



Wood Availability Forecasts – Central North Island 2014

Prepared for the Ministry for Primary Industries
by Indufor Asia Pacific Limited

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Ministry for Primary Industries' Wood Availability Forecasts

A new series of Wood Availability Forecasts is being prepared by Indufor Asia Pacific, for the Ministry for Primary Industries (MPI), covering the period from 2014 to 2050. These forecasts are intended as a planning tool for the forest industry, councils, and infrastructure and service providers. New forecasts for all nine regional wood supply regions will be published over the next eighteen months, along with new national forecasts.

MPI is working in association with the National Exotic Forest Description (NEFD) Steering Committee to prepare the new regional and national wood availability forecasts. NEFD user surveys have emphasised that wood availability forecasts are the most used and valued product delivered under the NEFD programme. The previous regional and national forecasts were prepared between 2006 and 2010 and are available here: <http://www.mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/>

MPI wishes to express its appreciation to the forest owners, managers and consultants of the Central North Island for their support in preparing these wood availability forecasts. The work would not be possible without this assistance.

Disclaimer

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ADDENDUM

March 2016

Under the section on data and methodology used to obtain forest areas it should also have been stated that areas of forest ages 20 and over, identified in the Small Forest Grower Survey, were removed. The Survey was undertaken in 2004 by AgriQuality (nowASUREQuality). There is now concern over the reliability of this resource information.

Details on the methods used by AgriQuality are available in the *Small Forest Grower Survey Report* (AgriQuality, NZ, 2005).



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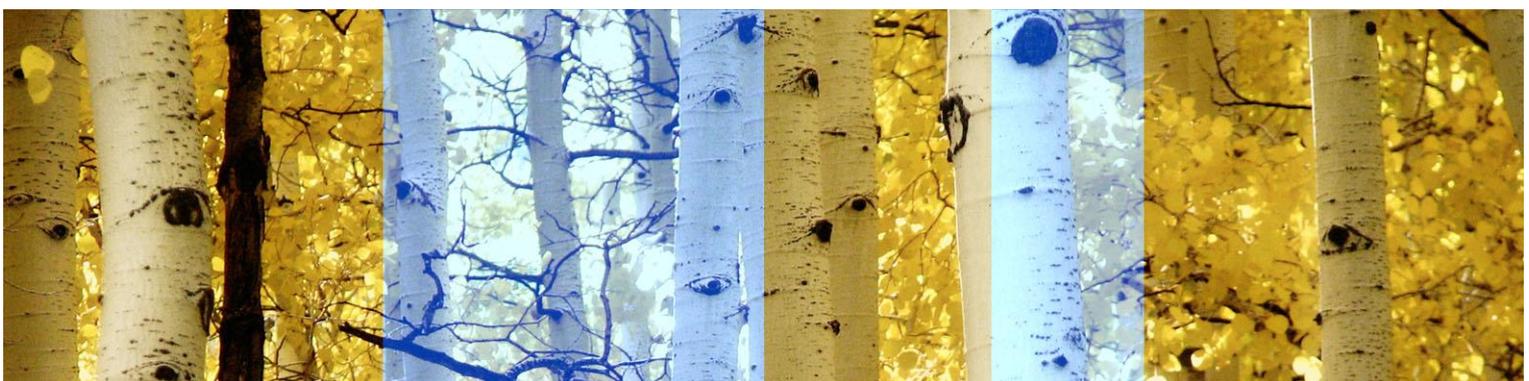
Wood Availability Forecasts – Central North Island 2014

Draft Report

2 December 2015

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PREFACE

This report was prepared at the request of the Ministry for Primary Industries (the Client) by Indufor Asia Pacific Limited.

The project involved development of a series of regional and national wood availability forecasts for New Zealand's plantation estate.

This report may only be used for the purpose for which it was prepared and its use is restricted to consideration of its entire contents. The conclusions presented are subject to the assumptions and limiting conditions noted within.

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DISCLAIMER

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1. INTRODUCTION

This report presents the findings from a 2014 wood availability study of the Central North Island (CNI) planted forest estate. This is based on the Ministry of Primary Industries (MPI) National Exotic Forest Description (NEFD) as at 1 April 2014. The study was undertaken by MPI, in association with the major plantation owners. The modelling supporting the study was undertaken by Indufor Asia Pacific Limited (Indufor).

Indufor prepared four production scenarios for radiata pine potential wood availability, and one for Douglas-fir availability. The scenarios indicate how the forest resource in the CNI could be harvested over the 2014 to 2050 period. The scenarios are based on the available resource in the region and a series of forecasting assumptions. Only radiata pine and Douglas-fir are included in the scenarios and wood availability forecasts. There are areas of other species in the CNI region, but these are not included in the availability forecasts.

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

- Those with 1000 ha of forest or more in the region of interest, and
- With more than three age-classes, and;
- Not a part of a syndicate.

There was also consultation with forest managers and consultants to ensure the scenarios represented a realistic range of future wood availability.

The scenarios clearly show there are different ways for the forest resource to be harvested. In examining the scenarios, it is important to recognise that forests are normally managed in a way that maximises the benefits to the enterprise that owns them. Each enterprise has its own harvesting strategy based on the owner's objectives and market conditions. Any change in harvesting strategies by forest owners affects the age-structures 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 of their forests or woodlots. The harvest age can vary markedly, even between neighbouring properties. The timing of the harvest of these forests 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.

There are different levels of uncertainty associated with the wood availability from each component of the estate. While the volumes forecast from 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 forecasts than for the small-scale owners' estate. Not only are harvest intentions less clear for small-scale owners, the resource description is potentially 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. Indufor undertook initial modelling of the scenarios, and these were presented to the major forest owners and consultants in the CNI wood supply region. Their feedback was taken into account in the final derived profiles.

2.1 Scenario 1: Large-scale Owners Harvest at Stated Intentions, Small-scale Owners Harvest at Age 28

Large-scale owners' wood availability is based on stated harvest intentions for the period 2014 to 2023 (calendar year estimates). After 2023, a 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 28.

This is similar to scenario 2 in the 2008 Wood Availability Forecasts, although the target rotation age for small scale owners was 30 years in the earlier analysis.

2.2 Scenario 2: Non-declining Yield (NDY) – Target Rotation 28 years

Large-scale owners' wood availability is assumed to be at stated harvest intentions for the period 2014 to 2023. After 2023, the wood availability from large-scale owners is assumed not to decrease (as for scenario 1).

For total radiata pine supply, the standard scenario 2 specified by the NEFD Steering Committee is that the supply is to be non-declining in perpetuity with a target rotation age of 28 years (30 years in scenario 3 in the 2008 Wood Availability Forecasts).

2.3 Scenario 3: Split NDY – Target Rotation 28 years

This is the same as scenario 2 except that the total wood availability of radiata pine from the region is allowed to decline after 2034 for a period of five years. Over this five year period, an annual change of up to 10% is allowed. The yield is then required to be non-declining from 2039.

2.4 Scenario 4: Target Rotation Age Variations

This is similar to scenario 3 except that target rotation ages of 26 and 30 years are also modelled (28 and 32 years in the 2008 Wood Availability Forecasts).

2.5 Discussion of the Scenarios - Radiata Pine

Figure 2-1A to Figure 2-1C illustrate the differences between Scenarios 1 to 3 (respectively) using the Central North Island radiata pine resource as an example (more detailed discussion is provided in Section 4).

In scenario 1 (Figure 2-1A), the forests owned by small-scale owners are assumed to be harvested at age 28. 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 CNI 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 (Figure 2-1B and Figure 2-1C, respectively) are based on yield regulation. 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 these scenarios, the future harvesting model is generally

constrained to be non-declining: that is, each year the volume must either be the same or higher than in the previous year.

Scenarios 2 and 3 avoid the large year-to-year fluctuations in volume seen in scenario 1. A fundamental property of the forests in the CNI (like many regions in New Zealand) is the large area of forests established during the 1990s. Scenarios 3 and 4 illustrate the harvesting of these forests by applying a non-declining yield constraint for the period 2020 to 2034. Then once the “bulge” of forest area planted during the 1990s has been harvested, the model lets the volume decline again.

The main limitations of scenarios 2 to 4 are that log prices and other market factors are significant determinants 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.

2.6 Scenario for Douglas-fir

One scenario is presented for Douglas-fir (all owners). It is based on the harvest intentions of large-scale owners for 2014 to 2023 with the yield regulated in subsequent years. After 2023, the wood availability from large-scale owners is modelled in a five-year period non-declining yield (NDY) block (i.e. 2024-2028, 2029-2033, etc). The total wood availability of the combined estate is also modelled to be non-declining within each of the five-year period NDY blocks. The harvest level for the first five-year NDY block is set to be the same as in 2023. The total wood availability from clearfell and production thinning operations can change by 100 000 m³ per year for the large-scale owners’ estate and by 150 000 m³ per year for the combined estate. The target rotation age is 40 years for Douglas-fir (45 years was used in the 2008 forecasts).

Illustration of Wood Availability Scenarios (CNI Radiata Pine Forecasts)

Figure 2-1A: Scenario 1: Large-scale Owners Harvest at Stated Intentions, Small-Scale Owners Harvest at Age 28

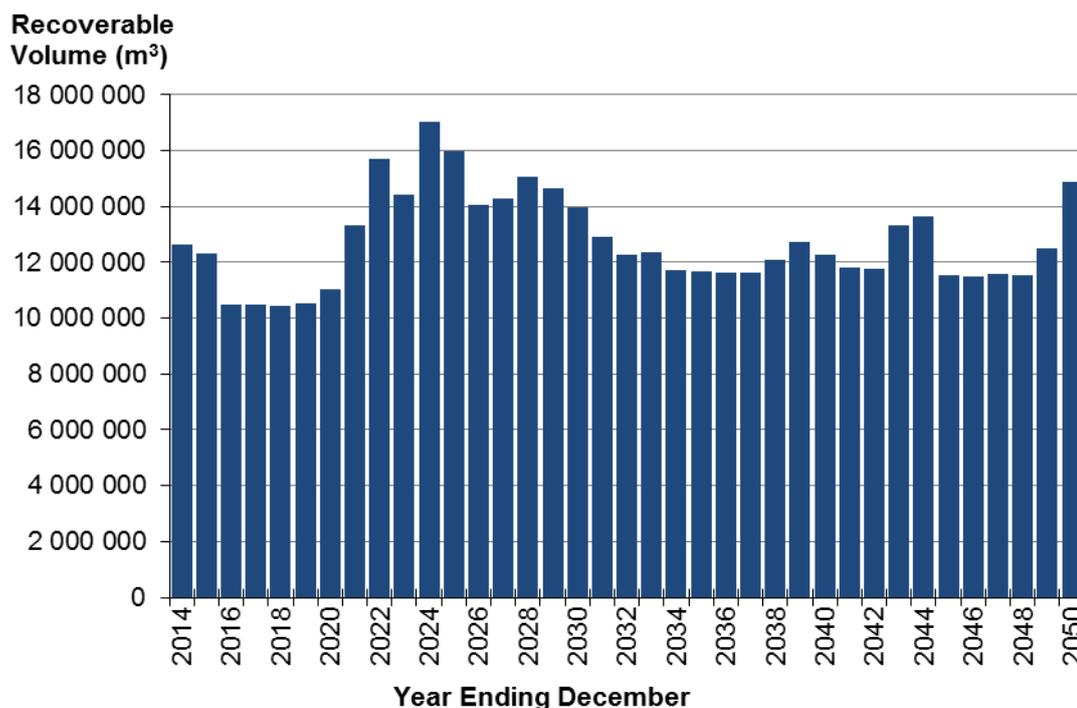


Figure 2-1B: Scenario 2: Large-Scale Owners Harvest at Stated Intentions. Overall Non-Declining Yield (from 2020) with a Target Rotation of 28 Years

