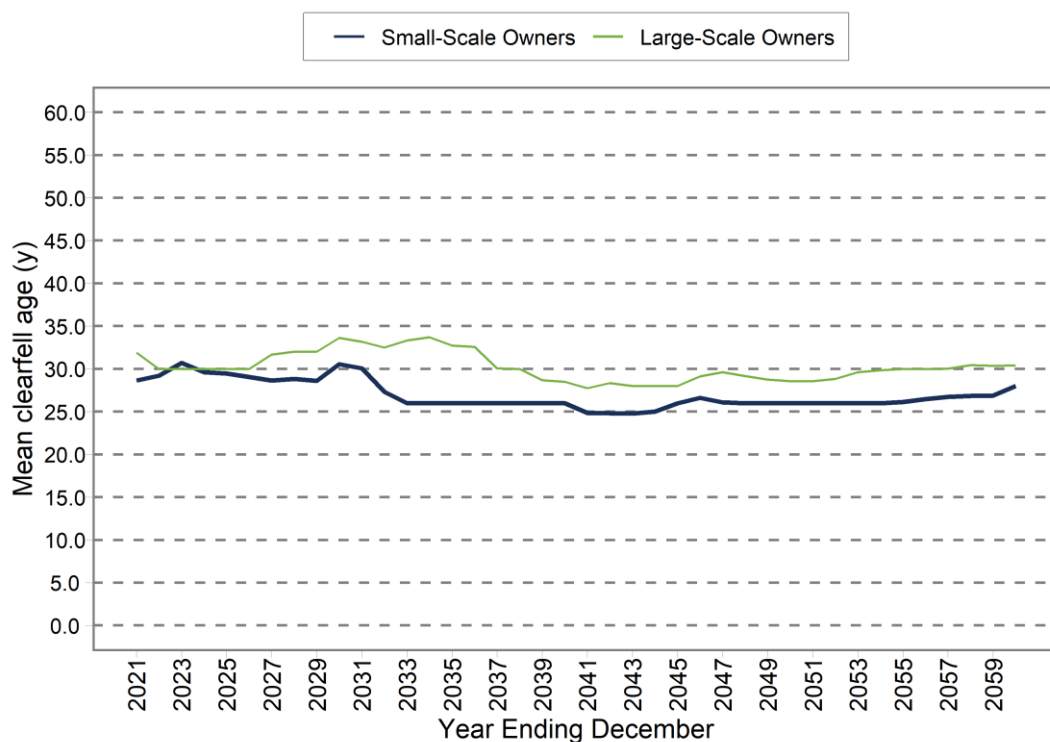
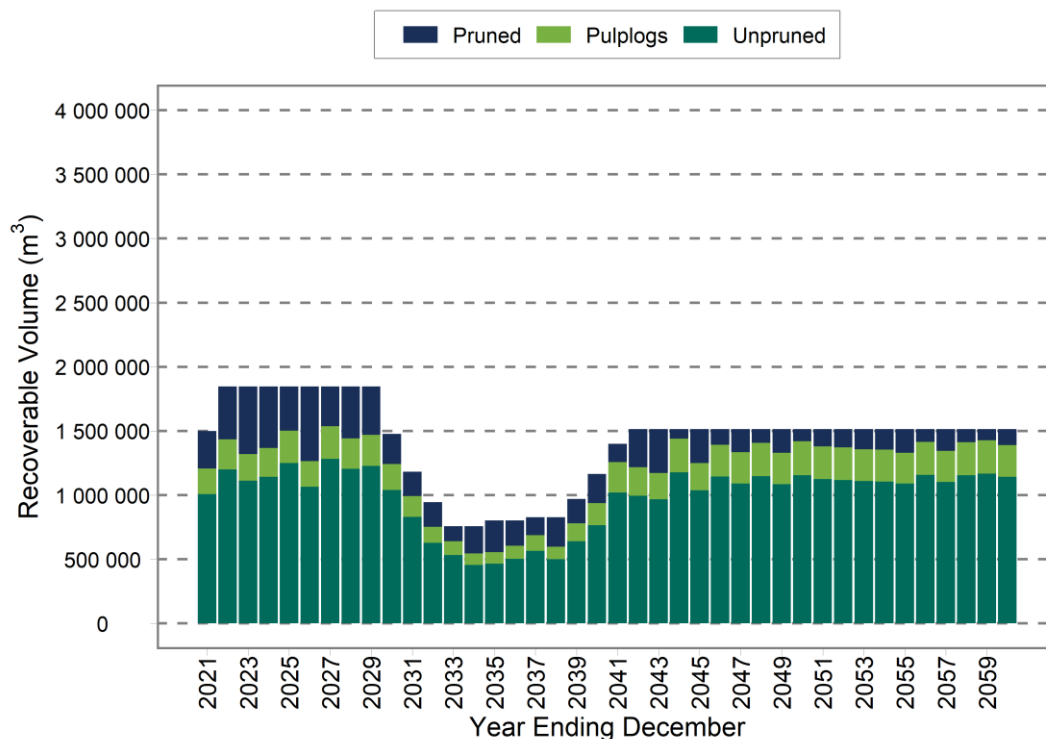


Figure 5-10 shows the radiata pine availability by log grade for all owners. As with most regions, near-term pruned volume remains high, while longer-term pruned volume becomes more sporadic as more owners shift to structural regimes.

**Figure 5-10:**  
**Eastern Southern North Island Radiata Pine Availability by Log Grade under**  
**Scenario 3**

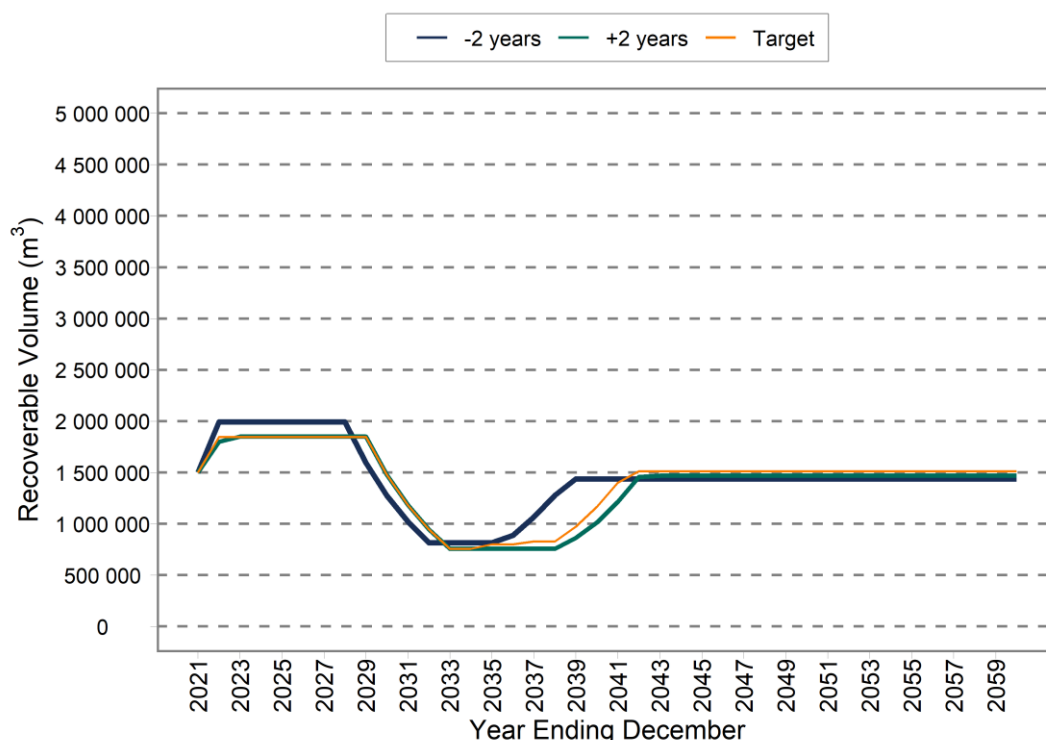


## 5.5 Scenario 4

In Scenario 4, target rotation ages of plus and minus two years are used (24 or 28 for small-scale owners rather than 26 years and 28 or 32 for large-scale owners) and the same constraints are applied as in Scenario 3. Figure 5-11 shows the woodflows for the different target rotation ages are not significantly different. The older target rotation age results in a slight delay in volume harvested, particularly after the decline in harvest volume. Likewise, a younger rotation age results in increased near-term volume and an earlier recovery from woodflow decline.



**Figure 5-11:**  
**Eastern Southern North Island Radiata Pine Availability by Target Rotation Age**  
**under Scenario 4**



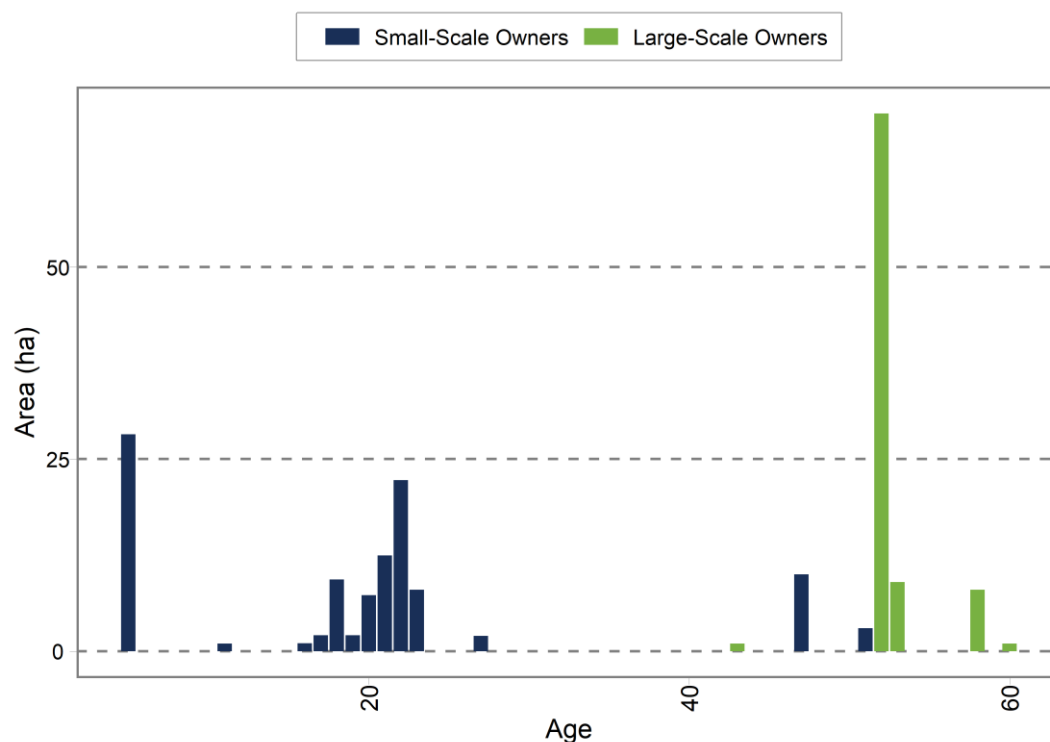
## 5.6 Douglas-fir

The area of Douglas-fir in Eastern Southern North Island is 189 ha. The age-class distribution of Douglas-fir in Eastern Southern North Island is uneven with a large area planted in the last couple of years by small-scale growers, as shown in Figure 5-12. The model requires 90% of all Douglas-fir area to be replanted into radiata pine, and 10% to be replanted into Douglas-fir.

