



Wood Availability Forecasts – East Coast 2014

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

ISBN No: 978-1-77665-117-7 (online)

May 2015

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 East Coast for their support in preparing these wood availability forecasts. The work would not be possible without this assistance.

Disclaimer

While every effort has been made to ensure the information is accurate, the Ministry for Primary Industries does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information. Any view or opinion expressed does not necessarily represent the view of the Ministry for Primary Industries.

Publisher

Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33

© Crown Copyright - Ministry for Primary Industries

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).



Indufor ...forest intelligence

Ministry for Primary Industries

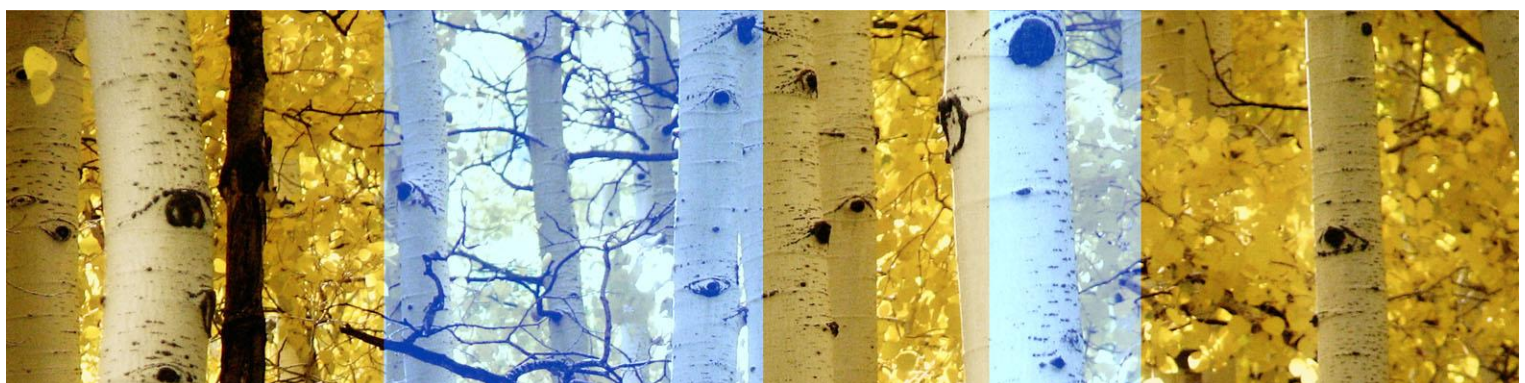
Wood Availability Forecasts – East Coast 2014

Final Report

22 May 2015

Auckland

A13-10661



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.

Indufor Asia Pacific



Nigel Chandler
Head of Forest Resources



Andre Neumann
Senior Consultant

Contact:

Indufor Asia Pacific
7th Floor, 55 Shortland St
PO Box 105 039
Auckland City
NEW ZEALAND

Tel. +64 9 281 4750
www.indufor-ap.com

DISCLAIMER

Indufor makes its best effort to provide accurate and complete information while executing the assignment. Indufor assumes no liability or responsibility for any outcome of the assignment.

TABLE OF CONTENTS

PREFACE	I
TABLE OF CONTENTS	II
1. INTRODUCTION	1
2. SCENARIOS	2
2.1 Scenario 1: Large-scale Owners Harvest at Stated Intentions, Small-scale Owners Harvest at Age 28	2
2.2 Scenario 2: Non-declining Yield (NDY) – Target Rotation 28 years	2
2.3 Scenario 3: Split NDY – Target Rotation 28 years	2
2.4 Scenario 4: Target Rotation Age Variations	2
2.5 Discussion of the Scenarios - Radiata Pine	2
2.6 Scenario for Douglas-fir	3
3. DATA	5
3.1 Method Used to Obtain Forest Areas	5
3.2 Method Used to Develop Yield Tables	5
3.3 Large-Scale Owners' Harvest Intentions	5
4. WOOD AVAILABILITY FORECASTS FOR EAST COAST	7
4.1 East Coast Region Overview	7
4.2 Assumptions	8
4.3 Scenario 1	8
4.3.1 Large-scale Owners' Estate	9
4.3.2 Small-scale Owners' Estate	10
4.3.3 Wood Availability from the Combined Estate for Scenario 1	11
4.4 Scenario 2	11
4.5 Scenario 3	13
4.6 Scenario 4	15
4.7 Douglas-fir	16
5. COMPARISON OF THE WOOD AVAILABILITY FORECASTS: 2008 VS 2014	19
6. CONCLUDING COMMENTS	23