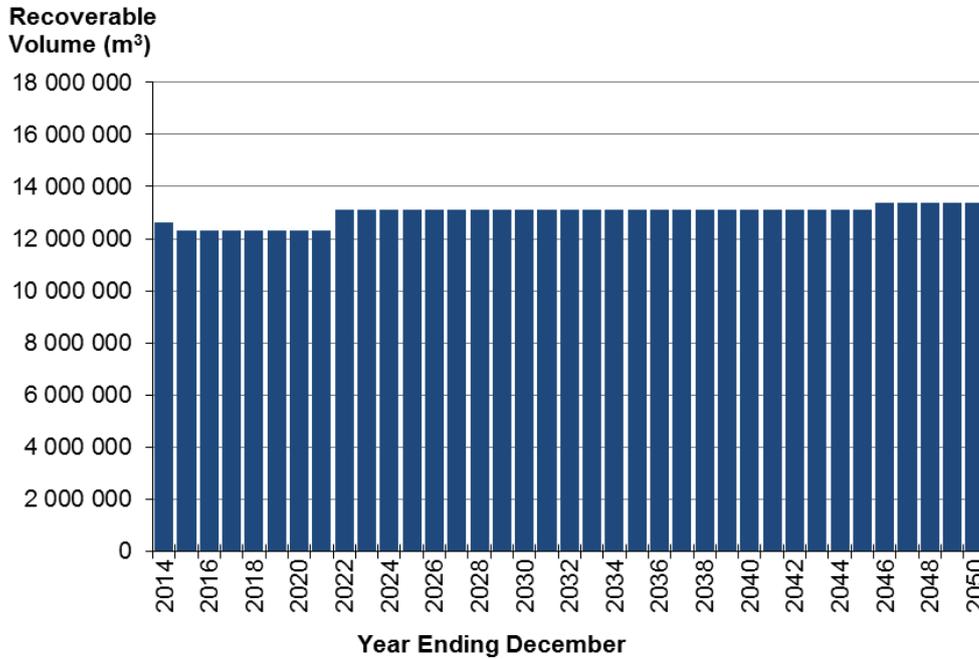
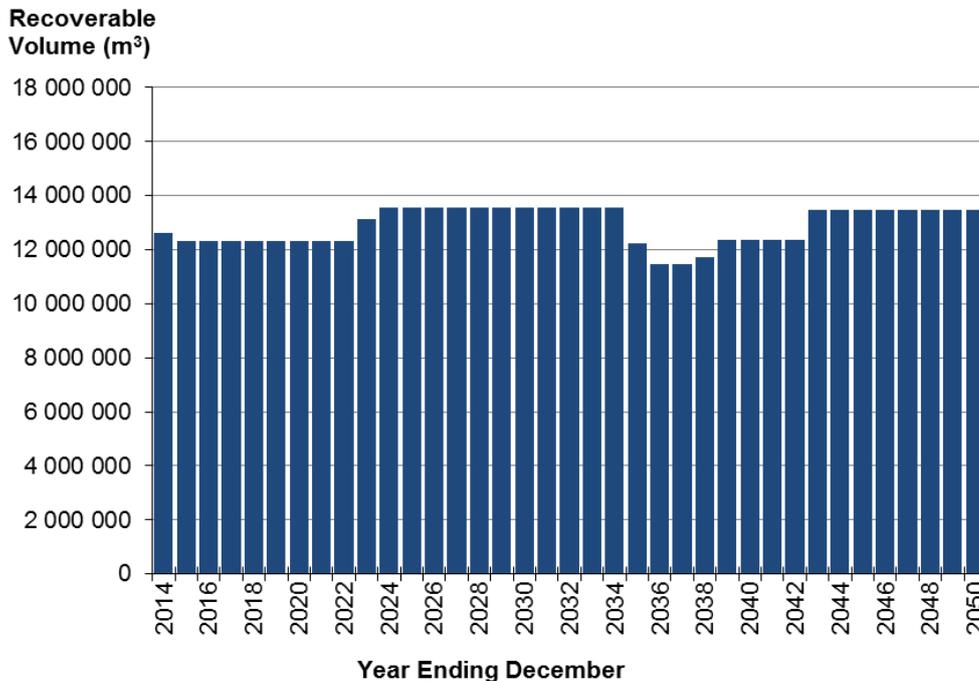


Figure 2-1C: Scenario 3: Large-scale Owners Harvest at Stated Intentions. Overall Split Non-Declining Yield (from 2020) with Target Rotation of 28 Years



3. DATA AND METHODOLOGY

3.1 Method Used to Obtain Forest Areas

The forest areas were sourced from the NEFD as at 1 April 2014 (MPI 2014). Only radiata pine areas are modelled. The area for the large-scale owners was unadjusted, while the area for the small-scale owners' estate was reduced by 15%.

This adjustment was made as small-scale owners generally report on a gross area basis rather than net stocked areas (excluding unplanted areas, areas not successfully established, streams, roads and wetlands).

In addition to this, reductions were made to the area of over-mature stands. For large-scale owners, areas older than 35 years of age were considered non-commercial and excluded. For small-scale owners, the maximum age was 40 years.

A further downwards adjustment of 4% was applied to all areas age 1 to 4 to reflect losses in stocked area due to factors such as erosion, slips, and various setbacks.

There has also been a change in the regional boundaries since the 2008 WAF were undertaken. In the 2008 WAF, Auckland was a separate region. In the 2014 WAF, the majority of the area has been transferred to CNI, with the exception of Auckland Council which is now part of Northland.

3.2 Method Used to Develop Yield Tables

For the 2008 WAF, new yield tables for the CNI were developed in the following way:

- Large-scale forest owners provided yield tables for their forest estates.
- These 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 1989), and Douglas-fir were then 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 also adjusted based on consultation with large-scale owners.
- The area-weighted average regional yield tables developed for the large-scale owners' estate were also applied to the small-scale forest owners' estate.

For the latest forecasts, the yield tables developed in 2008 were utilised, and were again calibrated to the latest harvest intentions information provided by large forest owners (essentially the process described in the third bullet point above was replicated to derive yield tables that reflected yields expected by the large owners).

3.3 Large-Scale Owners' Harvest Intentions

Large-scale owners were asked to provide details of their projected harvest volumes (by log grade, area and average harvest age) for the 2014 to 2033 period. The 12 largest owners all provided yearly (31 December) summary data for the project. Inclusion of actual levels of intended harvest by the large owners is considered a critical step, as it provides the best estimate of future wood availability for the first ten years (2014-2023) of the forecast horizon.

The large-scale owners who provided their harvest intentions were:

- Hancock Timber Resources Group (Taumata, Tiaki, OTPP)
- Lake Taupo and Rotoaira Forest Trusts
- DoC, MRP, Landcorp, Matahi, CFGC, Waiuku (managed by PF Olsen)
- Kaingaroa Timberlands
- Ernslaw One
- Crown Forestry (Te Whaiti, Matahi)
- Department of Corrections
- CHH Pulp and Paper
- Matariki Forests
- Global Forest Partners (Waonui, Te Waihou, Madaket)
- Viking
- Blakely Pacific

3.4 Modelling Assumptions

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

- All areas are replanted, with a regeneration lag of one year. Replanting is as follows:
 - All radiata pine areas are maintained as radiata pine.
 - Large-scale forest owners: 25% of all pruned areas will be replanted as a pruned regime, with 75% transferring to an unpruned regime
 - Small-scale forest owners: 50% of all pruned areas will be replanted as a pruned regime with 50% transferring to an unpruned regime
 - Douglas-fir: Only 15% of existing Douglas-fir will be replanted as Douglas-fir (the remainder is replanted as radiata pine)
- Based on a deforestation survey in the region, it was determined that conversion of forests to other land uses has been and is likely to continue at a sufficient rate for it to be incorporated into the wood availability forecasts. Some 26 000 ha are assumed to be converted out of forestry by 2025.
- The area awaiting replanting as at 31 March 2014 is included as area at age 0 (that is, the area to be replanted in the 2014 planting season).
- Total roundwood removals in the CNI region were estimated to be 13.0 million m³ for the year ended 31 March 2014. This was used to derive the harvest level for the first year of the model.
- 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 stands over 60 years of age are assumed to not be harvested (all owners).

4. WOOD AVAILABILITY FORECASTS FOR THE CENTRAL NORTH ISLAND

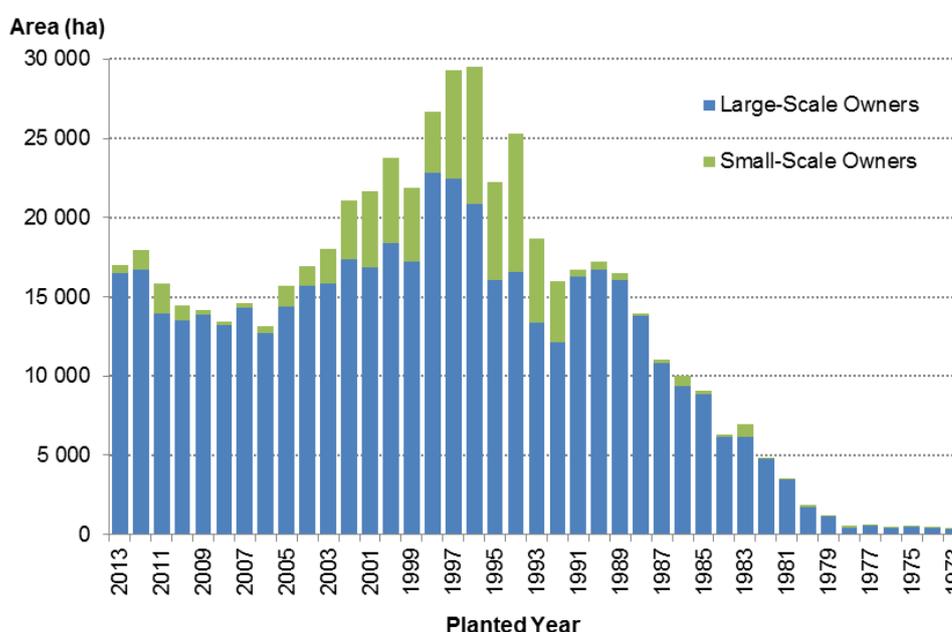
4.1 CNI Region Age-Class Distribution

The CNI region has a plantation resource of 587 104 ha spread across 17 districts. Of this, 555 144 ha consists of radiata pine and 18 977 ha are Douglas-fir.