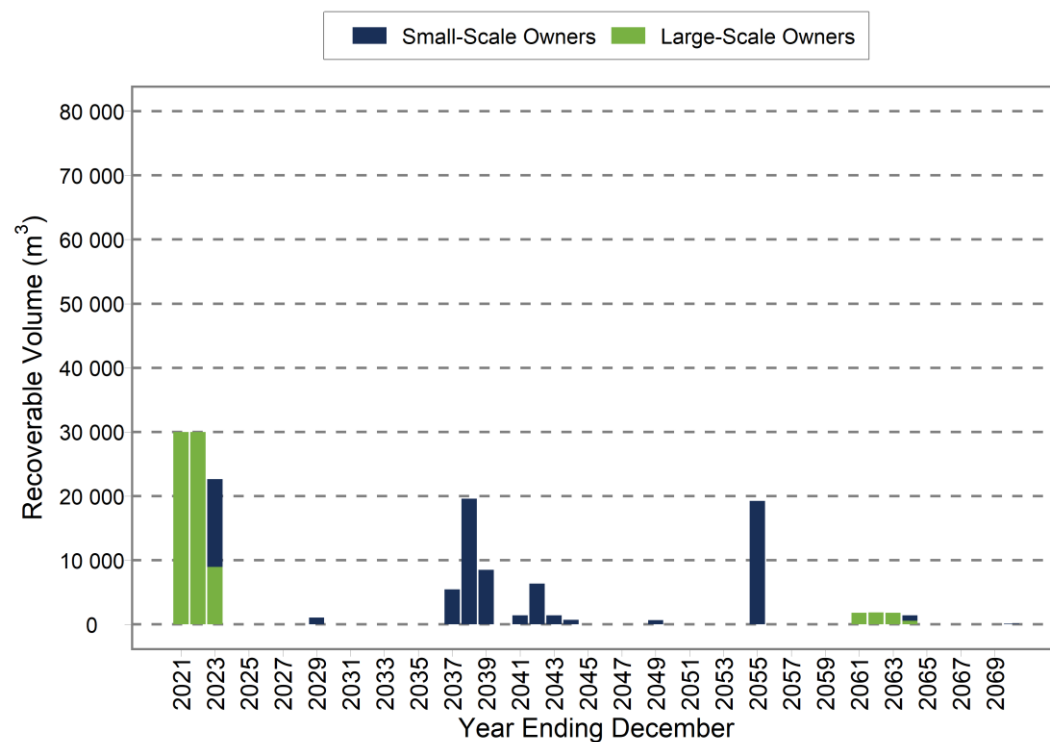
Figure 5-13 shows the wood availability forecast for Douglas-fir in the Eastern Southern North Island region. There is very little area in Douglas-fir, and the forecast shows sporadic availability of volume as the estate matures.

The target rotation age is 40 years for Douglas-fir for both small-scale and large-scale owners. The average clearfell age of the Douglas-fir estate in the Eastern Southern North Island region is presented in Figure 5-14. Initial harvesting of the large-scale owner resource occurs over a short period of time and the average harvest age is considerably higher than the target age.

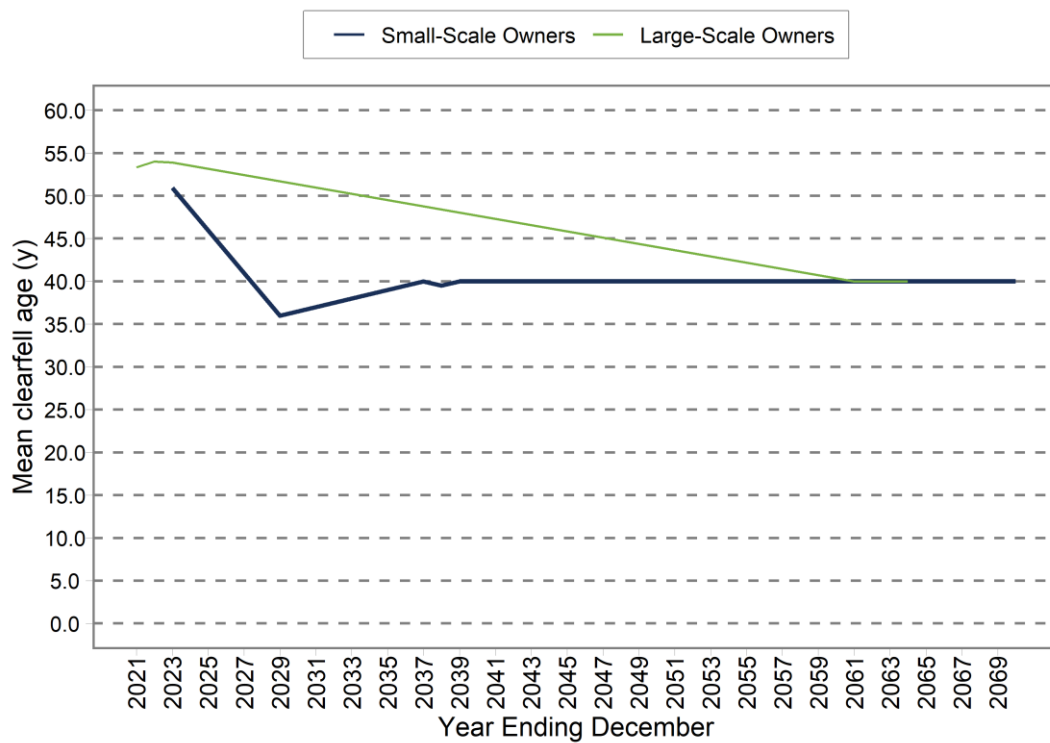
**Figure 5-12:**  
**Eastern Southern North Island Age-class Distribution of Douglas-fir**



**Figure 5-13:**  
**Eastern Southern North Island Douglas-fir Availability**



**Figure 5-14:**  
**Eastern Southern North Island Average Douglas-fir Clearfell Age**



## 6 WOOD AVAILABILITY FORECASTS FOR THE COMBINED SOUTHERN NORTH ISLAND REGION

The combined radiata pine forecasts for the Southern North Island region are presented for Scenario 2 (Figure 6-1 and Figure 6-2), Scenario 3 (Figure 6-3 and Figure 6-4) and Scenario 4 (Figure 6-5). The combined scenarios are additive, meaning the results of the Eastern and Western Southern North Island regions are added together to derive the combined results.

### 6.1 Scenario 2

Scenario 2 is based on non-declining yield and a target rotation age of 26 for small-scale owners and 30 for large-scale owners. Figure 6-1 indicates that wood availability in the Southern North Island region can remain at around 3 million m<sup>3</sup>, increasing slightly to just under 3.1 million m<sup>3</sup> from 2044.

