



Ministry for Primary Industries

# Wood Availability Forecast – West Coast 2021

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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 1 – West Coast Wood Availability Forecast from 2021 to 2060

## 1 INTRODUCTION

This report presents the findings of a wood availability study for the West Coast 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 1 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 the West Coast region 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

Due to the limited resource in the region, two wood availability scenarios have been modelled for radiata pine and one for Douglas-fir on the West Coast. These scenarios show the range of potential ways the forests in the West Coast region could be harvested in the future.

There are around 7 998 ha of species other than radiata pine and Douglas-fir in the West Coast region. The volumes from these species are not included in this 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 27

Large-scale owners' wood availability is based on stated harvest intentions for the period 2021 to 2030 (calendar year estimates, 10-years only). After 2030, the modelling assumption is that the wood availability from large-scale owners will not decrease. Small-scale owners are assumed to harvest their forest holdings at age 27.

### 2.2 Scenario 2: Non-declining Yield (NDY) – Target Rotation 27 Years

Large-scale owners' wood availability is assumed to be at stated harvest intentions for the period 2021 to 2030. After 2030, 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 for Douglas-fir

The large-scale resources are harvested at stated intentions up until 2040. The total Douglas-fir volume from all owners is limited to 60 000 cubic metres per year.

### 2.4 Discussion of Radiata Pine Scenarios

In Scenario 1, the forests owned by small-scale owners are assumed to be harvested at age 27. 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 West Coast 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.

Scenario 2 is based on yield regulation and avoids 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. This can lead to large fluctuations in the average rotation ages and may not be a realistic outcome. Regardless, for the

limited area within the West Coast region, this scenario is considered the most realistic given the age-class distribution and modelling constraints.

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.

There is likely some error in the NEFD data for 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.

Around 9% of the West Coast region 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 West Coast region, Margules Groome has made the following adjustments:

- 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 11% deforestation<sup>1</sup>) 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.

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<sup>1</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).

### 3.2 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 West Coast, no adjustments were made to the 2015 NEFD yield tables.

### 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 87% of the total NEFD area. Inclusion of the actual intended harvest level 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.

### 3.4 Modelling Assumptions

In addition to the modelling assumptions specific to each scenario, the wood availability forecast for the West Coast 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 is added to the model area based on MPI data. For the West Coast region there was no area awaiting restocking. All areas are replanted, with a regeneration lag of one year. Replanting rules are as follows:
  - Large-scale forest owners:
    - All areas are replanted into radiata pine.
    - All pruned areas will be replanted to an unpruned regime.
  - Small-scale forest owners:
    - All areas are replanted into radiata pine.
    - All pruned areas will be replanted to an unpruned regime.

