

FINAL REPORT

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Ministry for Primary Industries

Wood Availability Forecast – East Coast 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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1 INTRODUCTION

This report presents the findings of a wood availability study for the East 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 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 East 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 forecasts.

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 and one for Douglas-fir. These scenarios show the range of potential ways the forests in the 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 East Coast wood supply region. Their feedback was considered in the final derived profiles.

There are around 2 463 ha of species other than radiata pine and Douglas-fir in the East 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 31

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 31.

2.2 Scenario 2: Non-declining Yield (NDY) – Target Rotation 31 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 3: Split NDY – Target Rotation 31 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:

Year	Large-scale Owners	All
2021-2028	Harvest intentions	NDY, 10% increase/decrease
2028-2046	Harvest intentions then NDY	10% increase/decrease
>2036	NDY	NDY
>2022		<4.5 million

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 4B it is increased by two years.



2.5 Scenario for Douglas-fir

The large-scale resources are harvested at stated intentions up until 2022. The total Douglas-fir volume from large-scale owners is limited to 50 000 cubic metres per year.

2.6 Discussion of Radiata Pine Scenarios

In Scenario 1, the forests owned by small-scale owners are assumed to be harvested at age 31. 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 East 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.

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 East Coast (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 2018 for the East Coast¹ showed that the small-scale owners' resource NEFD area was overstated (specifically those with less than 1 000 ha). Of the small-scale owners with less than 1 000 ha, the study showed a mapped area that was 83% of the area reported in the NEFD indicating a significant 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 East Coast region has a portion of the area (~11%) 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 East Coast region, Margules Groome has made the following adjustments:

1. The "New Planting Imputations" and "2004 Small Forest Owner Survey" areas have been reduced so that the total area of the small-scale owners' resource less than 1 000 ha is 83% of the area of the reported NEFD as at 1 April 2020.

¹ 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.





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 2% deforestation²) 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 croptypes (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^3/ha) calculated from the large-scale owners' harvest intentions. In the case of East Coast, no adjustments were made to the 2015 NEFD yield tables.

² 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 53% of the total 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.







3.4 Modelling Assumptions

In addition to the modelling assumptions specific to each scenario, the wood availability forecast for the East 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 noncommercial 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 2 475 ha 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:
 - Large-scale forest owners:
 - All areas are replanted into radiata pine.
 - One hundred percent of all pruned areas will be replanted into an unpruned regime.
 - Small-scale forest owners:
 - All areas are replanted into radiata pine.
 - Fifty percent of all pruned areas will be replanted as a pruned regime with 50% transferring to an unpruned regime.
- Three percent of the area of first rotation stands are not replanted.
- The total harvest for 2021 has been constrained to be no greater than 3.12 million m³.
- The model assumes no future afforestation and deforestation.



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4 WOOD AVAILABILITY FORECASTS FOR EAST COAST

4.1 East Coast Region Area Description

The East Coast region has a plantation resource of 155 359 ha. Of this, 150 806 ha consists of radiata pine, and 2 090 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 139 480 ha.

The modelled resource consists entirely of radiata pine and Douglas-fir. Figure 4-1 shows the age-class distribution for the East Coast estate by owner size. Large-scale owners held 53% of the modelled resources, and small-scale owners held 47%.

Figure 4-2 shows the age-class distribution for the East Coast by species. Most of the estate is radiata pine, of which 63% is recorded as managed under a pruned regime. A small amount of production thinning is undertaken in the East Coast region, mostly by one of the large-scale owners and has been modelled where appropriate.



Figure 4-1: East Coast Modelled Age-class Distribution for All Species







Figure 4-2: East 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 31. Figure 4-3 shows the age-class distribution for the East Coast radiata pine estate for both large-scale and small-scale owners combined.

The wood availability from all owners in the East Coast 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: East Coast Age-class Distribution of Radiata Pine







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 East Coast region is just over 3 million m³ per year.

Figure 4-5:

East Coast Radiata Pine Availability under Scenario 2



Figure 4-6 shows that the harvest age varies from the target rotation of 31 years for both forest owner types under the constraints of Scenario 2. The rotation age for the small-scale owners needs to increase well above the target rotation age of 31 in the period 2027-2043 to be able to maintain the non-declining yield.





Figure 4-6: East Coast 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**:

East Coast 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 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 age for both ownership types at around 31 years.

Figure 4-8 shows the radiata pine availability from all owners. The total volume increases to around 4.5 million m³ per year for four years, then drops to around 2.5 million m³ for a period of sixteen years. The volume then increases back up to a sustainable annual cut of 3 million m³.