After deductions described in Section 3.1 are applied to the NEFD area, the modelled area reduces to 550 511 ha.

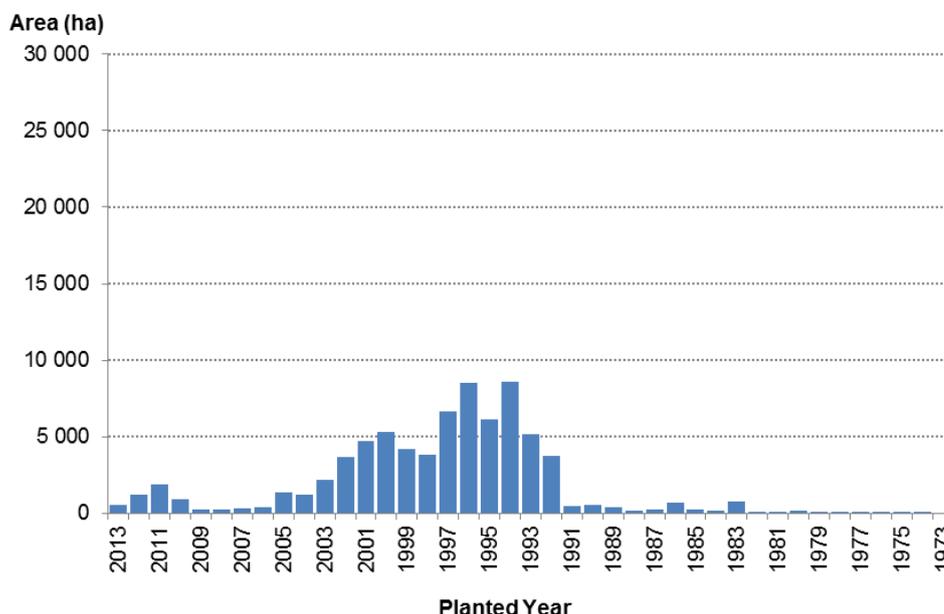
The modelled resource consists of both radiata pine and Douglas-fir. Figure 4-1 shows the age-class distribution for the CNI estate by owner size. Some 86% of the modelled resource is held by large owners and 14% by small owners. Figure 4-1 highlights the peak in planting in the mid-1990s in the large-scale owners' resource.

Figure 4-1: CNI Age-class Distribution by Owner – All Species as at 1 April 2014



The age-class distribution of the small-scale owners' estate only is shown in Figure 4-2. This also shows high rates of planting in the 1990s and early 2000s, with an average of 5 000 ha planted each year between 1992 and 2002 (currently 12 to 22 years old) and much less area in all other age-classes. The wood availability from this estate is influenced by the timing of the harvest of the large area aged 12 to 22.

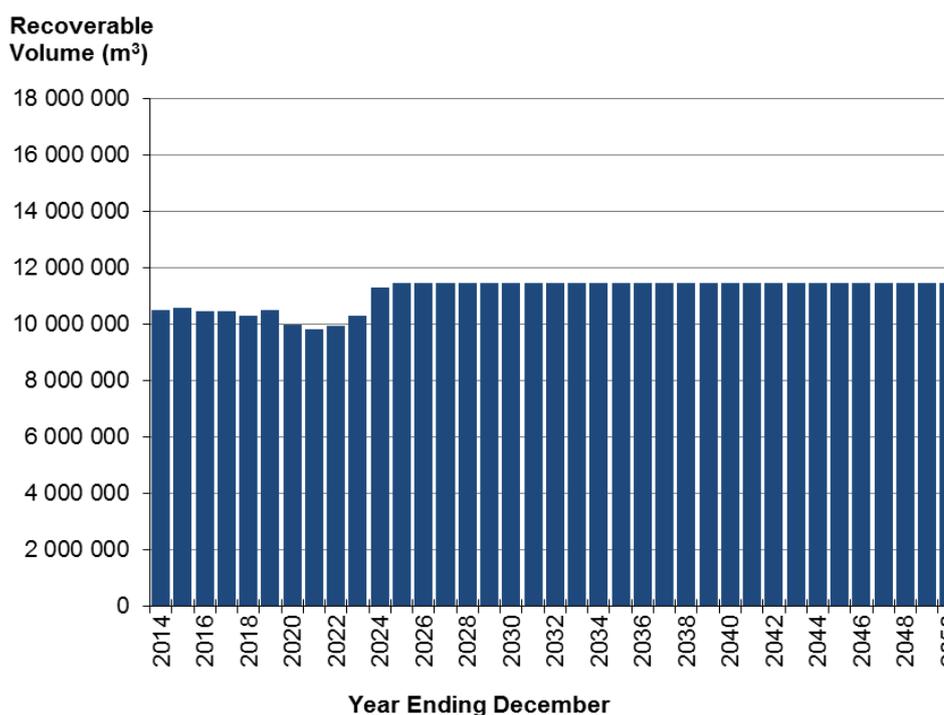
Figure 4-2: CNI Age-class Distribution of Radiata Pine – Small-Scale Owners as at 1 April 2014



4.2 Scenario 1

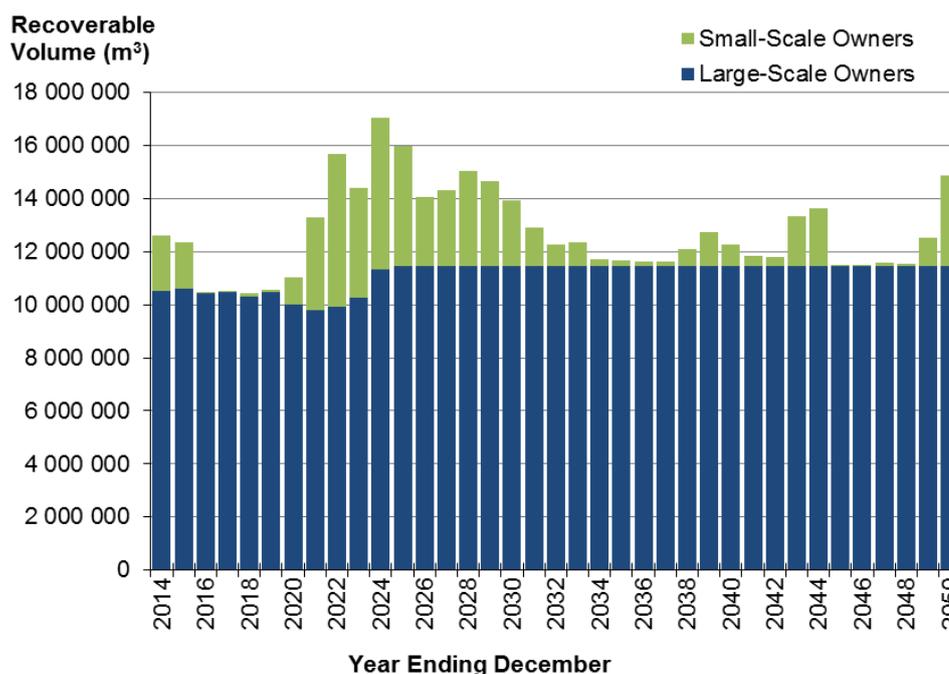
For this scenario, the availability of wood from large-scale owners is based on their stated harvest intentions for 2014 to 2023. Thereafter the availability is constrained to be non-declining with a target rotation age of 28 years. The wood availability of large-scale owners (Figure 4-3) is forecast to decrease slightly after 2018, before gradually increasing again from 2024 to a sustainable yield of around 11.5 million m³ per annum.

Figure 4-3: CNI Radiata Pine Availability under Scenario 1 – Large-Scale Owners



The wood availability from all owners in the CNI is presented in Figure 4-4. The large-scale owners' resource is shown as the "base" volume, and the forecasts match the volumes in Figure 4-3. The fluctuation in the total annual forecast volumes reflects the variation in the areas in each age-class of the small-scale owners' estate, and the assumption that this estate is harvested at age 28.

Figure 4-4: CNI Radiata Pine Availability under Scenario 1 – All Owners

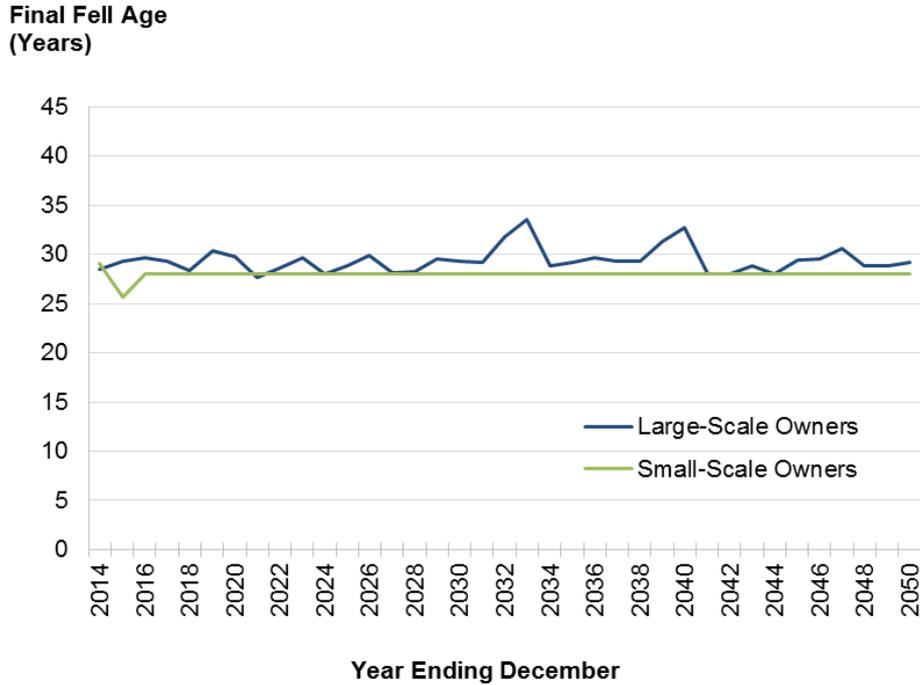


The large increase in harvest volume after 2019 (Figure 4-4) reflects the maturing of the small-scale owners' estate. For example, the increase in 2024 is a consequence of the 8 667 ha planted by small-scale owners in 1996 (Figure 4-2) being harvested at age 28 years.

Fluctuations in harvest volumes of the magnitude shown in Figure 4-4 would be impractical due to operational constraints (for example: availability of harvest machinery, harvesting crews and transport operators) and market absorption constraints (for example: limited domestic wood processing capacity, levels of export demand).