**4 WOOD AVAILABILITY FORECASTS FOR WEST COAST**

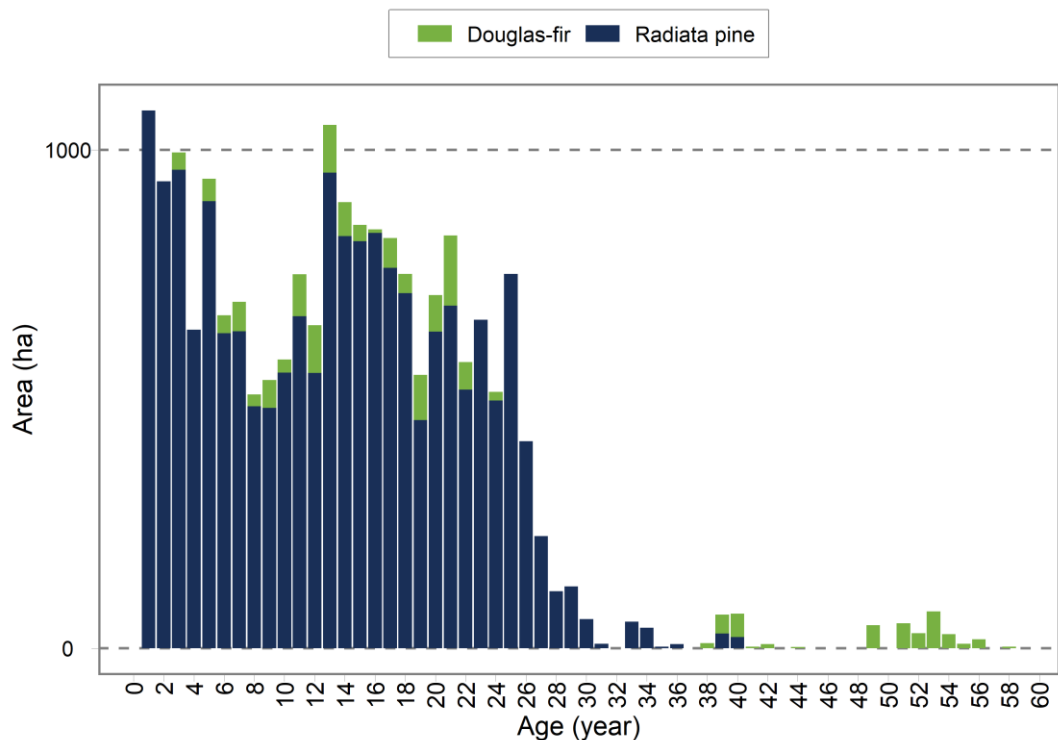
**4.1 West Coast Region Area Description**

The West Coast region has a plantation resource of 30 157 ha. Of this, 20 620 ha consists of radiata pine, and 1 539 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 28 503 ha.

The modelled resource consists entirely of radiata pine and Douglas-fir. Large-scale owners held 87% of the modelled resources, and small-scale owners held 13%. Due to the limited number of large-scale owners in the region, the results of the modelling have been aggregated by ownership.

Figure 4-1 shows the age-class distribution for the West Coast by species. Most of the estate is radiata pine, of which 24% is recorded as managed under a pruned regime. A small amount of production thinning is undertaken in the West Coast region, mostly by one of the large-scale owners and has been modelled where appropriate.