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:

East Coast Radiata Pine Availability under Scenario 3







Figure 4-9: East Coast Average Radiata Pine Clearfell Age under Scenario 3

Figure 4-10 shows the radiata pine availability by log grade for all owners. Proportionally, the pruned volume reduces throughout the forecast period as areas of pruned forest are replanted into an unpruned regime.

Year Ending December

Figure 4-10:





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4.5 Scenario 4

In Scenario 4, target rotation ages of 29 or 33 years are used (rather than 31 years) and the same constraints are applied as in Scenario 3. Figure 4-11 shows the woodflows for the three different target rotations ages are not significantly different. The older target rotation age of 33 results in a slight delay in volume harvested (as expected) and cannot maintain the peak of 4.5 million m³ for as long. Likewise, a rotation age of 29 results in an earlier recovery from woodflow decline.

Figure 4-11:





4.6 Douglas-fir

The area of Douglas-fir in the East Coast is 2 090 ha. The age-class distribution of Douglas-fir in the East Coast is uneven with a large area planted in the last couple of years by small-scale growers, as shown in Figure 4-12. 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 2022. From 2023, the wood availability from large-scale owners is limited to 50 000 m³ per year (Figure 4-13).

The target rotation age is 40 years for Douglas-fir. The average clearfell age of the Douglas-fir estate in the East Coast region is presented in Figure 4-14.





Figure 4-12: East Coast Age-class Distribution of Douglas-fir



Figure 4-13: East Coast Douglas-fir Availability





Figure 4-14: East Coast Average Douglas-fir Clearfell Age

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5 COMPARISON TO PREVIOUS FORECAST

The results of the 2021 wood availability forecasts were compared with the previous forecasts undertaken in 2014. The comparison is based on Scenario 2 (Figure 5-1) and Scenario 3 (Figure 5-2).

The long-term sustainable cut from the East Coast region under Scenario 2 has reduced from 3.34 million m^3 to 3.1 million m^3 . This is likely caused by a small reduction of the total area available and the increasing in the rotation age by three years.

In Scenario 3, the difference in the woodflow is more marked. The current harvest volume is 0.25 million m³ lower than the 2014 forecast. To maintain a target rotation age around 31 for both ownership types in these forecasts, the volume harvested is substantially higher for the first six years, with the harvest dropping to its lowest levels approximately five years earlier than the previous forecast.

Figure 5-1:

Wood Availability Forecasts (All Radiata Pine): 2014 vs 2021 under Scenario 2











The factors contributing to the variations include the following (refer to Table 5-1):

- The total model area has dropped by 5% in 2021, this is due to the percentage reduction in small-scale owner resource area (see Section 3.1). Over 4 300 ha of the large-scale owner resource area was removed from these forecast as it was over 35 years old and considered non-commercial.
- There has been some maturing of the East Coast resource; the average age has increased from 16.4 years in 2014, to 17.5 years in 2021.
- There are now greater proportions of the estate described by the higher yielding yield tables derived from stands planted in 1990 and thereafter. Just under 8 742 ha of forest planted before 1990 is now remaining in the East Coast.
- The radiata pine's target rotation age for the 2014 forecast was 28 years, whereas the target rotation for the 2021 forecast is 31 years. The increase in rotation age was based on results obtained from large forest owners harvest intention survey.



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Table 5-1: Key Differences between 2014 and 2021 WAF

Item	2014 WAF	2021 WAF	Change (%)
Stocked Area (ha)	146 737	139 480	-5
Average Age (years)	16.4	17.5	7
Productivity (m ³ /ha at age 30)	633	658	4
Clearfell Age Target (years)	28	31	11
Annual Sustainable Harvest (million m ³)	3.4	3.1	-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.







6 CONCLUSION

Wood availability from the East Coast wood supply region is expected to continue to increase in the next couple of years to a maximum of 4.5 million m^3/a . This increase is required to complete the harvesting at an average rotation age of around 31 years for the areas planted during the record afforestation years of 1992 to 1995. Once the peak of harvesting has been completed, the volume will likely decrease to a low of around 2.5 million m^3/a then rebound to a sustainable cut of 3 million m^3/a .

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. Regional logistical constraints are already impacting the harvest levels in the East Coast, which has led to an increase in the average rotation age to 31 years. Any further delaying of the harvest will lead to further increases in the average rotation age. As the harvest levels decrease, the rotation age may reduce over time, the likely impact of this is shown in Scenario 4 when a 29-year target rotation age was been modelled. In this scenario the woodflow can increase back to it sustainable cut of 3.1 million m³ five years earlier.