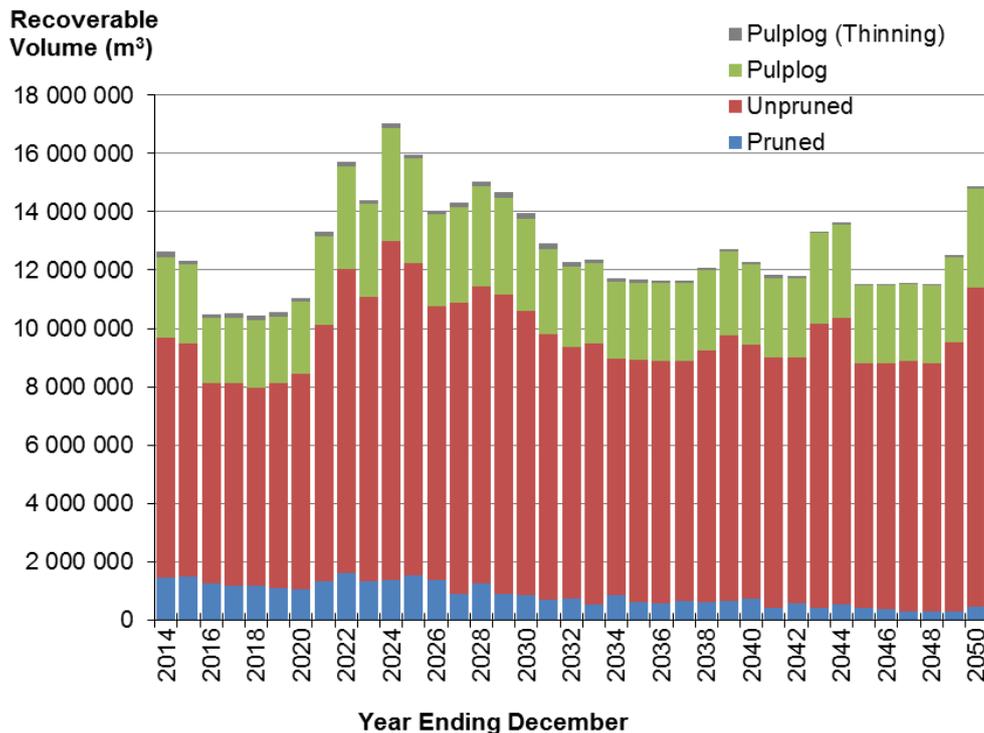
Figure 4-5 shows that, apart from the near-term harvest (which is constrained to the intentions of the large scale owners), the harvest age settles at the target of 28 years.

Figure 4-5: CNI Average Radiata Pine Clearfell Age under Scenario 1 – by Ownership Category



The harvest volumes forecast under scenario 1 are broken down by log grade in Figure 4-6. Of note is the declining availability of pruned log supply. This is a result of only 25% of pruned croptypes being maintained as pruned after harvest.

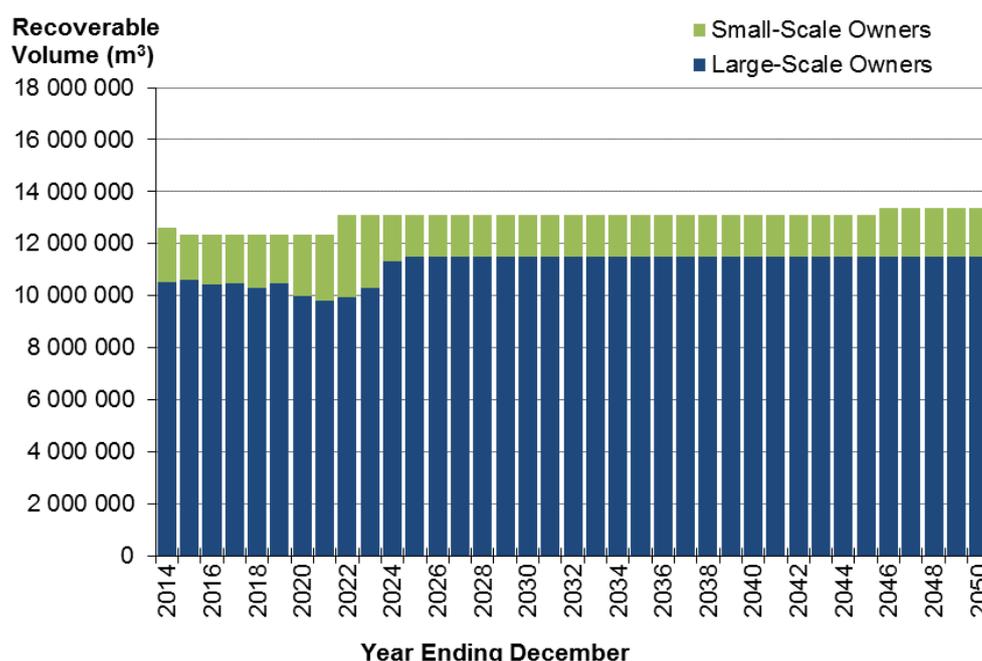
Figure 4-6: CNI Radiata Pine Availability under Scenario 1 – by Log Grade (all owners)



4.3 Scenario 2

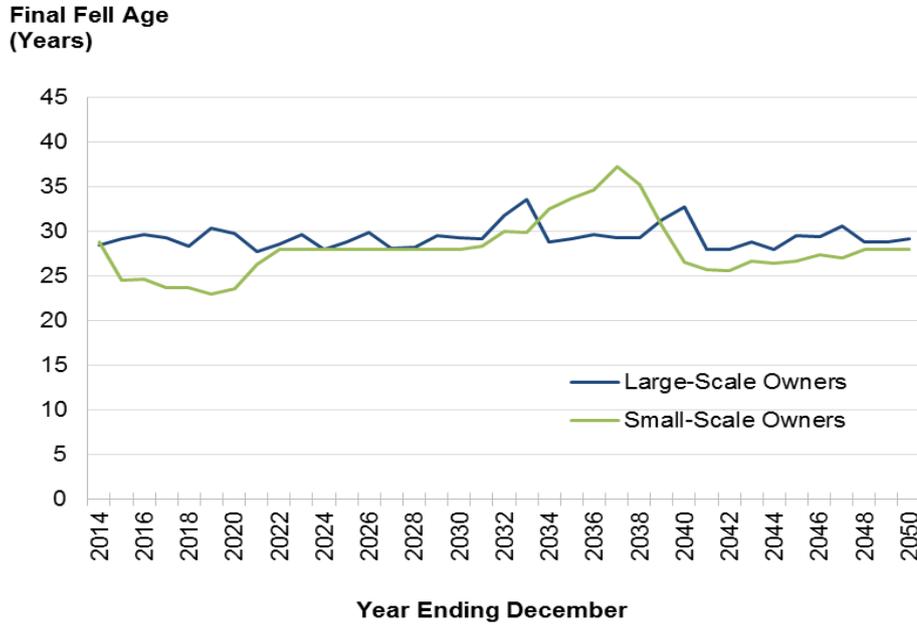
The second scenario assumes large-scale owners' resources are harvested as per their harvest intentions for the first 10 years, then a non-declining yield constraint is applied to the large-scale owners' estate after 2023. In addition, a non-declining yield constraint is applied to the total overall radiata pine estate from 2020, with a target rotation age of 28 years. Figure 4-7 indicates that a gradual increase in the harvest from the small-scale owners' estate could occur from 2015 through to 2022 (from 1.7 million m³ to 3.2 million m³). It then reduces to settle at a long term level of 1.7 million m³ per annum.

Figure 4-7: CNI Radiata Pine Availability under Scenario 2 – All Owners



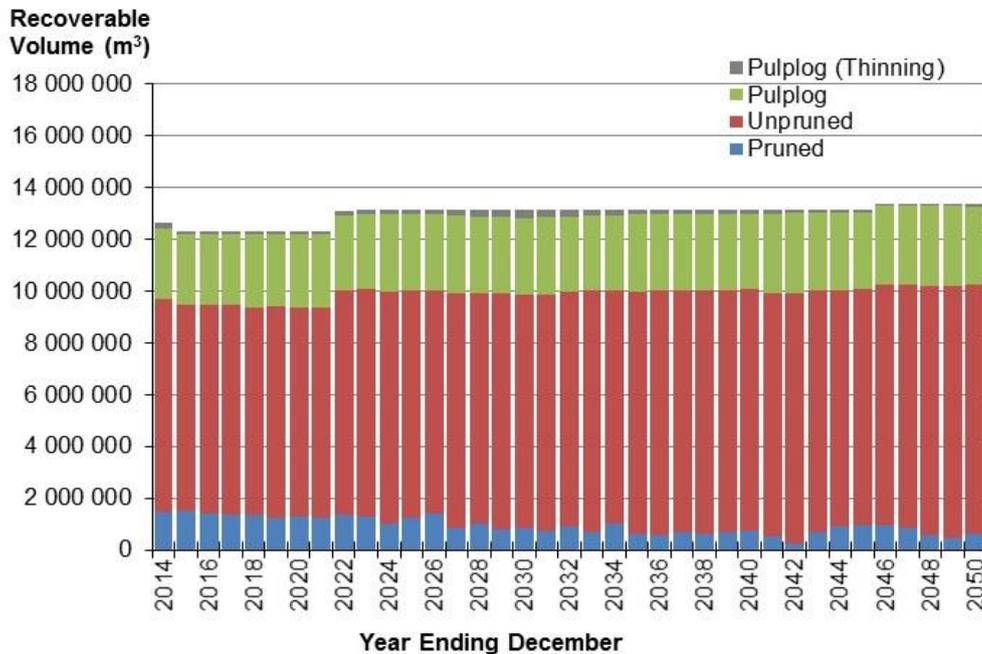
This scenario does at times require that the harvest age varies significantly from the target rotation of 28 years. This is especially the case for small-scale forest owners (Figure 4-8).

Figure 4-8: CNI Average Radiata Pine Clearfell Age under Scenario 2 – by Ownership Category



The harvest volumes forecast under scenario 2 are broken down by log grade in Figure 4-9.

Figure 4-9: CNI Radiata Pine Availability under Scenario 2 – by Log Grade (all owners)



4.4 Scenario 3

The third scenario again assumes large owners' resources are harvested in line with their harvest intentions between 2014 and 2023, and then non-declining after 2023. However, the overall yield is based on a split non-declining yield, with a target rotation age of 28 years. A drop in the overall harvest volume is allowed after 2034 for a five-year period (between 2035 and 2039 of no more than 10% per year). This scenario gives a forecast wood availability that is different to scenario 2 (Figure 4-10). Through the period 2024 to 2034, the wood availability is around 13.6 million m³ (0.5 million m³ higher than scenario 2).

The period through to 2022 is not dissimilar to scenario 2, with the harvest level at 12.3 million m³.