**Figure 4-1: West Coast Modelled Age-class Distribution by Species**



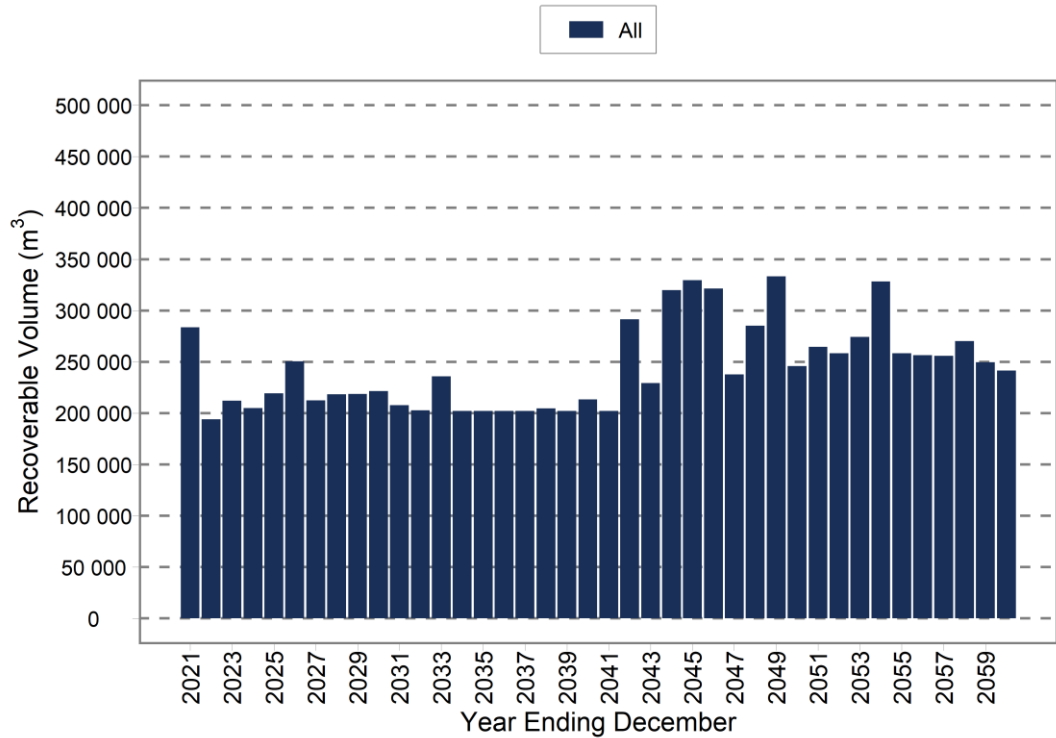
**4.2 Scenario 1**

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 27.

The wood availability from all owners in the West Coast region under Scenario 1 is presented in Figure 4-2. 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 4-2:  
West Coast Radiata Pine Availability from All Owners under Scenario 1**



**4.3 Scenario 2**

The Scenario 2 model assumes large-scale owners’ resources are harvested in-line with their harvesting intentions between 2021 and 2041, and then a non-declining yield constraint is applied after 2041. The total yield for all owners has been regulated using a non-declining yield constraint. Figure 4-3 shows the radiata pine availability for all owners under Scenario 2.

**Figure 4-3:  
West Coast Radiata Pine Availability from All Owners under Scenario 2**

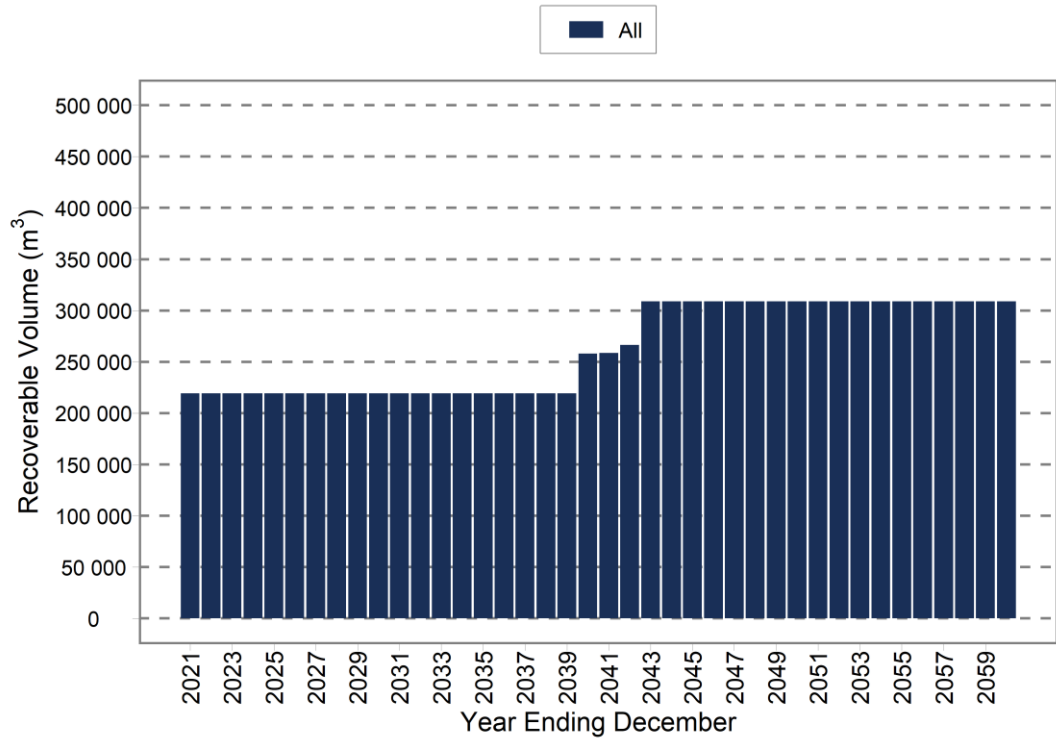
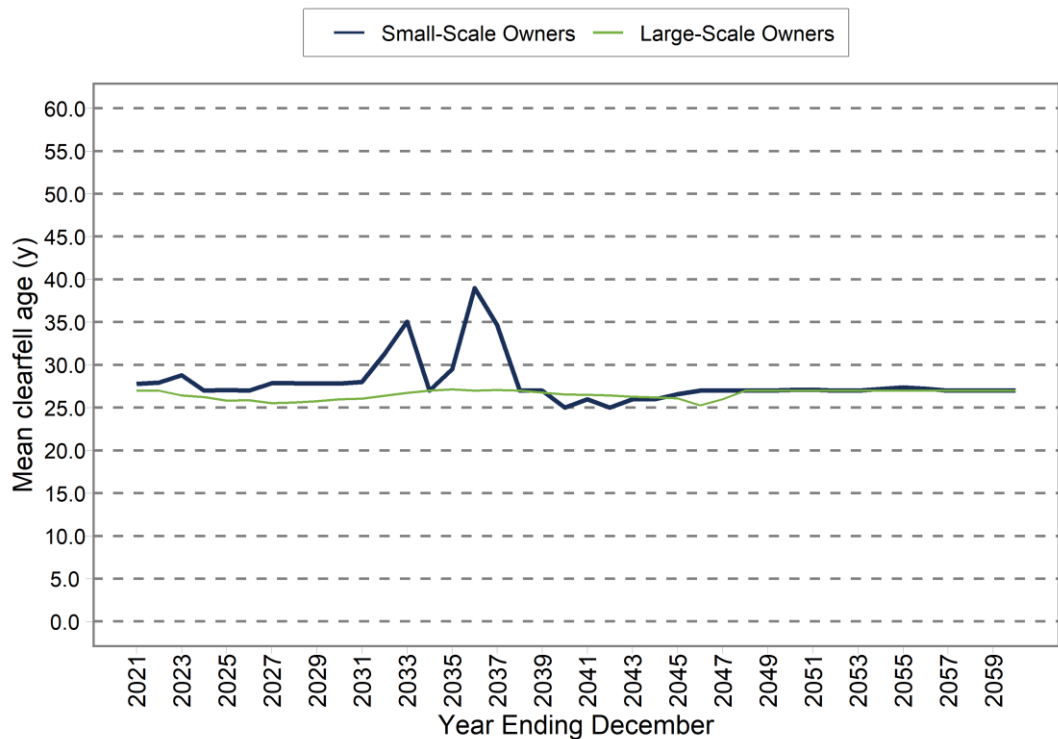