**Figure 6-1:**  
**Combined Southern North Island Region Radiata Pine Availability under Scenario 2**

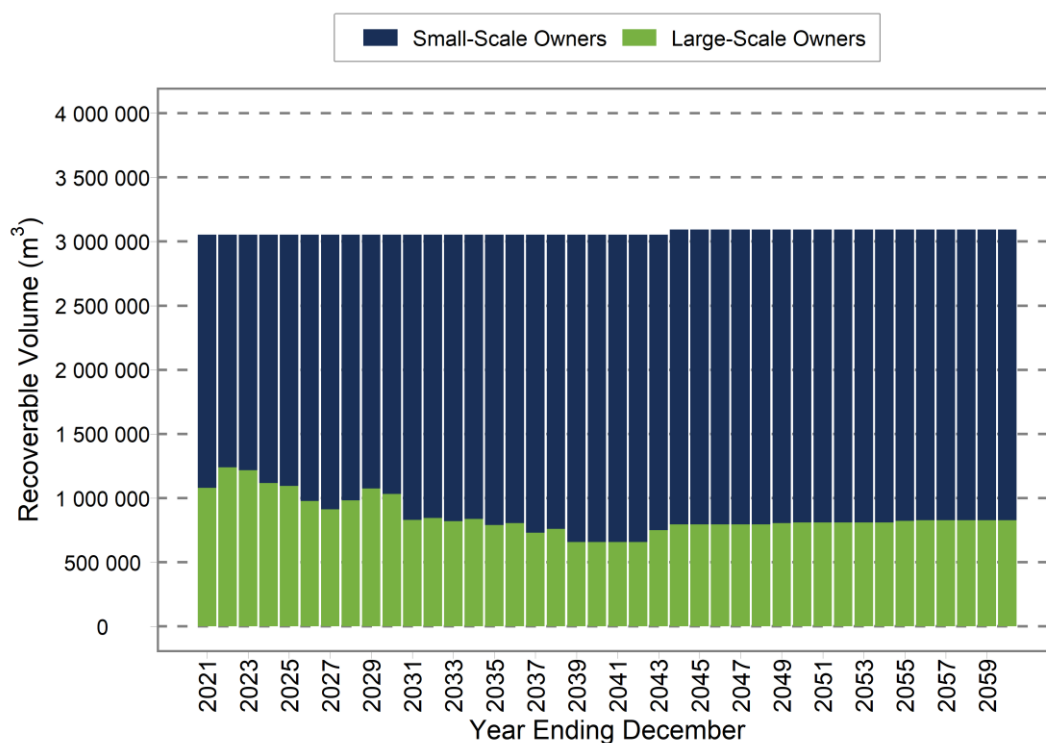
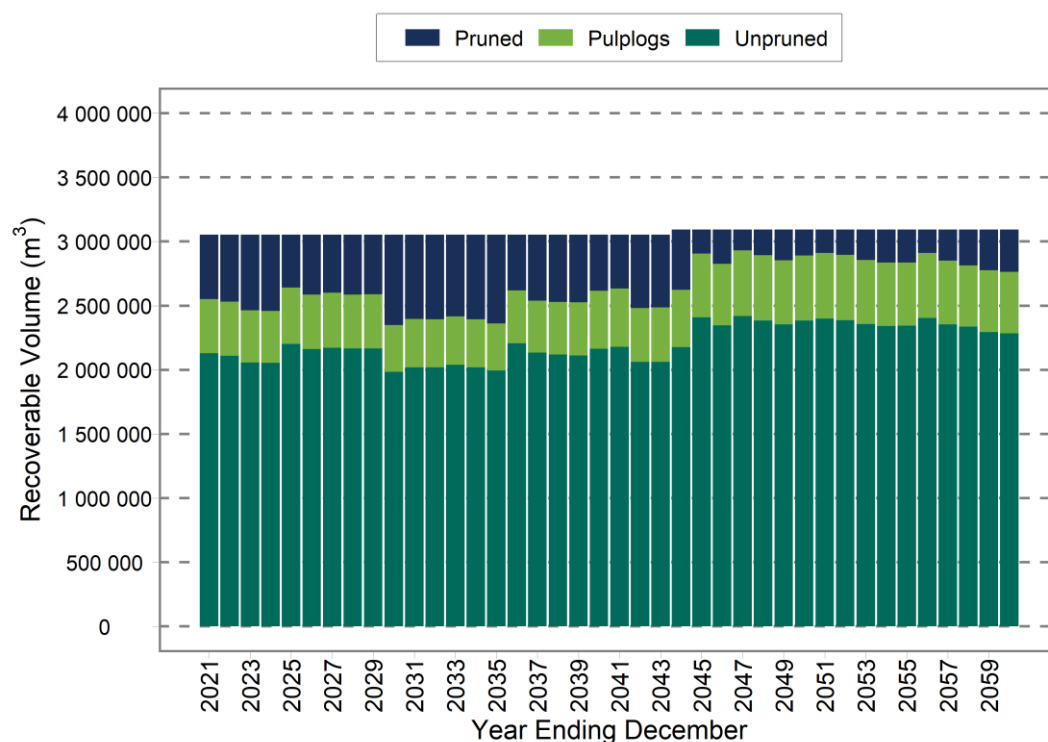


Figure 6-2 indicates the pruned log volume in the Southern North Island region remains reasonably high until around 2045, at which point the pruned resource starts to decrease more significantly.

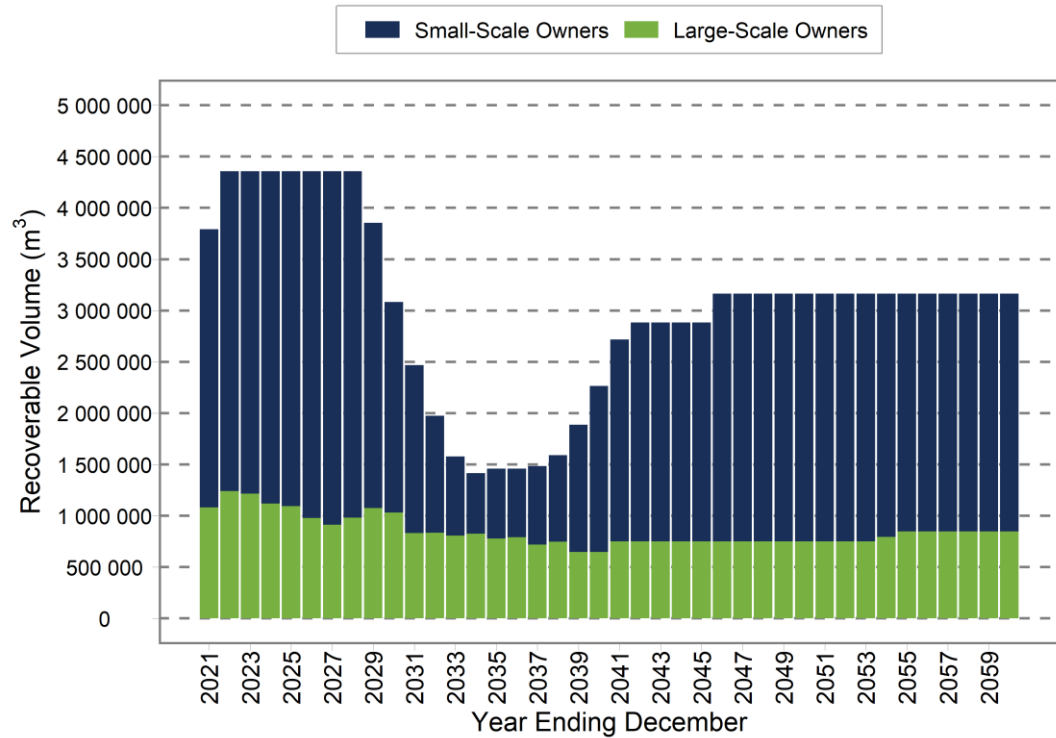
**Figure 6-2:**  
**Combined Southern North Island Region Radiata Pine Availability by Log Type**  
**under Scenario 2**



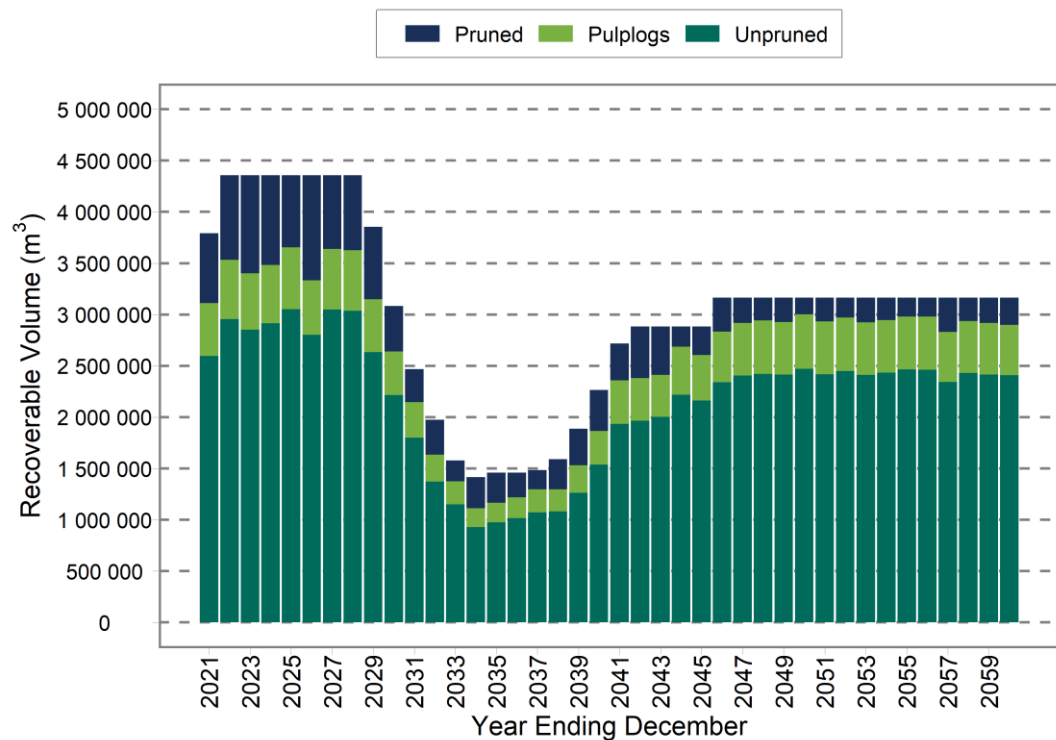
## 6.2 Scenario 3

Scenario 3 is based on a range of the constraints placed on the Eastern and Western Southern North Island regions separately to try to maintain an average rotation age of 26 for the small-scale owner resource and 30 for the large-scale owner resource (Figure 6-3 and Figure 6-4). The combined Southern North Island region can achieve harvest levels of just under 4.4 million m<sup>3</sup> from 2022 to 2028 after which the harvest level drops back to around 1.4 million m<sup>3</sup>. The volume then gradually rises back up to a long-term sustainable harvest of just under 3.2 million m<sup>3</sup>/a.