Figure 4-10: CNI Radiata Pine Availability under Scenario 3 – All Owners

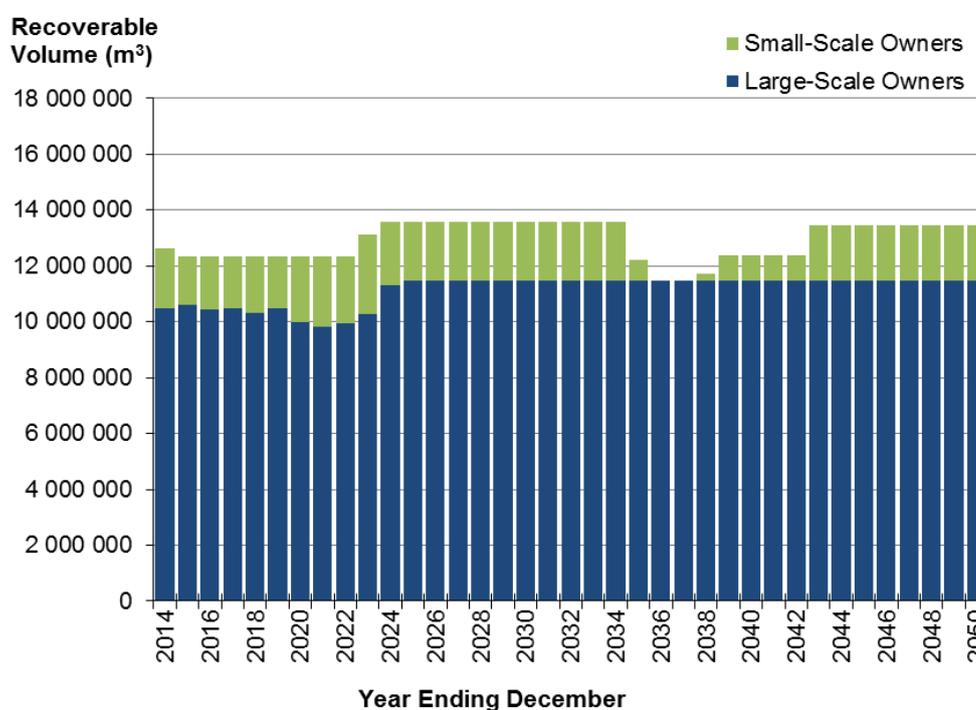
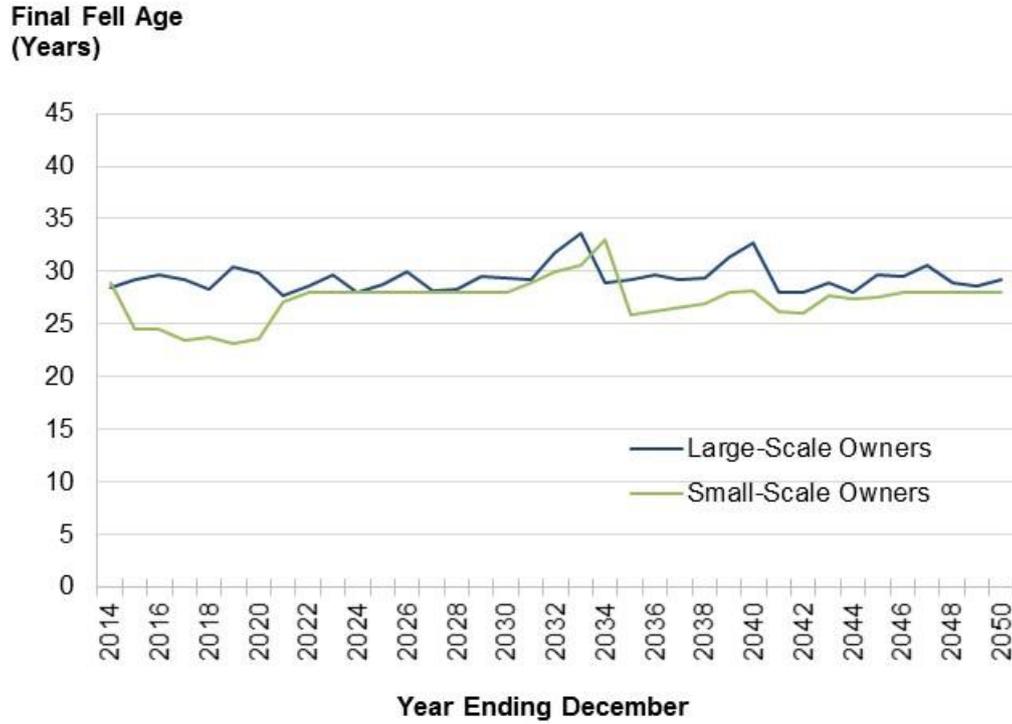
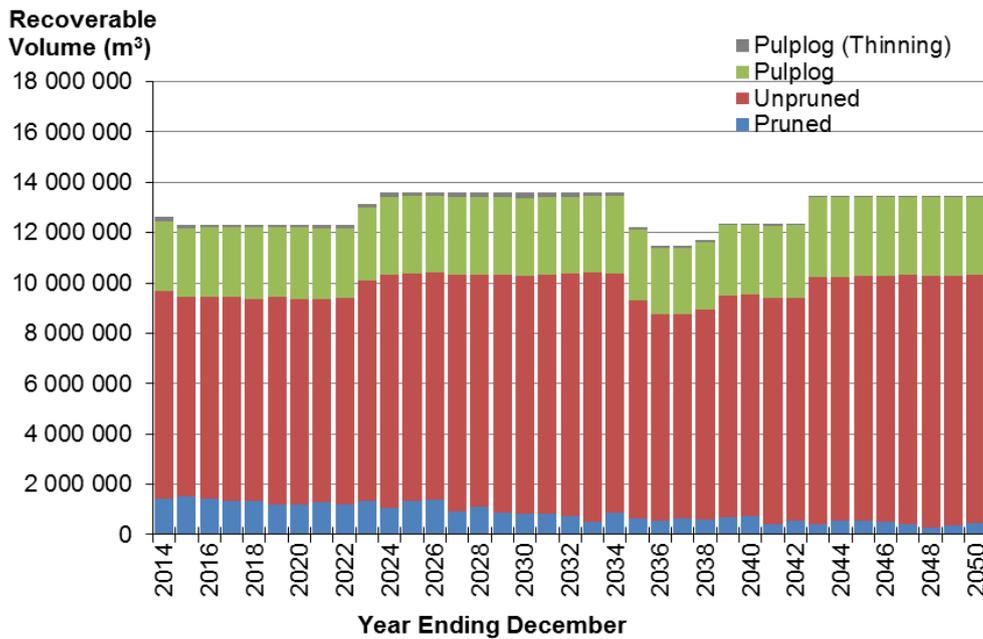


Figure 4-11: CNI Average Radiata Pine Clearfell Age under Scenario 3 – by Ownership Category



The harvest volumes forecast under scenario 3 are broken down by log grade in Figure 4-12.

Figure 4-12: CNI Radiata Pine Availability under Scenario 3 – by Log Grade (all owners)



4.5 Scenario 4

Target rotation ages of 26 or 30 years are used (rather than 28 years) and the same constraints are applied as in scenario 3 (Figure 4-13).

The harvest ages are somewhat constrained for the first ten years by the large-scale owners' harvest intentions and the requirement for a non-declining yield for the large owner's estate as well as the overall radiata pine estate. These constraints are slightly relaxed for the 26 and 30 year target rotations to allow the actual harvesting ages to more closely match the target rotation ages (Figure 4-14).

Figure 4-13: CNI Radiata Pine Availability by Target Rotation Age under Scenario 4 – All Owners

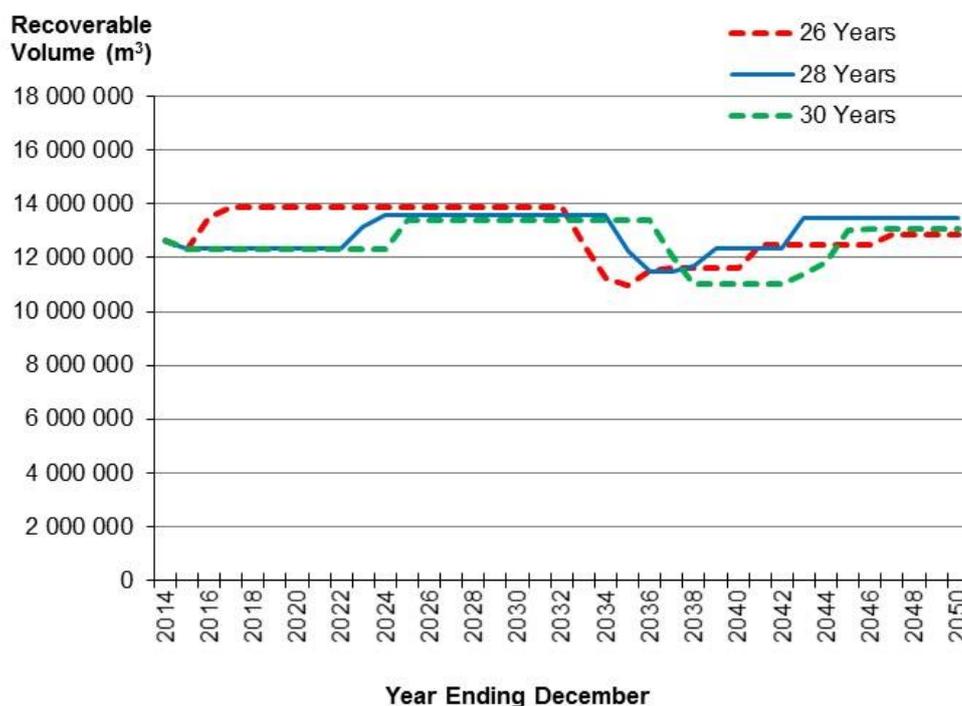
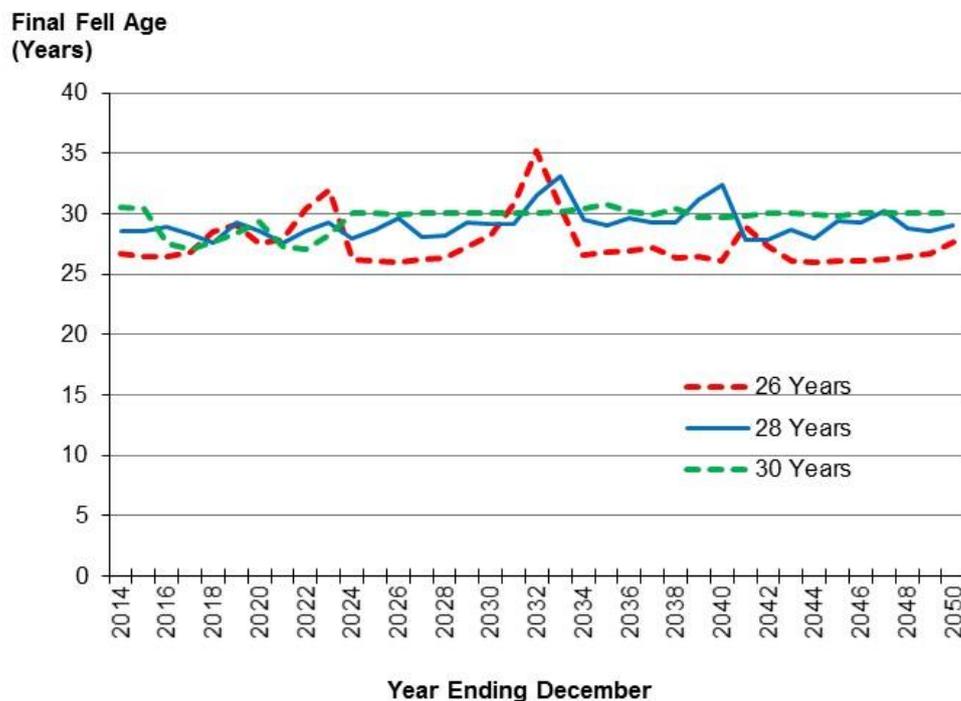


Figure 4-14: CNI Average Radiata Pine Clearfell Age by Target Rotation Age under Scenario 4 – All Owners



4.6 Douglas-fir

The age-class distribution of Douglas-fir in the CNI is shown in Figure 4-15.