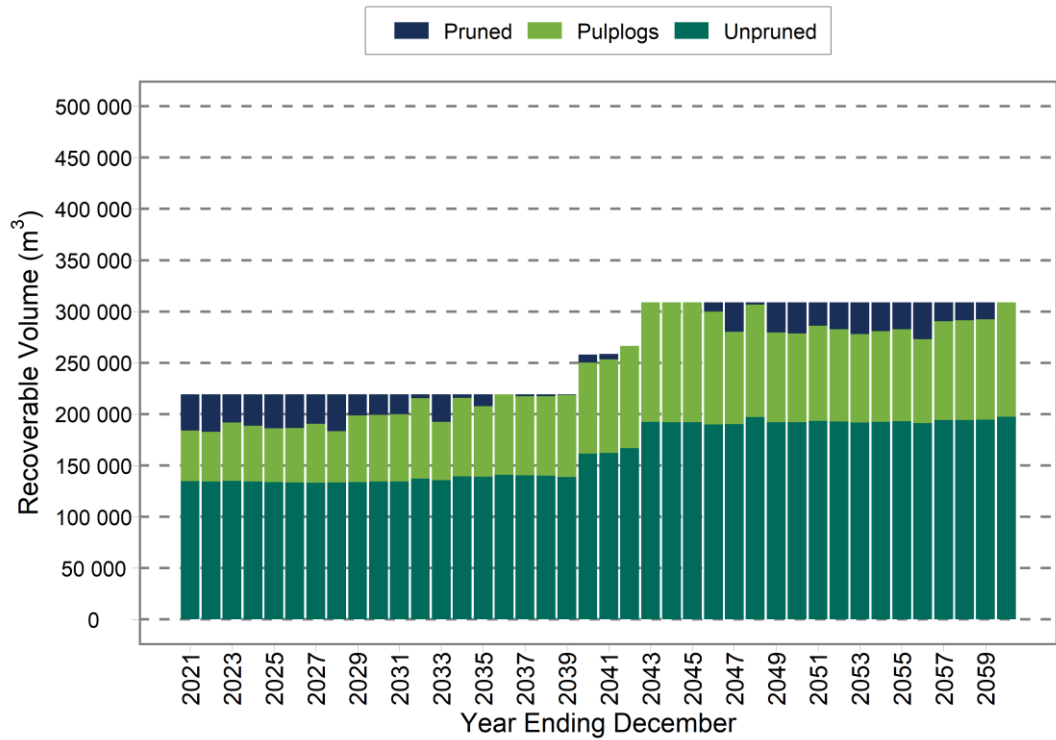
Figure 4-4 shows that the harvest age varies from the target rotation of 27 years, particularly for small-scale forest owners, under the constraints of Scenario 2. This is unavoidable without fluctuations in the harvest level similar to that in Scenario 1.