**Figure 6-3:**  
**Combined Southern North Island Region Radiata Pine Availability under Scenario 3**



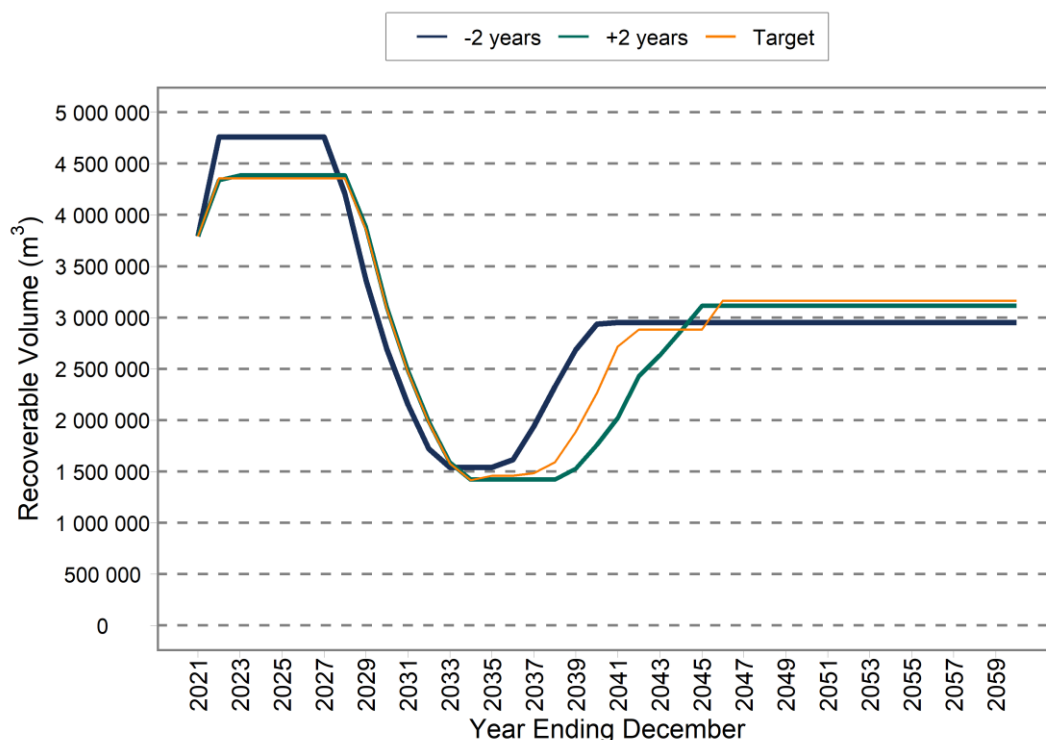
**Figure 6-4:**  
**Combined Southern North Island Region Radiata Pine Availability by Log Grade under Scenario 3**



### 6.3 Scenario 4

Different wood availability profiles are generated if the target rotation age is altered by plus or minus two years. Figure 6-5 indicates that reducing the harvest age by two years has the biggest impact on wood availability, resulting in a higher initial peak and a quicker recovery from the large drop in harvest levels, albeit to a slightly reduced long-term sustainable yield.

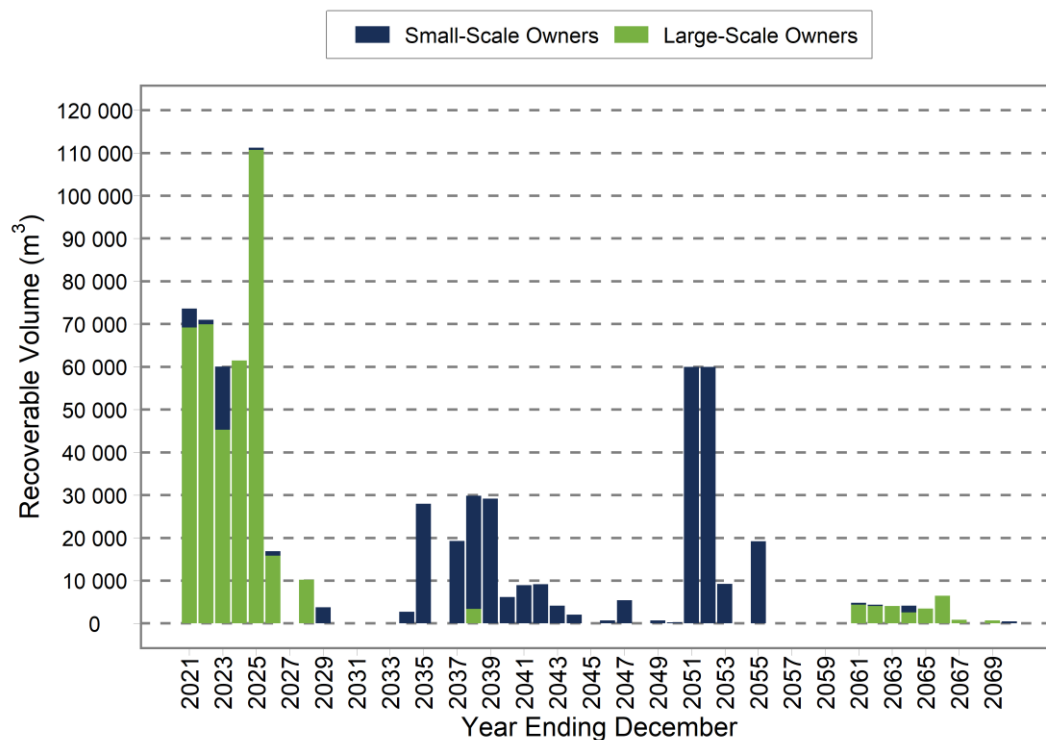
**Figure 6-5:**  
**Combined Southern North Island Region Radiata Pine Availability by Target Rotation Age under Scenario 4**



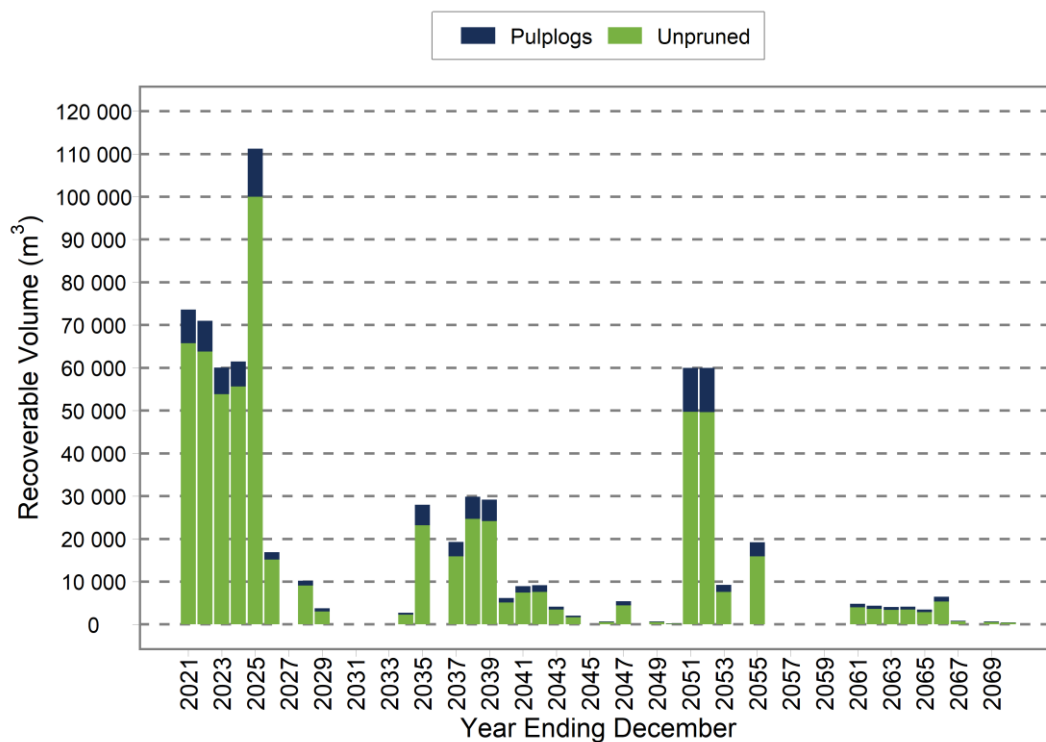
### 6.4 Douglas-fir

Figure 6-6 and Figure 6-7 show the combined Southern North Island Douglas-fir wood availability by ownership and log grade respectively. There is limited Douglas-fir planted in the Southern North Island region, and only smaller sporadic volumes are harvested over the longer term.

**Figure 6-6:**  
**Combined Southern North Island Region Douglas-fir Availability**



**Figure 6-7:**  
**Combined Southern North Island Region Douglas-fir Availability by Log Grade**



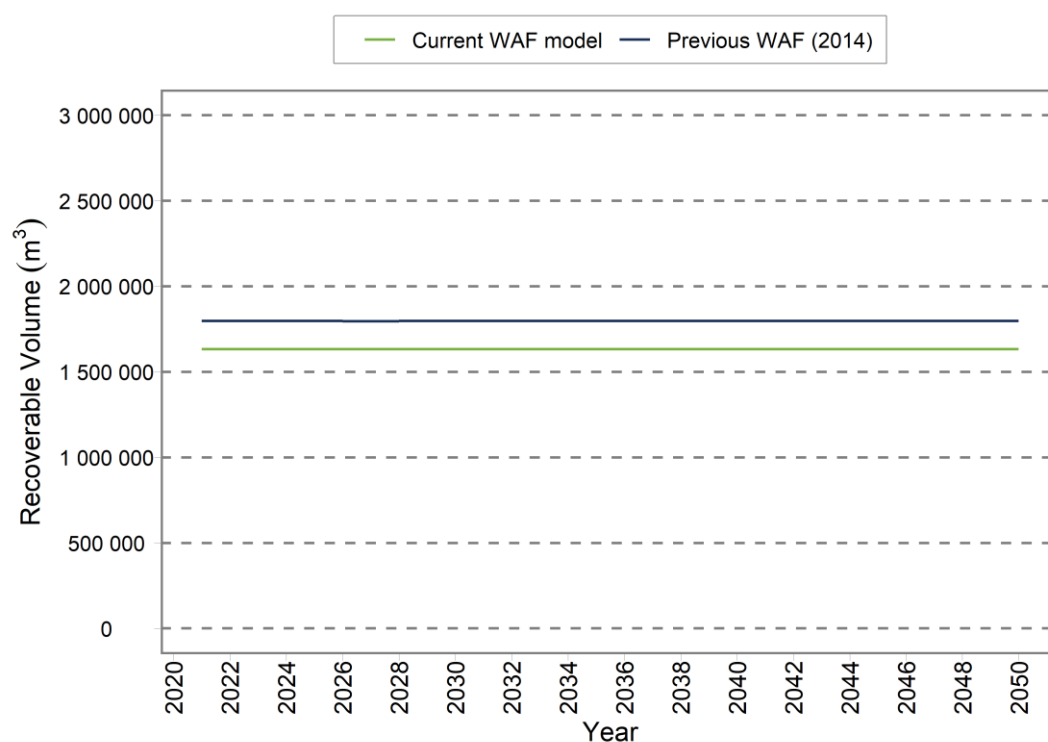


## 7 COMPARISON TO PREVIOUS FORECAST

The results of the 2021 wood availability forecasts were compared with the previous forecasts undertaken in 2014 for each sub-region based on Scenario 2 (Figure 7-1 and Figure 7-2) and Scenario 3 (Figure 7-3 and Figure 7-4).