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 age-class distribution and area 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 over-prediction of NEFD area for this group of forest owners in the region. This uncertainty will impact the wood availability from the East Coast region, particularly in the short term.



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Appendix - East Coast Wood Availability Forecasts for the Period 2021-2060

Table 1: East Coast Wood Avaliability under Scenario 1

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and target harvest age of 31 years)

Year Ending	Large-Scale	Small-Scale	All
December	Owners	Owners	Owners
	(000 m ³)	(000 m ³)	(000 m ³)
2021	1 914	1 193	3 108
2022	2 114	3 380	5 493
2023	2 139	1 010	3 149
2024	2 215	1 112	3 326
2025	2 181	2 858	5 039
2026	2 213	4 245	6 459
2027	2 297	1 800	4 097
2028	2 290	1 316	3 605
2029	2 201	4 105	6 306
2030	1 797	1 405	3 202
2031	1 427	2 954	4 381
2032	1 427	958	2 385
2033	1 427	1 089	2 516
2034	1 427	409	1 836
2035	1 427	208	1 635
2036	1 427	1 192	2 618
2037	1 427	376	1 803
2038	1 427	384	1 810
2039	1 427	292	1 718
2040	1 427	49	1 476
2041	1 427	260	1 687
2042	1 427	132	1 559
2043	1 427	1 925	3 352
2044	1 427	1 670	3 097
2045	1 427	0	1 427
2046	1 427	0	1 427
2047	1 427	1 468	2 894
2048	1 427	1 064	2 491
2049	1 427	1 935	3 362
2050	1 427	2 517	3 944
2051	1 427	2 520	3 947
2052	1 427	2 617	4 043
2053	1 427	1 679	3 106
2054	1 427	1 197	2 623
2055	1 427	2 743	4 169
2056	1 427	3 252	4 679
2057	1 427	657	2 083
2058	1 427	1 827	3 254
2059	1 427	2 143	3 570
2060	1 427	1 664	3 091

Notes:

Table 2: East Coast Wood Avaliability 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	Large-Scale	Small-Scale	All	
December	Owners	Owners	Owners	
	(000 m ³)	(000 m ³)	(000 m ³)	
2021	1 914	1 184	3 098	
2022	2 114	985	3 098	
2023	2 139	959	3 098	
2024	2 215	884	3 098	
2025	2 181	917	3 098	
2026	2 213	885	3 098	
2027	2 297	802	3 098	
2028	2 290	809	3 098	
2029	2 201	897	3 098	
2030	1 797	1 302	3 098	
2031	903	2 195	3 098	
2032	903	2 195	3 098	
2033	903	2 195	3 098	
2034	903	2 195	3 098	
2035	903	2 195	3 098	
2036	903	2 195	3 098	
2037	903	2 195	3 098	
2038	903	2 195	3 098	
2039	903	2 195	3 098	
2040	1 565	1 533	3 098	
2041	1 735	1 364	3 098	
2042	1 735	1 364	3 098	
2043	1 735	1 364	3 098	
2044	1 735	1 364	3 098	
2045	1 735	1 364	3 098	
2046	1 735	1 364	3 098	
2047	1 735	1 364	3 098	
2048	1 735	1 364	3 098	
2049	1 735	1 364	3 098	
2050	1 735	1 364	3 098	
2051	1 735	1 364	3 098	
2052	1 735	1 364	3 098	
2053	1 735	1 364	3 098	
2054	1 735	1 364	3 098	
2055	1 735	1 364	3 098	
2056	1 735	1 364	3 098	
2057	1 735	1 364	3 098	
2058	1 735	1 364	3 098	
2059	1 735	1 364	3 098	
2060	1 735	1 364	3 098	

Notes:

Table 3: East Coast Wood Avaliability 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	Large-Scale	Small-Scale	All	Pruned	Unpruned	Pulp Logs
December	Owners	Owners	Owners			
	(000 m ³)					
2021	1 914	1 210	3 125	514	2 016	594
2022	2 114	1 323	3 437	566	2 242	629
2023	2 139	1 642	3 781	610	2 407	764
2024	2 215	1 944	4 159	871	2 644	643
2025	2 181	2 319	4 500	879	2 861	760
2026	2 213	2 287	4 500	762	2 865	873
2027	2 297	2 203	4 500	880	2 862	757
2028	2 290	2 210	4 500	791	2 873	835
2029	2 201	1 984	4 185	504	2 677	1 004
2030	1 797	1 970	3 767	488	2 411	867
2031	1 426	1 964	3 390	444	2 169	777
2032	1 426	1 625	3 051	406	1 949	695
2033	1 426	1 320	2 746	421	1 747	577
2034	1 426	1 045	2 471	295	1 582	595
2035	1 426	1 045	2 471	344	1 573	555
2036	1 426	1 045	2 471	439	1 557	475
2037	1 426	1 045	2 471	416	1 559	497
2038	1 426	1 045	2 471	512	1 549	411
2039	1 426	1 045	2 471	440	1 557	475
2040	1 426	1 045	2 471	330	1 573	569
2041	1 426	1 045	2 471	427	1 559	486
2042	1 426	1 045	2 471	274	1 568	629
2043	1 426	1 045	2 471	452	1 552	467
2044	1 426	1 045	2 471	136	1 577	759
2045	1 426	1 045	2 471	117	1 582	772
2046	1 426	1 045	2 471	342	1 572	558
2047	1 426	1 045	2 471	271	1 558	642
2048	1 426	1 045	2 471	309	1 555	608
2049	1 426	1 474	2 901	319	1 832	750
2050	1 426	1 574	3 000	312	1 894	794
2051	1 426	1 574	3 000	218	1 906	876
2052	1 426	1 574	3 000	260	1 902	839
2053	1 426	1 574	3 000	311	1 914	775
2054	1 426	1 574	3 000	293	1 915	792
2055	1 426	1 574	3 000	357	1 914	729
2056	1 426	1 574	3 000	143	1 921	936
2057	1 426	1 574	3 000	466	1 913	621
2058	1 426	1 574	3 000	226	1 918	856
2059	1 426	1 574	3 000	152	1 921	928
2060	1 426	1 574	3 000	441	1 916	644

Notes:

Table 4: East Coast Wood Avaliability 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 29, 31 and 33 years)

Year Ending	Recoverable	Average	Recoverable	Average	Recoverable	Average
December	Volume Target	Age	Volume Target	Age	Volume Target	Age
	Age 29 (000 m ³)	(Years)	Age 31 (000 m ³)	(Years)	Age 33 (000 m ³)	(Years)
2021	3 125	30	3 125	31	3 125	33
2022	3 437	29	3 437	31	3 437	33
2023	3 781	30	3 781	31	3 781	32
2024	4 159	29	4 159	31	4 027	31
2025	4 500	29	4 500	31	4 055	31
2026	4 500	29	4 500	31	4 058	31
2027	4 500	33	4 500	31	4 464	31
2028	4 500	33	4 500	32	4 500	32
2029	4 327	36	4 185	32	4 272	32
2030	3 894	30	3 767	32	3 845	32
2031	3 505	30	3 390	32	3 460	32
2032	3 154	33	3 051	32	3 114	32
2033	2 839	32	2 746	31	2 803	32
2034	2 555	33	2 471	32	2 522	32
2035	2 555	31	2 471	30	2 522	31
2036	2 555	29	2 471	29	2 522	30
2037	2 555	29	2 471	29	2 522	31
2038	2 555	29	2 471	29	2 522	30
2039	2 555	28	2 471	29	2 522	30
2040	2 555	29	2 471	31	2 522	31
2041	2 555	29	2 471	29	2 522	30
2042	2 555	29	2 471	30	2 522	31
2043	2 555	29	2 471	29	2 522	32
2044	2 612	29	2 471	31	2 522	31
2045	2 950	29	2 471	31	2 522	33
2046	2 973	28	2 471	31	2 522	30
2047	2 973	28	2 471	29	2 522	29
2048	2 973	28	2 471	29	2 522	30
2049	2 973	28	2 901	29	2 522	32
2050	2 973	28	3 000	29	2 522	30
2051	2 973	28	3 000	30	2 522	31
2052	2 973	28	3 000	30	2 522	30
2053	2 973	28	3 000	31	2 794	31
2054	2 973	28	3 000	31	3 059	31
2055	2 973	28	3 000	31	3 059	31
2056	2 973	29	3 000	31	3 059	32
2057	2 973	29	3 000	31	3 059	33
2058	2 973	29	3 000	31	3 059	33
2059	2 973	29	3 000	31	3 059	33
2060	2 973	29	3 000	31	3 059	33

Notes:

Table 5: East Coast Wood Avaliability 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	Large-Scale	Small-Scale	All	Average
December	Owners	Owners	Owners	Age
	(000 m ³)	(000 m ³)	(000 m ³)	(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