**Figure 4-4:  
West Coast Average Radiata Pine Clearfell Age under Scenario 2**



The harvest volume forecast under Scenario 2 is shown by log grade in Figure 4-5.

**Figure 4-5:  
West Coast Radiata Pine Availability by Log Grade under Scenario 2**

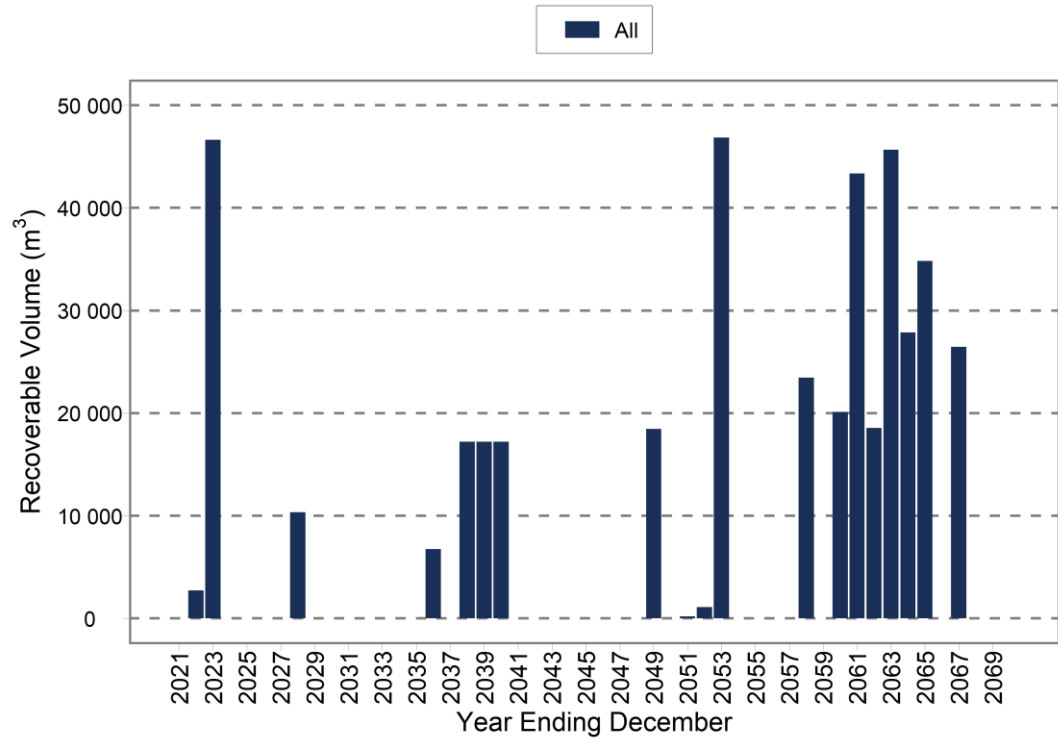


**4.4 Douglas-fir**

The area of Douglas-fir in West Coast is 1 539 ha. The age-class distribution of Douglas-fir in the West Coast region is uneven. The model requires all Douglas-fir area to be replanted into radiata pine.