The long-term sustainable cuts under the current forecast for the Western Southern North Island region under Scenario 2 is lower than the previous forecast (Figure 7-1). The yield tables associated with the Western Southern North Island were adjusted down, particularly for unpruned regimes, and this results in a lower volume than was seen in the previous forecast for this region.

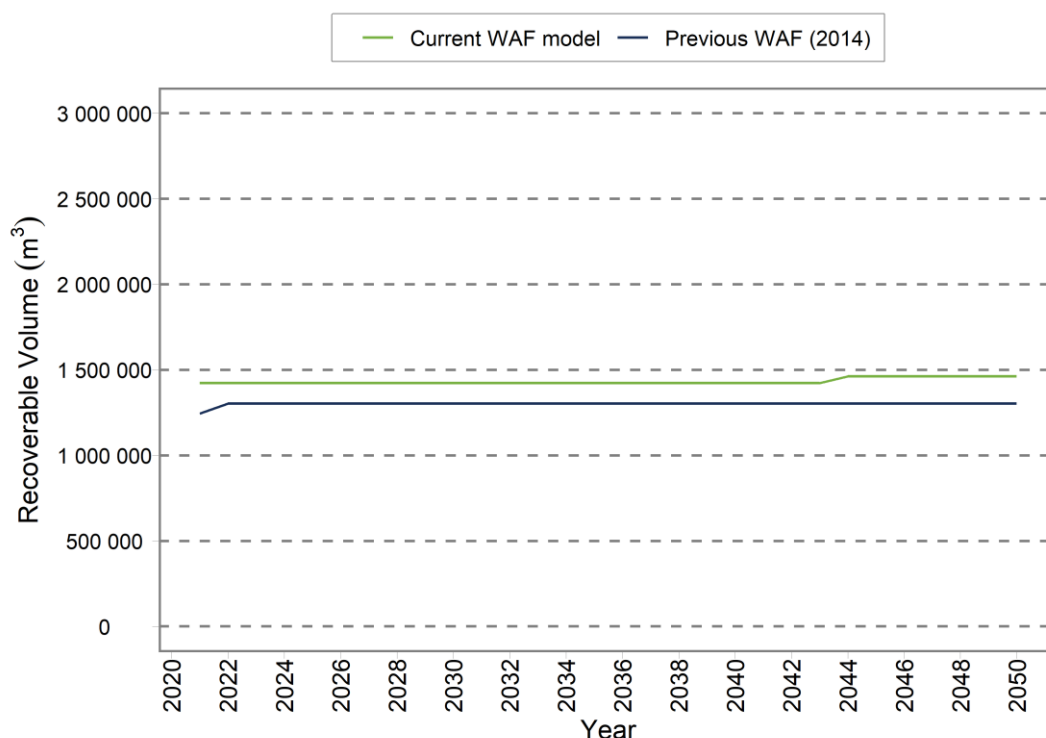
**Figure 7-1:**  
**Wood Availability Forecasts (All Radiata Pine): 2014 vs 2021 – Western Southern North Island under Scenario 2**



The long-term sustainable cut under the current forecast for the Eastern Southern North Island region under Scenario 2 is slightly higher than previously forecast (Figure 7-2), likely due to the increase area in the region (see The “Productivity” is the area weight average yield from the yield tables at a reference age. The “Annual Sustainable Harvest” is the annual harvest as determined in Scenario 2. “N/A” indicates where the previous wood availability report does not provide that parameter.

Table 7-2).

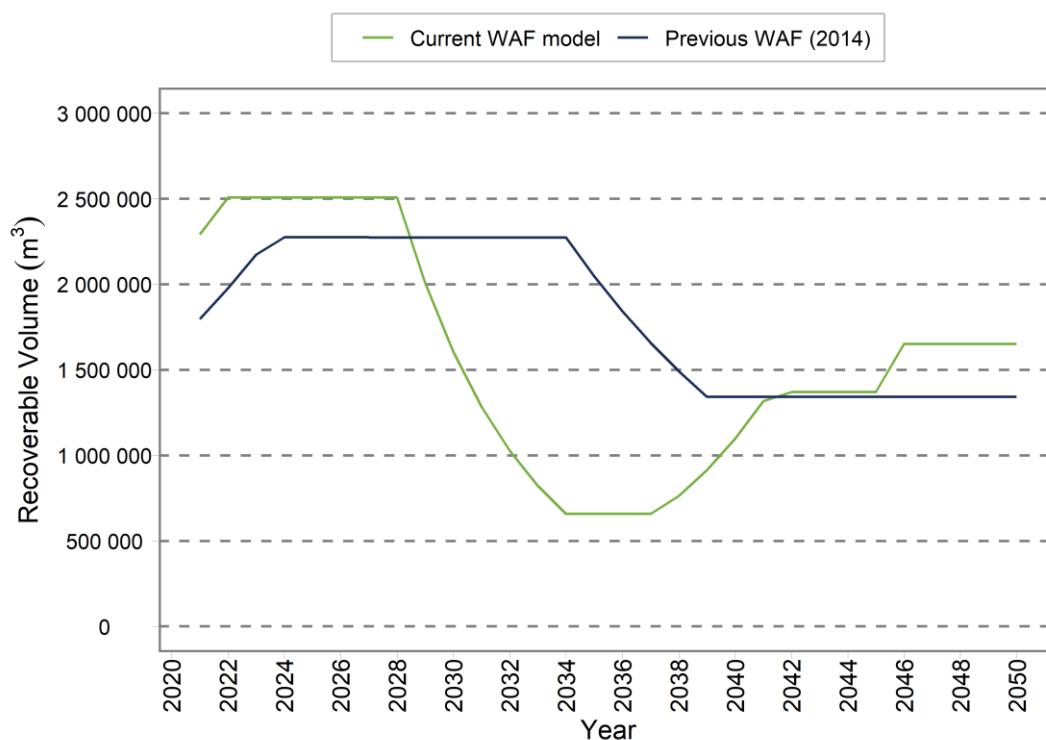
**Figure 7-2:**  
**Wood Availability Forecasts (All Radiata Pine): 2014 vs 2021 – Eastern Southern North Island under Scenario 2**



For Scenario 3, the latest Western Southern North Island forecast shows a higher level of volume available over the near term, with a sharper and deeper drop off sooner than was previously forecast (Figure 7-3). The overall difference in total volume is likely attributable to the reduction in expected yields from this region (see Section 3.2).

The longer-term sustainable harvest is slightly higher than previously forecast (Figure 7-3). This is likely due to the increased area associated with the small-scale owner resource, and the shift in the age-class distribution associated with the higher and more compact near-term harvest volumes. The previous forecast reduced the small-scale owner resource area by 15% for both regions. For this forecast, as discussed in Section 3.1, the small-scale owner resource was increased slightly. Given increased flexibility in the age-class distribution, for the Western Southern North Island, this has resulted in a higher long-term sustainable yield.

**Figure 7-3:**  
**Wood Availability Forecasts (All Radiata Pine): 2014 vs 2021 – Western Southern North Island under Scenario 3**



For Eastern Southern North Island, the difference in the forecasts under Scenario 3 is similar to that seen for the Western Southern North Island, but with a more significant increase in volume over the longer-term (Figure 7-4). Higher volumes are expected over the near-term compared with what was previously forecast, followed by a slightly deeper drop sooner than was previously forecast. Longer-term, the harvest level is then sustainable at a higher level than previously forecast. As mentioned above, this is likely due to the increased area associated with the small-scale owner resource compared with the previous forecast.

**Figure 7-4:**  
**Wood Availability Forecasts (All Radiata Pine): 2014 vs 2021 – Eastern Southern North Island under Scenario 3**

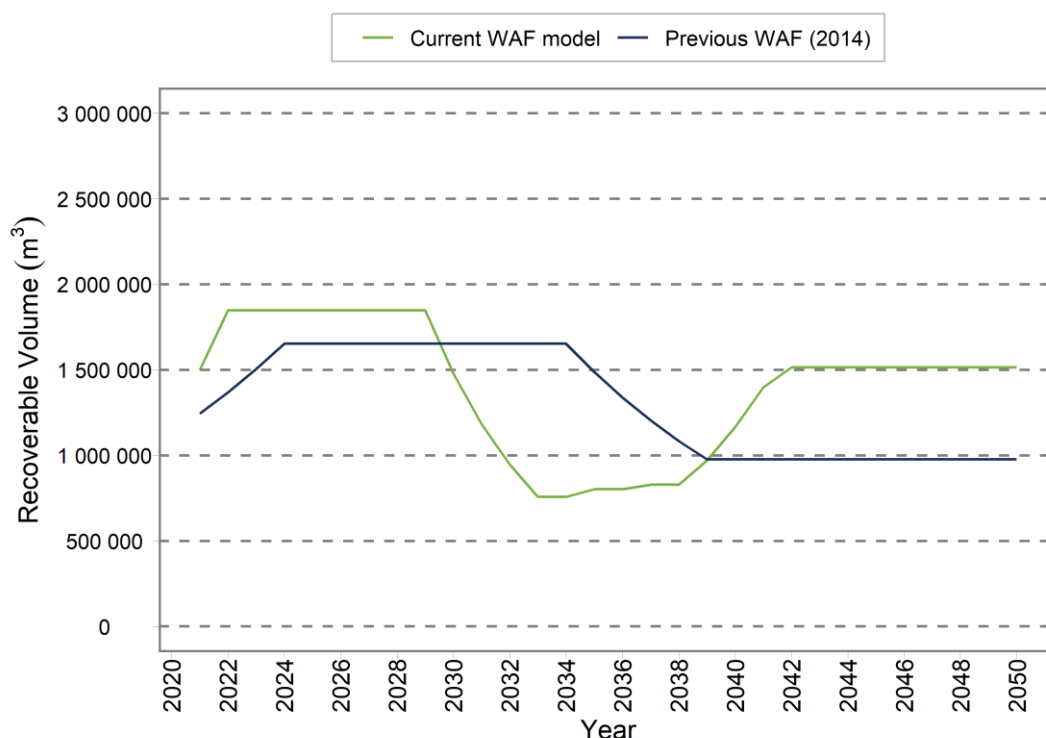


Table 7-1 and The “Productivity” is the area weight average yield from the yield tables at a reference age. The “Annual Sustainable Harvest” is the annual harvest as determined in Scenario 2. “N/A” indicates where the previous wood availability report does not provide that parameter.