The Douglas-fir harvest for the large-scale owners' estate is based on intentions for the period 2014 to 2023. After 2023, the wood availability from large-scale owners is modelled in five-year non-declining yield (NDY) blocks (i.e. 2024-2028, 2029-2033, etc). The total wood availability of the combined estate is also modelled to be non-declining within each of the five-year NDY blocks (Figure 4-16). The harvest level for the first five-year NDY block is set to be the same as in 2024. The wood availability of Douglas-fir from clearfell and production thinning operations can change by 100 000 m³ per year for the large-scale owners' estate and by 150 000 m³ per year for the combined estate.

The target rotation age is 40 years for Douglas-fir.

Figure 4-15: CNI Age-class Distribution of Douglas-fir – All Owners as at 1 April 2014

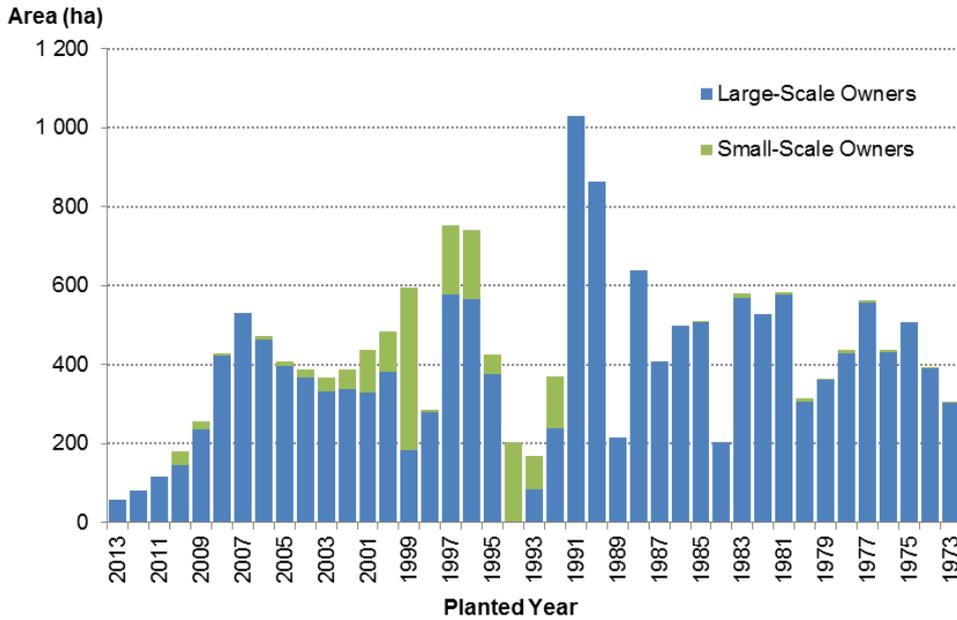
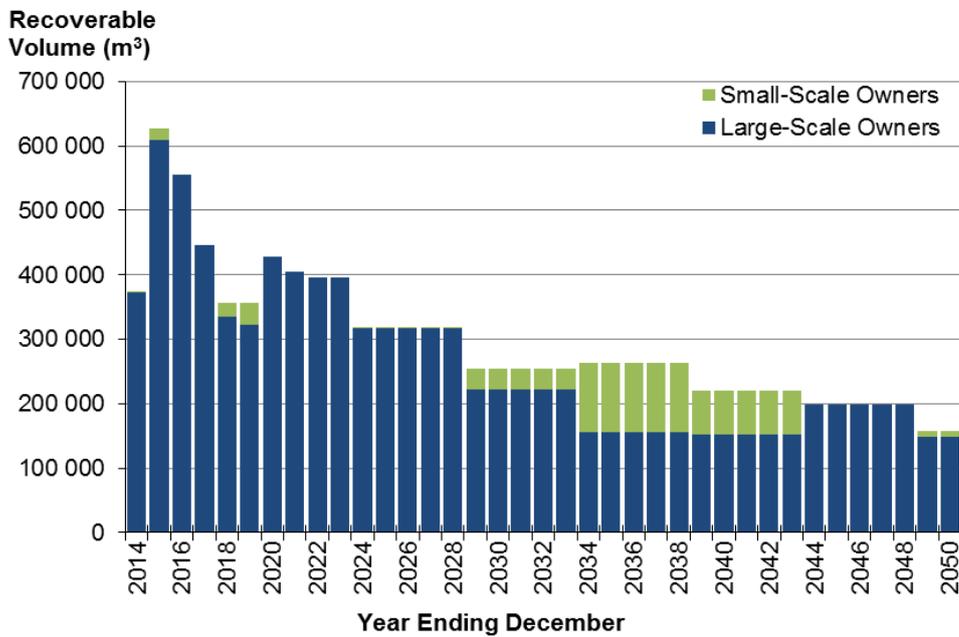


Figure 4-16: CNI Douglas-fir Availability – Combined Estate (Includes Volumes from Production Thinning as well as Clearfell)



5. COMPARISON OF THE WOOD AVAILABILITY FORECASTS: 2008 VS 2014

The results of the 2014 wood availability forecasts were compared with the previous forecasts, undertaken in 2008 (Figure 5-1). The comparison is based on Scenario 2 (which is equivalent to the Scenario 3 in the 2008 forecasts). It can be seen that the wood availability from the 2014 forecasts is higher through to 2020, and then from 2022 it settles at a level 400 000 m³ higher than that in the 2008 forecasts (a 3.4% increase).

Figure 5-1: Wood Availability Forecasts (All Radiata Pine): 2008 vs 2014

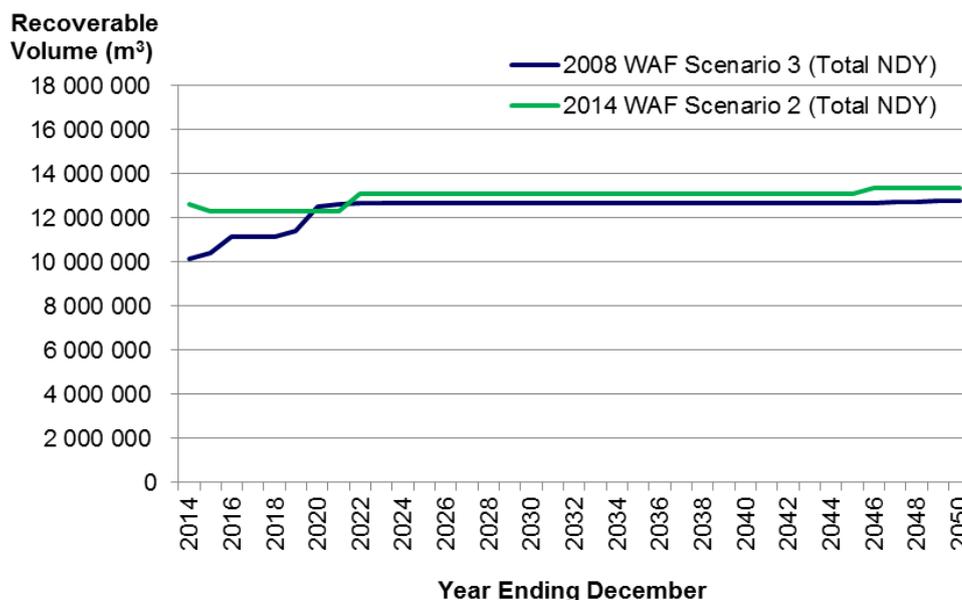


Table 5-1 shows that since the 2008 WAF, there has been a decrease in stocked area, and the 2014 calibrated yield tables are similar or slightly lower than the 2008 calibrated yield tables. However Table 5-1 also shows:

- A move in area from the lower yielding pruned to higher yielding unpruned croptypes
- A move in area from the lower yielding pre-90 to higher yielding post-89 croptypes.

Combined, these factors allow the long-term harvest level to slightly exceed the 2008 WAF projection.

Table 5-1: Area by Croptype and Croptype Yields

Croptype Group	Yield Tables (age 28 TRV)			Area (ha)		
	2008 WAF	2014 WAF	% Change in TRV	2008 WAF	2014 WAF	% Change in Area
By Regime						
Pruned	615	600	-2.4%	320 709	251 244	-22%
Unpruned	654	650	-0.6%	227 187	280 846	24%
				547 895	532 089	
By Maturity Class						
Pre-90	548	535	-2.5%	217 275	80 739	-63%
Post-89	685	677	-1.2%	330 620	451 350	37%
				547 895	532 089	

Figure 5-2 compares the area-age-class distribution between the NEFD's used in each of the WAFs. The additional 2014 WAF area in the age-classes 1999-2003 represents the gain from

the Auckland region being redistributed between CNI and Northland. These semi-mature age-classes will be contributing to the higher harvest profile through to 2020.