The Douglas-fir harvest for the large-scale owners’ estate is based on intentions for 2021 to 2040. From 2040, the wood availability from all owners is limited to an upper limit of 60 000 m<sup>3</sup> per year (Figure 4-6). The target rotation age is 50 years for all owners.

**Figure 4-6:  
West Coast Douglas-fir Availability from All Owners**





## 5 CONCLUSION

Wood availability from the West Coast wood supply region is expected to be relatively smooth going forward, increasing from around 220 000 m<sup>3</sup>/a over the near term to around 300 000 m<sup>3</sup>/a over the longer term, with small and sporadic volumes of Douglas-fir available as the resource matures.

Market conditions (e.g. demand from China) and logistical constraints (e.g. trucking and harvest crew constraints) will determine the actual rate of harvest. Any delay of the harvest will lead to an increase in the average rotation age, particularly for the small-scale owner resource.

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## Appendix - West Coast Wood Availability Forecasts for the Period 2021-2060

**Table 1: West Coast 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 27 years)

Year Ending December	All Owners (000 m <sup>3</sup> )
2021	284
2022	194
2023	212
2024	205
2025	219
2026	251
2027	212
2028	218
2029	219
2030	222
2031	208
2032	203
2033	236
2034	202
2035	202
2036	202
2037	202
2038	205
2039	202
2040	213
2041	202
2042	291
2043	229
2044	320
2045	330
2046	321
2047	238
2048	285
2049	333
2050	246
2051	265
2052	258
2053	274
2054	328
2055	258
2056	257
2057	256
2058	270
2059	250
2060	242

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

**Table 2: West Coast 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	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	219	35	135	49
2022	219	36	134	49
2023	219	27	135	57
2024	219	30	134	54
2025	219	33	134	52
2026	219	33	134	53
2027	219	29	133	57
2028	219	36	134	50
2029	219	21	134	65
2030	219	20	135	65
2031	219	19	135	66
2032	219	4	137	79
2033	219	27	136	57
2034	219	3	140	76
2035	219	12	139	69
2036	219	0	141	78
2037	219	2	140	77
2038	219	2	140	77
2039	219	1	139	80
2040	258	8	162	89
2041	259	5	162	91
2042	267	0	167	100
2043	309	0	193	116
2044	309	0	192	117
2045	309	0	192	117
2046	309	9	190	110
2047	309	29	190	90
2048	309	2	197	110
2049	309	29	192	87
2050	309	30	192	86
2051	309	23	194	93
2052	309	26	193	90
2053	309	31	192	86
2054	309	28	193	88
2055	309	26	193	90
2056	309	36	191	82
2057	309	19	194	96
2058	309	18	194	97
2059	309	17	195	98
2060	309	0	198	111

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

**Table 3: West Coast Wood Availability for Douglas-fir**

(Assumes that large-scale owners harvest at stated intentions with yield regulated and a target rotation age of 50 years)

Year Ending	All	Average
December	Owners (000 m <sup>3</sup> )	Age (Years)
2021	53	40
2022	19	40
2023	30	40
2024	9	40
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	10	35
2031	0	0
2032	0	0
2033	0	0
2034	5	37
2035	2	37
2036	9	36
2037	9	35
2038	0	0
2039	0	0
2040	0	0
2041	1	40
2042	6	40
2043	11	40
2044	1	40
2045	1	40
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0
2051	0	0
2052	31	40
2053	0	0
2054	0	0
2055	0	0
2056	0	0
2057	46	40
2058	178	40
2059	0	0
2060	0	0

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