Table 7-2 show variations between the current and previous forecasts for Western SNI and Eastern SNI respectively. The variations include the following:

- In both the Western and Eastern Southern North Island there has been an increase in the radiata pine stocked area. This is due to an overall increase in the NEFD radiata pine area<sup>4</sup>, and the adoption of the new percentage adjustments to the forest owners’ resource of less than 1 000 ha. In the previous forecast a 15% reduction was applied to all areas less than 1 000 ha. For this forecast, the Western SNI was increased by 1% and the Eastern Southern North Island was increased by 2% based on the mapping work carried out by the University of Canterbury (see Section 3.1).
- The radiata pine’s target rotation age for the 2014 forecast was 28 years, whereas the target rotation for the 2021 forecast is split between large-scale and small-scale owners to be 30 and 26 years respectively. The shift in rotation ages was based on results obtained from the large forest owners harvest intention survey and feedback from the regional presentations.

<sup>4</sup> See description of Forest Area Development in Section 3.1 and Conclusions in Section 8.

**Table 7-1:**  
**Key Differences between 2014 and 2021 WAF – Western Southern North Island**  
**(Radiata Pine)**

Item	2014 WAF	2021 WAF	Change (%)
Stocked Area (ha)	76 798	81 432	6
Average Age (years)	N/A	19.3	N/A
Productivity (m <sup>3</sup> /ha at age 28)	596	559	-6
Clearfell Age Target (years)	28	26 / 30	N/A
Annual Sustainable Harvest (million m <sup>3</sup> )	1.80	1.63	-9

The “Productivity” is the area weight average yield from the yield tables at a reference age. The “Annual Sustainable Harvest” is the annual harvest as determined in Scenario 2. “N/A” indicates where the previous wood availability report does not provide that parameter.

**Table 7-2:**  
**Key Differences between 2014 and 2021 WAF – Eastern Southern North Island**  
**(Radiata Pine)**

Item	2014 WAF	2021 WAF	Change (%)
Stocked Area (ha)	58 169	71 431	23
Average Age (years)	N/A	17.1	N/A
Productivity (m <sup>3</sup> /ha at age 28)	563	563	0
Clearfell Age Target (years)	28	26 / 30	N/A
Annual Sustainable Harvest (million m <sup>3</sup> )	1.30	1.46	12

The “Productivity” is the area weight average yield from the yield tables at a reference age. The “Annual Sustainable Harvest” is the annual harvest as determined in Scenario 2. “N/A” indicates where the previous wood availability report does not provide that parameter.

## 8 CONCLUSION

Wood availability under Scenario 3 from the Southern North Island wood supply region is expected to continue to increase in the next couple of years to a maximum of 4.4 million m<sup>3</sup>/a. This increase is required to complete the harvesting for the areas planted during the record afforestation years of 1992 to 1995 at a reasonable rotation age. Once the peak of harvesting has been completed, the volume will likely decrease to a low of around 1.4 million m<sup>3</sup>/a then rebound to a sustainable cut of just under 3.2 million m<sup>3</sup>/a. Both the Western and Eastern Southern North Island regions' wood availability is either likely to peak in the next couple of years or may already have peaked. For both regions, the peak is likely to plateau for a period before dropping significantly, then gradually rising again. These fluctuations are largely age-based and smoothing of the peak and dip would result in significant rises in the average harvest age, particularly for the small-scale owners' resource.

Market conditions (e.g. demand from China) and logistical constraints (e.g. trucking and port constraints) will determine the actual rate of harvest increase, and the peak that is reached.

The increase in wood availability in the next couple of years is largely driven by the small-scale owner resource, however, the confidence around the NEFD areas and age-class distribution for these owners is low. Margules Groome has made some adjustment to areas of the owners with less than 1 000 ha – this is to account for a recent mapping study showing a likely slight under-prediction of area for this group of forest owners in the region. These uncertainties will impact the wood availability from the Southern North Island region, particularly in the short term.

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## Appendix 1 - Southern North Island Wood Availability Forecasts for the Period 2021-2060

**Table 1: Southern North Island Wood Availability under Scenario 1**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and target harvest of age 26 (small-scale owners) and 30 (large-scale owners) years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	1 080	2 712	3 792
2022	1 240	10 760	12 000
2023	1 217	7 249	8 466
2024	1 118	2 259	3 377
2025	1 096	1 399	2 495
2026	978	919	1 897
2027	914	726	1 640
2028	982	1 648	2 630
2029	1 076	1 295	2 372
2030	1 032	761	1 793
2031	831	662	1 493
2032	833	356	1 189
2033	807	331	1 138
2034	824	225	1 049
2035	776	1 313	2 089
2036	791	655	1 446
2037	718	866	1 585
2038	748	63	811
2039	646	398	1 044
2040	646	295	941
2041	709	2 512	3 221
2042	735	2 553	3 288
2043	735	2 346	3 081
2044	765	2 121	2 886
2045	765	4 489	5 254
2046	768	1 343	2 112
2047	768	3 110	3 879
2048	817	2 742	3 559
2049	817	10 472	11 289
2050	817	7 258	8 075
2051	817	2 958	3 775
2052	817	1 572	2 389
2053	817	1 316	2 133
2054	817	1 396	2 213
2055	817	2 147	2 964
2056	817	1 695	2 511
2057	817	1 295	2 112
2058	817	769	1 585
2059	817	485	1 302
2060	817	393	1 210

Notes: m<sup>3</sup> = cubic metres inside bark



**Table 2: Southern North Island Wood Availability under Scenario 2**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and total wood availability is modelled at a non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	1 080	1 973	3 054
2022	1 240	1 813	3 054
2023	1 217	1 837	3 054
2024	1 118	1 936	3 054
2025	1 096	1 958	3 054
2026	978	2 076	3 054
2027	914	2 140	3 054
2028	982	2 072	3 054
2029	1 076	1 978	3 054
2030	1 032	2 022	3 054
2031	831	2 223	3 054
2032	846	2 208	3 054
2033	820	2 234	3 054
2034	837	2 217	3 054
2035	789	2 264	3 054
2036	804	2 250	3 054
2037	731	2 323	3 054
2038	761	2 293	3 054
2039	659	2 395	3 054
2040	659	2 395	3 054
2041	659	2 395	3 054
2042	659	2 395	3 054
2043	751	2 303	3 054
2044	796	2 298	3 094
2045	796	2 298	3 094
2046	796	2 298	3 094
2047	796	2 298	3 094
2048	796	2 298	3 094
2049	805	2 289	3 094
2050	809	2 284	3 094
2051	809	2 284	3 094
2052	809	2 284	3 094
2053	809	2 284	3 094
2054	809	2 284	3 094
2055	823	2 271	3 094
2056	827	2 266	3 094
2057	827	2 266	3 094
2058	827	2 266	3 094
2059	827	2 266	3 094
2060	827	2 266	3 094

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 3: Southern North Island Wood Availability under Scenario 3**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield, and total wood availability is modelled at a split non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Pruned (000 m <sup>3</sup> )	Unpruned (000 m <sup>3</sup> )	Pulp Logs (000 m <sup>3</sup> )
2021	1 080	2 712	3 792	680	2 597	515
2022	1 240	3 116	4 356	825	2 955	576
2023	1 217	3 139	4 356	954	2 851	551
2024	1 118	3 239	4 356	872	2 914	570
2025	1 096	3 261	4 356	701	3 053	602
2026	978	3 379	4 356	1 022	2 801	533
2027	914	3 442	4 356	717	3 047	592
2028	982	3 374	4 356	729	3 035	592
2029	1 076	2 779	3 855	706	2 633	516
2030	1 032	2 052	3 084	444	2 216	423
2031	831	1 636	2 467	320	1 799	348
2032	834	1 140	1 974	339	1 372	262
2033	808	771	1 579	204	1 150	225
2034	825	590	1 415	303	930	182
2035	778	682	1 460	293	976	191
2036	793	667	1 460	241	1 017	202
2037	719	767	1 486	190	1 074	222
2038	749	842	1 591	293	1 082	215
2039	647	1 239	1 887	355	1 262	270
2040	647	1 617	2 264	400	1 537	327
2041	750	1 966	2 717	358	1 934	424
2042	750	2 134	2 884	503	1 965	416
2043	750	2 134	2 884	471	2 003	411
2044	750	2 134	2 884	198	2 218	468
2045	750	2 134	2 884	280	2 162	443
2046	750	2 415	3 165	332	2 339	494
2047	750	2 415	3 165	247	2 406	512
2048	750	2 415	3 165	222	2 423	521
2049	750	2 415	3 165	238	2 416	511
2050	750	2 415	3 165	164	2 471	529
2051	750	2 415	3 165	230	2 418	517
2052	750	2 415	3 165	194	2 449	522
2053	750	2 415	3 165	241	2 413	511
2054	794	2 371	3 165	219	2 433	513
2055	846	2 319	3 165	186	2 465	514
2056	846	2 319	3 165	186	2 462	517
2057	846	2 319	3 165	334	2 344	487
2058	846	2 319	3 165	227	2 431	507
2059	846	2 319	3 165	249	2 414	502
2060	846	2 319	3 165	266	2 408	491

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 4: Southern North Island Wood Availability under Scenario 4**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield, and total wood availability is modelled at a split non-declining yield with target rotation ages of 26/30, - 2 years and + 2 years)