Figure 5-2: Area Age-Class Comparisons: NEFD 2008 vs NEFD 2014

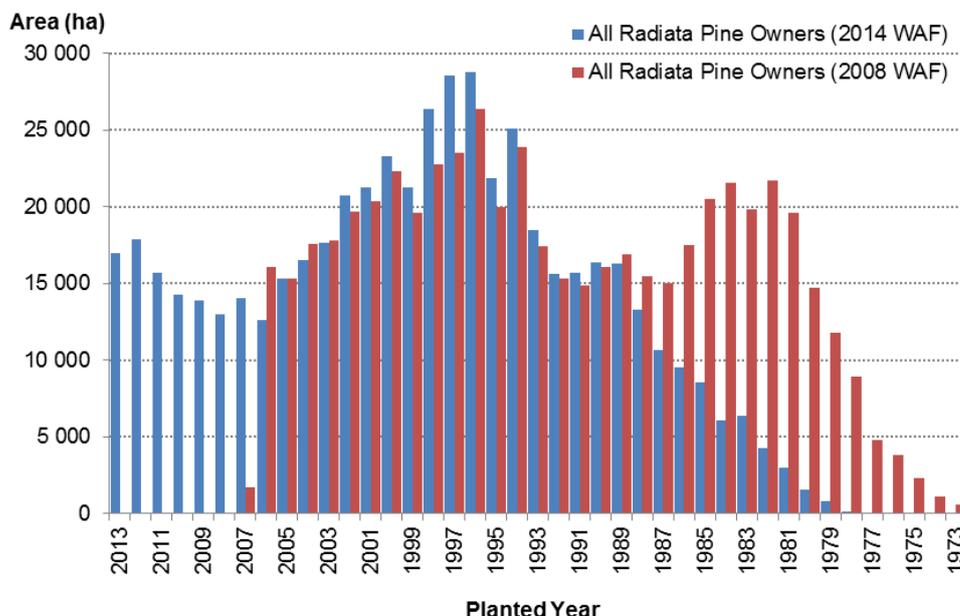
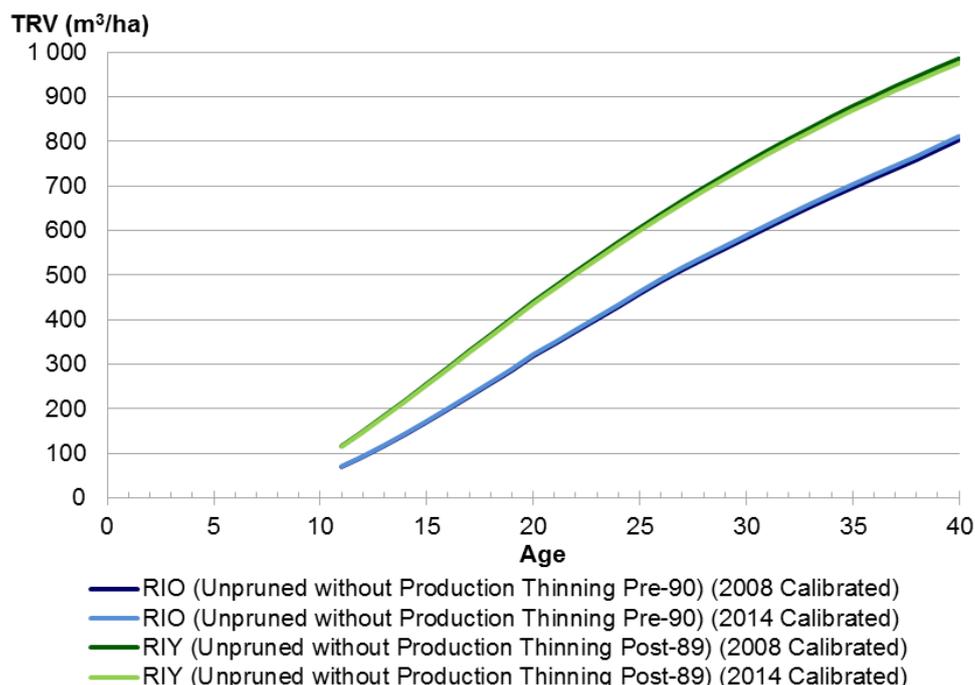


Figure 5-3 to Figure 5-6 compare the yield table assumptions between the 2008 and 2014 WAFs. It can be seen that there has been little change in the radiata pine yield tables, but a significant jump in the Douglas-fir yield tables (based on the large-scale owner harvest intentions).

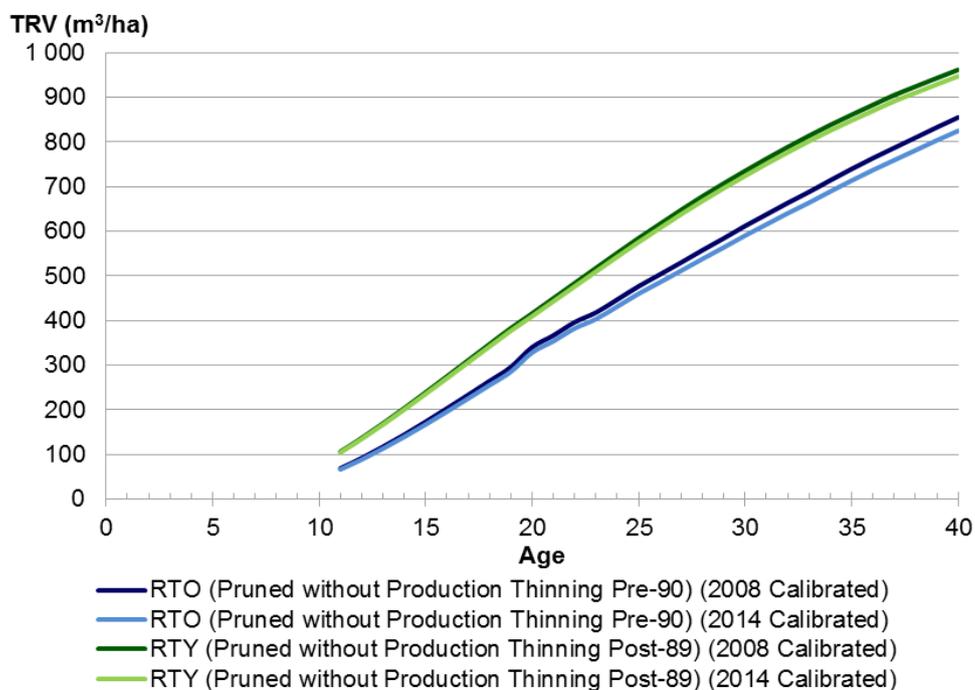
Figure 5-3: Unpruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts



Note: RIO (2008) is incorrectly referenced on the MPI website as RMO

RIY (2008) is incorrectly referenced on the MPI website as RMY

Figure 5-4: Pruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts



Note: RTO (2008) is incorrectly referenced on the MPI website as RIY

RTY (2008) is incorrectly referenced on the MPI website as RIO

Figure 5-5: Douglas-fir Yield Tables: 2008 vs 2014 Wood Availability Forecasts

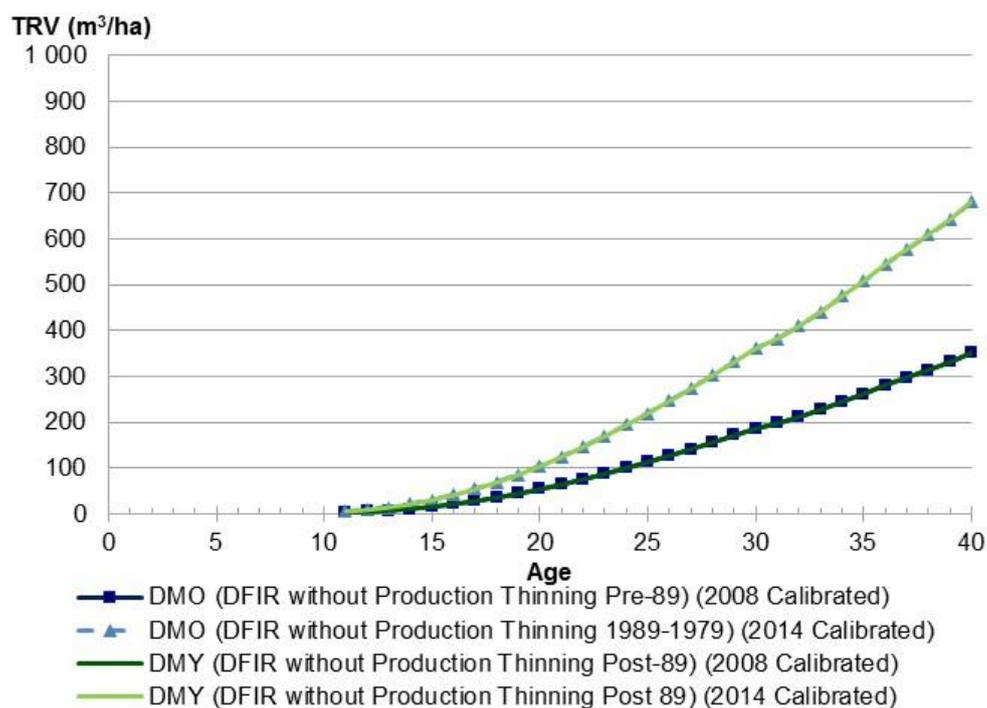
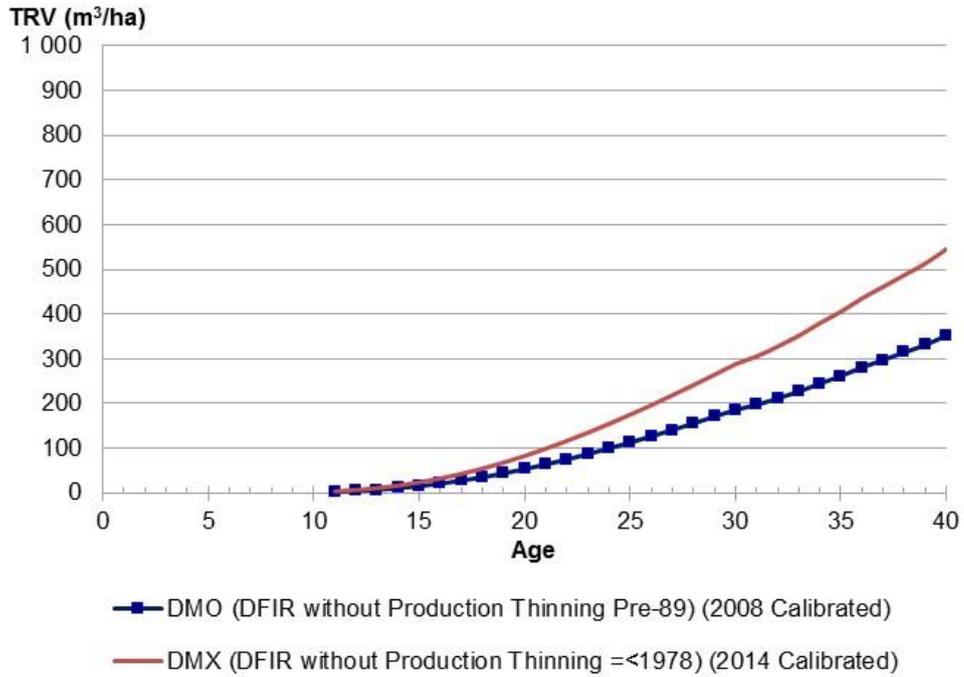


Figure 5-6: Douglas-fir Yield Tables: 2008 vs 2014 Wood Availability Forecasts



6. CONCLUDING COMMENTS

Wood availability from the CNI wood supply region's planted forest resource is expected to maintain at current levels through to the early 2020s (at around 12.3 million m³ p.a.), at which point a small lift in harvest is possible (to 13.1 million m³ p.a.). Scenario 3 showed that there is potential for a slightly higher harvest level (13.5 million m³) through to 2034.

Supply is dominated by the large-scale owners (85%), and the mix of owner size stays fairly even through time. From 2016 through to 2021 the large-scale owner supply does reduce slightly, before rising to a long-term sustainable yield of 11.5 million m³ p.a. The small-scale owner resource can comfortably fill this small deficit.

As with a number of the other wood supply regions, a significant portion of the future wood availability will come from the region's small-scale forest owners who established forests during the 1990s. Market conditions and logistical constraints will determine the actual rate of harvest increase, and what level is reached. Scenario 1 and scenario 4a show that the small-scale owner harvest could be brought forward if a younger clearfell age was targeted (for example, in response to a strong export market).