Year Ending December	Recoverable Volume Target Age - 2 (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age + 2 (000 m <sup>3</sup> )	Average Age (Years)
2021	3 792	30	3 792	29	3 792	30
2022	4 759	30	4 356	29	4 337	30
2023	4 759	29	4 356	29	4 386	30
2024	4 759	30	4 356	29	4 386	30
2025	4 759	29	4 356	29	4 386	29
2026	4 759	29	4 356	30	4 386	29
2027	4 759	28	4 356	29	4 386	29
2028	4 206	28	4 356	29	4 386	29
2029	3 365	29	3 855	30	3 878	29
2030	2 692	29	3 084	31	3 103	30
2031	2 153	27	2 467	30	2 482	29
2032	1 723	28	1 974	31	1 986	29
2033	1 542	28	1 579	30	1 589	30
2034	1 542	28	1 415	29	1 422	30
2035	1 542	27	1 460	29	1 422	30
2036	1 617	27	1 460	29	1 422	30
2037	1 940	26	1 486	28	1 422	30
2038	2 328	26	1 591	28	1 422	30
2039	2 686	25	1 887	27	1 529	29
2040	2 935	25	2 264	27	1 758	29
2041	2 953	25	2 717	26	2 023	28
2042	2 953	25	2 884	26	2 427	28
2043	2 953	25	2 884	26	2 635	28
2044	2 953	25	2 884	26	2 868	28
2045	2 953	25	2 884	26	3 114	28
2046	2 953	25	3 165	26	3 114	28
2047	2 953	25	3 165	27	3 114	28
2048	2 953	25	3 165	27	3 114	28
2049	2 953	25	3 165	27	3 114	28
2050	2 953	25	3 165	27	3 114	28
2051	2 953	25	3 165	27	3 114	28
2052	2 953	25	3 165	27	3 114	28
2053	2 953	25	3 165	27	3 114	28
2054	2 953	25	3 165	27	3 114	29
2055	2 953	25	3 165	27	3 114	29
2056	2 953	25	3 165	27	3 114	29
2057	2 953	25	3 165	27	3 114	29
2058	2 953	25	3 165	28	3 114	29
2059	2 953	25	3 165	28	3 114	29
2060	2 953	25	3 165	29	3 114	29

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 5: Southern North Island Wood Availability for Douglas-fir**

(Assumes that large-scale owners harvest at stated intentions with yield regulated and a target rotation age of 40 years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Average Age (Years)
2021	77	0	77	53
2022	44	2	46	53
2023	59	14	73	54
2024	50	0	50	55
2025	50	0	50	57
2026	50	0	50	58
2027	50	0	50	59
2028	50	0	50	60
2029	1	1	2	38
2030	0	0	0	0
2031	0	100	100	37
2032	6	8	13	37
2033	5	9	13	37
2034	27	12	38	37
2035	50	0	50	36
2036	50	6	56	37
2037	50	5	55	38
2038	0	20	20	40
2039	50	15	65	40
2040	42	0	42	40
2041	18	4	22	40
2042	0	24	24	40
2043	19	16	35	40
2044	50	11	61	40
2045	50	4	54	40
2046	50	22	72	40
2047	8	23	31	40
2048	0	6	6	40
2049	0	1	1	40
2050	0	55	55	40
2051	0	90	90	40
2052	0	13	13	40
2053	0	0	0	0
2054	0	65	65	40
2055	0	406	406	40
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0

Notes: m<sup>3</sup> = cubic metres inside bark

## Appendix 2 - Western SNI Wood Availability Forecasts for the Period 2021-2060

**Table 1: Western SNI Wood Availability under Scenario 1**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and target harvest age of 26 (small-scale owners) and 30 (large-scale owners) years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	482	1 983	2 465
2022	492	5 508	6 000
2023	501	5 499	6 000
2024	516	1 391	1 906
2025	405	1 022	1 426
2026	383	599	983
2027	367	339	706
2028	373	1 110	1 483
2029	361	987	1 348
2030	414	450	864
2031	403	322	725
2032	350	210	560
2033	324	244	568
2034	341	95	436
2035	294	654	947
2036	309	393	701
2037	235	253	488
2038	265	63	328
2039	163	335	498
2040	163	202	365
2041	227	1 810	2 036
2042	252	1 260	1 512
2043	252	1 303	1 555
2044	252	1 074	1 327
2045	252	1 420	1 672
2046	256	557	813
2047	256	2 697	2 952
2048	304	2 026	2 330
2049	304	5 103	5 407
2050	304	4 954	5 258
2051	304	1 714	2 018
2052	304	1 139	1 444
2053	304	797	1 102
2054	304	658	962
2055	304	1 278	1 582
2056	304	1 179	1 484
2057	304	579	883
2058	304	382	686
2059	304	281	585
2060	304	283	588

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 2: Western SNI Wood Availability under Scenario 2**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and total wood availability is modelled at a non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	482	1 150	1 632
2022	492	1 139	1 632
2023	501	1 131	1 632
2024	516	1 116	1 632
2025	405	1 227	1 632
2026	383	1 248	1 632
2027	367	1 265	1 632
2028	373	1 259	1 632
2029	361	1 270	1 632
2030	414	1 218	1 632
2031	403	1 229	1 632
2032	350	1 282	1 632
2033	324	1 308	1 632
2034	341	1 291	1 632
2035	294	1 338	1 632
2036	309	1 323	1 632
2037	235	1 396	1 632
2038	265	1 367	1 632
2039	163	1 469	1 632
2040	163	1 469	1 632
2041	163	1 469	1 632
2042	163	1 469	1 632
2043	255	1 377	1 632
2044	300	1 332	1 632
2045	300	1 332	1 632
2046	300	1 332	1 632
2047	300	1 332	1 632
2048	300	1 332	1 632
2049	309	1 323	1 632
2050	313	1 318	1 632
2051	313	1 318	1 632
2052	313	1 318	1 632
2053	313	1 318	1 632
2054	313	1 318	1 632
2055	313	1 318	1 632
2056	313	1 318	1 632
2057	313	1 318	1 632
2058	313	1 318	1 632
2059	313	1 318	1 632
2060	313	1 318	1 632

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 3: Western SNI Wood Availability under Scenario 3**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield, and total wood availability is modelled at a split non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Pruned (000 m <sup>3</sup> )	Unpruned (000 m <sup>3</sup> )	Pulp Logs (000 m <sup>3</sup> )
2021	482	1 810	2 292	389	1 590	313
2022	492	2 016	2 508	411	1 755	342
2023	501	2 007	2 508	427	1 739	342
2024	516	1 993	2 508	391	1 771	347
2025	405	2 104	2 508	356	1 804	348
2026	383	2 125	2 508	439	1 735	335
2027	367	2 141	2 508	405	1 765	338
2028	373	2 135	2 508	324	1 829	356
2029	361	1 645	2 007	328	1 405	273
2030	414	1 191	1 605	208	1 175	222
2031	403	881	1 284	131	968	185
2032	350	678	1 027	145	744	139
2033	324	498	822	87	617	118
2034	341	317	658	91	473	93
2035	294	364	658	48	510	100
2036	309	349	658	44	513	101
2037	235	422	658	49	508	100
2038	265	498	763	62	583	117
2039	163	752	915	164	621	130
2040	163	935	1 098	171	772	155
2041	266	1 052	1 318	217	915	185
2042	266	1 104	1 370	206	968	196
2043	266	1 104	1 370	129	1 036	206
2044	266	1 104	1 370	126	1 041	204
2045	266	1 104	1 370	16	1 125	230
2046	266	1 385	1 651	210	1 194	247
2047	266	1 385	1 651	69	1 315	267
2048	266	1 385	1 651	116	1 276	259
2049	266	1 385	1 651	54	1 330	267
2050	266	1 385	1 651	71	1 315	265
2051	266	1 385	1 651	97	1 294	261
2052	266	1 385	1 651	54	1 330	267
2053	266	1 385	1 651	86	1 303	262
2054	310	1 342	1 651	60	1 327	265
2055	310	1 342	1 651	3	1 375	273
2056	310	1 342	1 651	87	1 305	259
2057	310	1 342	1 651	164	1 241	246
2058	310	1 342	1 651	125	1 275	251
2059	310	1 342	1 651	162	1 246	244
2060	310	1 342	1 651	143	1 265	244

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 4: Western SNI Wood Availability under Scenario 4**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield,  
and total wood availability is modelled at a split non-declining yield with target rotation ages of 26/30,  
- 2 years and + 2 years)

Year Ending December	Recoverable Volume Target Age - 2 (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age + 2 (000 m <sup>3</sup> )	Average Age (Years)
2021	2 292	30	2 292	28	2 292	31
2022	2 765	29	2 508	29	2 537	29
2023	2 765	30	2 508	28	2 537	30
2024	2 765	29	2 508	29	2 537	29
2025	2 765	29	2 508	29	2 537	29
2026	2 765	29	2 508	30	2 537	29
2027	2 765	28	2 508	29	2 537	28
2028	2 212	28	2 508	28	2 537	28
2029	1 770	28	2 007	29	2 030	28
2030	1 416	28	1 605	30	1 624	29
2031	1 133	27	1 284	29	1 299	29
2032	906	26	1 027	31	1 039	29
2033	725	27	822	29	831	29
2034	725	27	658	28	665	29
2035	725	26	658	27	665	29
2036	728	27	658	27	665	29
2037	874	26	658	27	665	28
2038	1 049	25	763	27	665	28
2039	1 247	25	915	27	665	28
2040	1 496	25	1 098	26	746	29
2041	1 514	25	1 318	26	809	28
2042	1 514	25	1 370	26	970	28
2043	1 514	25	1 370	26	1 165	28
2044	1 514	25	1 370	26	1 397	28
2045	1 514	24	1 370	26	1 644	28
2046	1 514	24	1 651	25	1 644	27
2047	1 514	24	1 651	26	1 644	28
2048	1 514	24	1 651	26	1 644	28
2049	1 514	24	1 651	26	1 644	28
2050	1 514	25	1 651	26	1 644	28
2051	1 514	25	1 651	26	1 644	28
2052	1 514	25	1 651	26	1 644	28
2053	1 514	25	1 651	26	1 644	28
2054	1 514	25	1 651	27	1 644	28
2055	1 514	25	1 651	27	1 644	28
2056	1 514	25	1 651	27	1 644	29
2057	1 514	25	1 651	27	1 644	29
2058	1 514	25	1 651	27	1 644	29
2059	1 514	25	1 651	28	1 644	29
2060	1 514	25	1 651	29	1 644	29