The area information from the NEFD as at 1 April 2014 has reported some variations from the NEFD as at 1 April 2007, which was used in the 2008 forecasts. MPI has applied a consistent methodology and approach in compiling the NEFD data in both 2007 and 2014. Therefore, these area variances are more likely due to how the forest owners have responded to the MPI survey.

Appendix – Central North Island Wood Availability Forecasts for the Period 2014 to 2050

Table 1: Central North Island Wood Availability under Scenario 1

(Assumes that large-scale owners harvest at stated intentions and then at non-declining yield, and small-scale owners harvest at age 28 years).

Year Ending December	Large-Scale Owners (000 m3 IB)	Small-Scale Owners (000 m3 IB)	All Owners (000 m3 IB)
2014	10 499	2 127	12 627
2015	10 588	1 747	12 335
2016	10 449	43	10 493
2017	10 466	34	10 500
2018	10 306	116	10 421
2019	10 480	69	10 549
2020	9 995	1 057	11 052
2021	9 805	3 495	13 301
2022	9 941	5 759	15 701
2023	10 285	4 129	14 414
2024	11 313	5 718	17 031
2025	11 466	4 499	15 965
2026	11 466	2 583	14 049
2027	11 466	2 839	14 306
2028	11 466	3 576	15 042
2029	11 466	3 196	14 662
2030	11 466	2 481	13 947
2031	11 466	1 449	12 915
2032	11 466	809	12 275
2033	11 466	902	12 369
2034	11 466	261	11 727
2035	11 466	208	11 674
2036	11 466	160	11 626
2037	11 466	161	11 628
2038	11 466	623	12 090
2039	11 466	1 266	12 732
2040	11 466	813	12 279
2041	11 466	357	11 824
2042	11 466	313	11 780
2043	11 466	1 850	13 316
2044	11 466	2 155	13 621
2045	11 466	53	11 519
2046	11 466	42	11 508
2047	11 466	112	11 578
2048	11 466	68	11 535
2049	11 466	1 039	12 505
2050	11 466	3 399	14 865

Notes:
m3 cubic metres
IB inside bark.

Table 2: Central 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 m3 IB)	Small-Scale Owners (000 m3 IB)	All Owners (000 m3 IB)
2014	10 499	2 127	12 627
2015	10 588	1 742	12 330
2016	10 449	1 881	12 330
2017	10 466	1 864	12 330
2018	10 306	2 024	12 330
2019	10 480	1 850	12 330
2020	9 995	2 335	12 330
2021	9 805	2 525	12 330
2022	9 941	3 161	13 102
2023	10 285	2 837	13 122
2024	11 313	1 809	13 122
2025	11 517	1 605	13 122
2026	11 517	1 605	13 122
2027	11 517	1 605	13 122
2028	11 517	1 605	13 122
2029	11 517	1 605	13 122
2030	11 517	1 605	13 122
2031	11 517	1 605	13 122
2032	11 517	1 605	13 122
2033	11 517	1 605	13 122
2034	11 517	1 605	13 122
2035	11 517	1 605	13 122
2036	11 517	1 605	13 122
2037	11 517	1 605	13 122
2038	11 517	1 605	13 122
2039	11 517	1 605	13 122
2040	11 517	1 605	13 122
2041	11 517	1 605	13 122
2042	11 517	1 605	13 122
2043	11 517	1 605	13 122
2044	11 517	1 605	13 122
2045	11 517	1 605	13 122
2046	11 517	1 848	13 365
2047	11 517	1 848	13 365
2048	11 517	1 848	13 365
2049	11 517	1 848	13 365
2050	11 517	1 848	13 365

Notes:
m3 cubic metres
IB inside bark.

Table 3: Central 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 m3 IB)	Small- Scale Owners (000 m3 IB)	All Owners (000 m3 IB)	Pruned (000 m3 IB)	Unpruned (000 m3 IB)	Chip Logs (000 m3 IB)	Total (000 m3 IB)
2014	10 499	2 127	12 627	1 433	8 256	2 937	12 627
2015	10 588	1 742	12 330	1 496	7 964	2 870	12 330
2016	10 449	1 881	12 330	1 410	8 059	2 861	12 330
2017	10 466	1 864	12 330	1 336	8 123	2 871	12 330
2018	10 306	2 024	12 330	1 349	8 026	2 955	12 330
2019	10 480	1 851	12 330	1 201	8 225	2 904	12 330
2020	9 995	2 335	12 330	1 200	8 139	2 991	12 330
2021	9 805	2 525	12 330	1 291	8 068	2 971	12 330
2022	9 941	2 389	12 330	1 193	8 224	2 914	12 330
2023	10 285	2 853	13 137	1 312	8 772	3 053	13 137
2024	11 313	2 264	13 578	1 064	9 269	3 245	13 578
2025	11 456	2 122	13 578	1 319	9 073	3 185	13 578
2026	11 456	2 122	13 578	1 385	9 025	3 167	13 578
2027	11 456	2 122	13 578	895	9 426	3 256	13 578
2028	11 456	2 122	13 578	1 118	9 212	3 248	13 578
2029	11 456	2 122	13 578	893	9 435	3 250	13 578
2030	11 456	2 122	13 578	844	9 457	3 277	13 578
2031	11 456	2 122	13 578	818	9 501	3 259	13 578
2032	11 456	2 122	13 578	755	9 624	3 199	13 578
2033	11 456	2 122	13 578	525	9 880	3 172	13 578
2034	11 456	2 122	13 578	885	9 499	3 193	13 578
2035	11 456	764	12 220	661	8 656	2 903	12 220
2036	11 456	0	11 456	566	8 189	2 701	11 456
2037	11 456	0	11 456	624	8 129	2 703	11 456
2038	11 456	251	11 706	581	8 361	2 765	11 706
2039	11 456	911	12 366	665	8 828	2 873	12 366
2040	11 456	911	12 366	719	8 803	2 845	12 366
2041	11 456	911	12 366	414	8 895	2 968	12 366
2042	11 456	911	12 366	564	8 861	2 941	12 366
2043	11 456	1 995	13 451	416	9 834	3 201	13 451
2044	11 456	1 995	13 451	544	9 699	3 208	13 451
2045	11 456	1 995	13 451	547	9 744	3 160	13 451
2046	11 456	1 995	13 451	489	9 799	3 162	13 451
2047	11 456	1 995	13 451	403	9 903	3 145	13 451
2048	11 456	1 995	13 451	282	9 974	3 195	13 451
2049	11 456	1 995	13 451	380	9 889	3 183	13 451
2050	11 456	1 995	13 451	435	9 869	3 147	13 451

Notes:
m3 cubic metres
IB inside bark.

Table 4: Central 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, 28 and 30 years).

Year Ending December	Recoverable Volume target age 26 (000 m3 IB)		Recoverable Volume target age 28 (000 m3 IB)		Recoverable Volume target age 30 (000 m3 IB)	
	Average Age (Years)		Average Age (Years)		Average Age (Years)	
2014	26.7	12 627	28.5	12 627	30.5	12 627
2015	26.5	12 344	28.6	12 330	30.4	12 330
2016	26.5	13 484	28.9	12 330	27.5	12 330
2017	26.8	13 886	28.4	12 330	27.0	12 330
2018	28.4	13 886	27.6	12 330	27.7	12 330
2019	29.1	13 886	29.3	12 330	28.4	12 330
2020	27.6	13 886	28.6	12 330	29.3	12 330
2021	27.9	13 886	27.6	12 330	27.3	12 330
2022	30.4	13 886	28.5	12 330	27.1	12 330
2023	32.0	13 886	29.3	13 137	28.2	12 330
2024	26.2	13 886	28.0	13 578	30.0	12 330
2025	26.1	13 886	28.7	13 578	30.0	13 423
2026	26.0	13 886	29.6	13 578	29.9	13 423
2027	26.2	13 886	28.1	13 578	30.0	13 423
2028	26.4	13 886	28.2	13 578	30.0	13 423
2029	27.3	13 886	29.3	13 578	30.0	13 423
2030	28.2	13 886	29.1	13 578	30.0	13 423
2031	30.9	13 886	29.1	13 578	30.0	13 423
2032	35.2	13 886	31.5	13 578	30.0	13 423
2033	30.6	12 497	33.1	13 578	30.2	13 423
2034	26.5	11 247	29.5	13 578	30.4	13 423
2035	26.8	10 966	29.0	12 220	30.7	13 423
2036	27.0	11 535	29.6	11 456	30.2	13 423
2037	27.2	11 644	29.3	11 456	30.0	12 081
2038	26.3	11 644	29.3	11 706	30.4	11 000
2039	26.5	11 644	31.1	12 366	29.7	11 000
2040	26.0	11 644	32.4	12 366	29.7	11 000
2041	28.9	12 500	27.9	12 366	29.8	11 000
2042	27.2	12 500	27.9	12 366	30.0	11 000
2043	26.0	12 500	28.7	13 451	30.0	11 387
2044	26.0	12 500	27.9	13 451	29.9	11 834
2045	26.1	12 500	29.4	13 451	29.9	13 018
2046	26.1	12 500	29.2	13 451	30.0	13 096
2047	26.2	12 851	30.2	13 451	30.0	13 096
2048	26.5	12 851	28.8	13 451	30.0	13 096
2049	26.7	12 851	28.6	13 451	30.0	13 096
2050	27.7	12 851	29.0	13 451	30.0	13 096

Notes:
m3 cubic metres
IB inside bark.

Table 5: Central North Island Wood Availability for Douglas-fir
 (Assumes that large-scale owners harvest at stated intentions with yield regulated in subsequent years and a target rotation of 40 years).

Year Ending December	Large-Scale Owners (000 m3 IB)	Small-Scale Owners (000 m3 IB)	All Owners (000 m3 IB)	Average Age (Years)
2014	373	1	373	42.2
2015	610	17	627	43.5
2016	555	0	555	41.8
2017	446	0	446	39.3
2018	335	22	357	39.8
2019	322	35	357	40.1
2020	429	0	429	37.9
2021	405	0	405	38.6
2022	396	0	396	38.5
2023	396	0	396	39.2
2024	317	0	317	37.8
2025	317	0	317	35.0
2026	317	0	317	35.3
2027	317	0	317	38.2
2028	317	0	317	38.7
2029	222	32	254	38.6
2030	222	32	254	36.7
2031	222	32	254	39.3
2032	222	32	254	36.3
2033	222	32	254	36.5
2034	155	108	263	37.6
2035	155	108	263	36.8
2036	155	108	263	40.0
2037	155	108	263	38.5
2038	155	108	263	37.1
2039	152	68	221	39.1
2040	152	68	221	38.8
2041	152	68	221	38.8
2042	152	68	221	39.7
2043	152	68	221	40.0
2044	198	0	198	40.0
2045	198	0	198	40.0
2046	198	0	198	40.0
2047	198	0	198	40.0
2048	198	0	198	40.0
2049	149	9	158	40.0
2050	149	9	158	40.6

Notes:
 m3 cubic metres
 IB inside bark.



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