Notes: m<sup>3</sup> = cubic metres inside bark



**Table 5: West SNI Wood Availability for Douglas-fir**

(Assumes that large-scale owners harvest at stated intentions with yield regulated and a target rotation age of 40 years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Average Age (Years)
2021	47	0	47	52
2022	14	2	16	51
2023	50	0	50	55
2024	50	0	50	55
2025	50	0	50	57
2026	50	0	50	58
2027	50	0	50	59
2028	50	0	50	60
2029	1	0	1	39
2030	0	0	0	0
2031	0	100	100	37
2032	6	8	13	37
2033	5	9	13	37
2034	27	12	38	37
2035	50	0	50	36
2036	50	6	56	37
2037	50	0	50	38
2038	0	0	0	0
2039	50	7	57	40
2040	42	0	42	40
2041	18	3	21	40
2042	0	17	17	40
2043	19	15	33	40
2044	50	10	60	40
2045	50	4	54	40
2046	50	22	72	40
2047	8	23	31	40
2048	0	6	6	40
2049	0	0	0	0
2050	0	55	55	40
2051	0	90	90	40
2052	0	13	13	40
2053	0	0	0	0
2054	0	65	65	40
2055	0	387	387	40
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0

Notes: m<sup>3</sup> = cubic metres inside bark

### Appendix 3 - Eastern SNI Wood Availability Forecasts for the Period 2021-2060

**Table 1: Eastern SNI Wood Availability under Scenario 1**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and target harvest of age 26 (small-scale owners) and 30 (large-scale owners) years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	599	728	1 327
2022	748	5 252	6 000
2023	716	1 750	2 466
2024	602	869	1 471
2025	691	378	1 068
2026	595	320	914
2027	547	387	934
2028	609	538	1 147
2029	715	308	1 023
2030	618	311	929
2031	428	340	768
2032	483	146	628
2033	483	87	570
2034	483	131	614
2035	483	659	1 142
2036	483	262	745
2037	483	614	1 097
2038	483	0	483
2039	483	63	546
2040	483	93	576
2041	483	702	1 185
2042	483	1 293	1 776
2043	483	1 043	1 526
2044	513	1 047	1 559
2045	513	3 070	3 583
2046	513	786	1 299
2047	513	414	926
2048	513	716	1 229
2049	513	5 370	5 882
2050	513	2 304	2 817
2051	513	1 244	1 757
2052	513	432	945
2053	513	519	1 031
2054	513	738	1 251
2055	513	869	1 381
2056	513	515	1 028
2057	513	716	1 229
2058	513	386	899
2059	513	205	717
2060	513	110	623

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 2: Eastern SNI Wood Availability under Scenario 2**

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and total wood availability is modelled at a non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )
2021	599	823	1 422
2022	748	674	1 422
2023	716	706	1 422
2024	602	820	1 422
2025	691	731	1 422
2026	595	828	1 422
2027	547	875	1 422
2028	609	813	1 422
2029	715	707	1 422
2030	618	804	1 422
2031	428	994	1 422
2032	496	926	1 422
2033	496	926	1 422
2034	496	926	1 422
2035	496	926	1 422
2036	496	926	1 422
2037	496	926	1 422
2038	496	926	1 422
2039	496	926	1 422
2040	496	926	1 422
2041	496	926	1 422
2042	496	926	1 422
2043	496	926	1 422
2044	496	966	1 462
2045	496	966	1 462
2046	496	966	1 462
2047	496	966	1 462
2048	496	966	1 462
2049	496	966	1 462
2050	496	966	1 462
2051	496	966	1 462
2052	496	966	1 462
2053	496	966	1 462
2054	496	966	1 462
2055	509	953	1 462
2056	514	948	1 462
2057	514	948	1 462
2058	514	948	1 462
2059	514	948	1 462
2060	514	948	1 462

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 3: Eastern SNI Wood Availability under Scenario 3**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield, and total wood availability is modelled at a split non-declining yield)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Pruned (000 m <sup>3</sup> )	Unpruned (000 m <sup>3</sup> )	Pulp Logs (000 m <sup>3</sup> )
2021	599	901	1 500	291	1 007	202
2022	748	1 100	1 848	414	1 201	234
2023	716	1 132	1 848	527	1 112	208
2024	602	1 246	1 848	481	1 144	223
2025	691	1 157	1 848	345	1 249	254
2026	595	1 254	1 848	584	1 066	198
2027	547	1 301	1 848	312	1 282	254
2028	609	1 239	1 848	405	1 206	236
2029	715	1 133	1 848	377	1 228	243
2030	618	861	1 478	236	1 041	202
2031	428	755	1 183	189	832	162
2032	484	462	946	194	628	124
2033	484	273	757	117	533	107
2034	484	273	757	211	457	89
2035	484	318	802	245	466	91
2036	484	318	802	197	504	101
2037	484	344	828	141	565	122
2038	484	344	828	231	500	98
2039	484	487	971	191	640	140
2040	484	682	1 166	228	765	172
2041	484	915	1 399	141	1 019	239
2042	484	1 030	1 514	297	996	220
2043	484	1 030	1 514	342	967	205
2044	484	1 030	1 514	73	1 177	264
2045	484	1 030	1 514	263	1 037	213
2046	484	1 030	1 514	122	1 145	247
2047	484	1 030	1 514	178	1 091	245
2048	484	1 030	1 514	105	1 147	262
2049	484	1 030	1 514	184	1 086	244
2050	484	1 030	1 514	93	1 156	265
2051	484	1 030	1 514	134	1 124	256
2052	484	1 030	1 514	140	1 119	255
2053	484	1 030	1 514	155	1 110	249
2054	484	1 030	1 514	159	1 106	249
2055	537	977	1 514	184	1 090	240
2056	537	977	1 514	99	1 157	258
2057	537	977	1 514	170	1 103	241
2058	537	977	1 514	102	1 156	255
2059	537	977	1 514	87	1 168	259
2060	537	977	1 514	123	1 144	247

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 4: Eastern SNI Wood Availability under Scenario 4**

(Assumes that large-scale owners harvest at stated intentions then at non-declining yield,  
and total wood availability is modelled at a split non-declining yield with target rotation ages of 26/30,  
- 2 years and + 2 years)

Year Ending December	Recoverable Volume Target Age - 2 (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age (000 m <sup>3</sup> )	Average Age (Years)	Recoverable Volume Target Age + 2 (000 m <sup>3</sup> )	Average Age (Years)
2021	1 500	29	1 500	30	1 500	29
2022	1 994	30	1 848	30	1 800	30
2023	1 994	29	1 848	30	1 849	29
2024	1 994	30	1 848	30	1 849	30
2025	1 994	30	1 848	30	1 849	30
2026	1 994	29	1 848	29	1 849	29
2027	1 994	29	1 848	30	1 849	30
2028	1 994	28	1 848	30	1 849	29
2029	1 595	30	1 848	30	1 849	30
2030	1 276	30	1 478	32	1 479	31
2031	1 021	28	1 183	31	1 183	30
2032	817	31	946	30	947	30
2033	817	30	757	31	757	30
2034	817	29	757	31	757	30
2035	817	28	802	30	757	30
2036	888	27	802	30	757	30
2037	1 066	26	828	28	757	30
2038	1 279	26	828	28	757	30
2039	1 439	25	971	27	864	30
2040	1 439	25	1 166	27	1 012	29
2041	1 439	25	1 399	26	1 214	28
2042	1 439	25	1 514	26	1 457	28
2043	1 439	25	1 514	26	1 470	28
2044	1 439	25	1 514	26	1 470	29
2045	1 439	25	1 514	27	1 470	29
2046	1 439	25	1 514	27	1 470	28
2047	1 439	25	1 514	27	1 470	28
2048	1 439	25	1 514	27	1 470	29
2049	1 439	25	1 514	27	1 470	29
2050	1 439	25	1 514	27	1 470	29
2051	1 439	25	1 514	27	1 470	29
2052	1 439	25	1 514	27	1 470	29
2053	1 439	25	1 514	27	1 470	29
2054	1 439	25	1 514	27	1 470	29
2055	1 439	25	1 514	27	1 470	29
2056	1 439	25	1 514	28	1 470	29
2057	1 439	25	1 514	28	1 470	29
2058	1 439	25	1 514	28	1 470	29
2059	1 439	25	1 514	28	1 470	29
2060	1 439	25	1 514	29	1 470	29

Notes: m<sup>3</sup> = cubic metres inside bark

**Table 5: Eastern SNI Wood Availability for Douglas-fir**

(Assumes that large-scale owners harvest at stated intentions with yield regulated and a target rotation age of 40 years)

Year Ending December	Large-Scale Owners (000 m <sup>3</sup> )	Small-Scale Owners (000 m <sup>3</sup> )	All Owners (000 m <sup>3</sup> )	Average Age (Years)
2021	30	0	30	53
2022	30	0	30	54
2023	9	14	23	52
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	1	1	36
2030	0	0	0	0
2031	0	0	0	0
2032	0	0	0	0
2033	0	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0
2037	0	5	5	40
2038	0	20	20	40
2039	0	9	9	40
2040	0	0	0	0
2041	0	1	1	40
2042	0	6	6	40
2043	0	1	1	40
2044	0	1	1	40
2045	0	0	0	0
2046	0	0	0	0
2047	0	0	0	0
2048	0	0	0	0
2049	0	1	1	40
2050	0	0	0	0
2051	0	0	0	0
2052	0	0	0	0
2053	0	0	0	0
2054	0	0	0	0
2055	0	19	19	40
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0

Notes: m<sup>3</sup> = cubic metres inside bark