Table of Figures

Figure 2-1A: Scenario 1: Large-scale Owners Harvest at Stated Intentions, Small- Scale Owners Harvest at Age 28	3
Figure 4-1: East Coast Age-class Distribution by Species – All Owners as at 1 April 2013	7
Figure 4-2: East Coast Age-class Distribution by Owner – All Species as at 1 April 2013	7
Figure 4-3: East Coast Age-class Distribution of Radiata Pine – All Owners Estate as at 1 April 2013	9

Figure 4-4: East Coast Age-class Distribution of Radiata Pine – Large-Scale Owners as at 1 April 2013	9
Figure 4-5: East Coast Radiata Pine Availability under Scenario 1 – Large-Scale Owners	10
Figure 4-6: East Coast Age-class Distribution of Radiata Pine – Small-Scale Owners as at 1 April 2013	10
Figure 4-7: East Coast Radiata Pine Availability under Scenario 1 – by Owner	11
Figure 4-8: East Coast Radiata Pine Availability under Scenario 2 – by Owner	12
Figure 4-9: East Coast Average Radiata Pine Clearfell Age under Scenario 2 – by Ownership Category	12
Figure 4-10: East Coast Radiata Pine Availability under Scenario 3 – by Owner	13
Figure 4-11: East Coast Average Radiata Pine Clearfell Age under Scenario 3 – by Ownership Category	14
Figure 4-12: East Coast Radiata Pine Availability under Scenario 3 – by Log Grade (all owners)	14
Figure 4-13: East Coast Radiata Pine Availability by Target Rotation Age under Scenario 4 – All Owners	15
Figure 4-14: East Coast Average Radiata Pine Clearfell Age by Target Rotation Age under Scenario 4 – All Owners	16
Figure 4-15: East Coast Age-class Distribution of Douglas-fir – All Owners as at 1 April 2013	17
Figure 4-16: East Coast Douglas-fir Availability under Scenario 5 – by Owner	17
Figure 4-17: East Coast Average Douglas-fir Clearfell Age – All Owners	18
Figure 5-1: Wood Availability Forecasts (All Radiata Pine): 2008 vs 2014	19
Figure 5-2: Area Age-Class Comparisons: NEFD 2005 vs NEFD 2013	20
Figure 5-3: Pre 1990 Unpruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts	21
Figure 5-4: Post 1989 Unpruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts	21
Figure 5-5: Pre 1990 Pruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts	22
Figure 5-6: Post 1989 Pruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts	22

1. INTRODUCTION

This report presents the findings from a 2014 wood availability study of the East Coast planted forest estate based on the MPI National Exotic Forest Description (NEFD) as at 1 April 2013. 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 maturing forest resource in the East Coast could be harvested over the 2014 to 2050 period. The scenarios are based on the available resource in each 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 East Coast 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 distinct 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 owners' objectives and market conditions. Any change in harvesting strategies by forest owners affects the age-structure and maturity of the forests it owns. 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 owners' 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. 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 East Coast wood supply region. Their feedback was taken into account in the final derived profiles.

There are around 2 939 ha of species other than radiata pine and Douglas-fir in the East Coast region. The volumes from these species are not included in the wood availability forecasts.

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). The total wood availability of radiata pine from the region is modelled 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 East Coast 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 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 (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 East Coast (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 2014 to 2034. Then once the “bulge” of forest area planted during the 1990s has been harvested, the model lets the volume decline again.

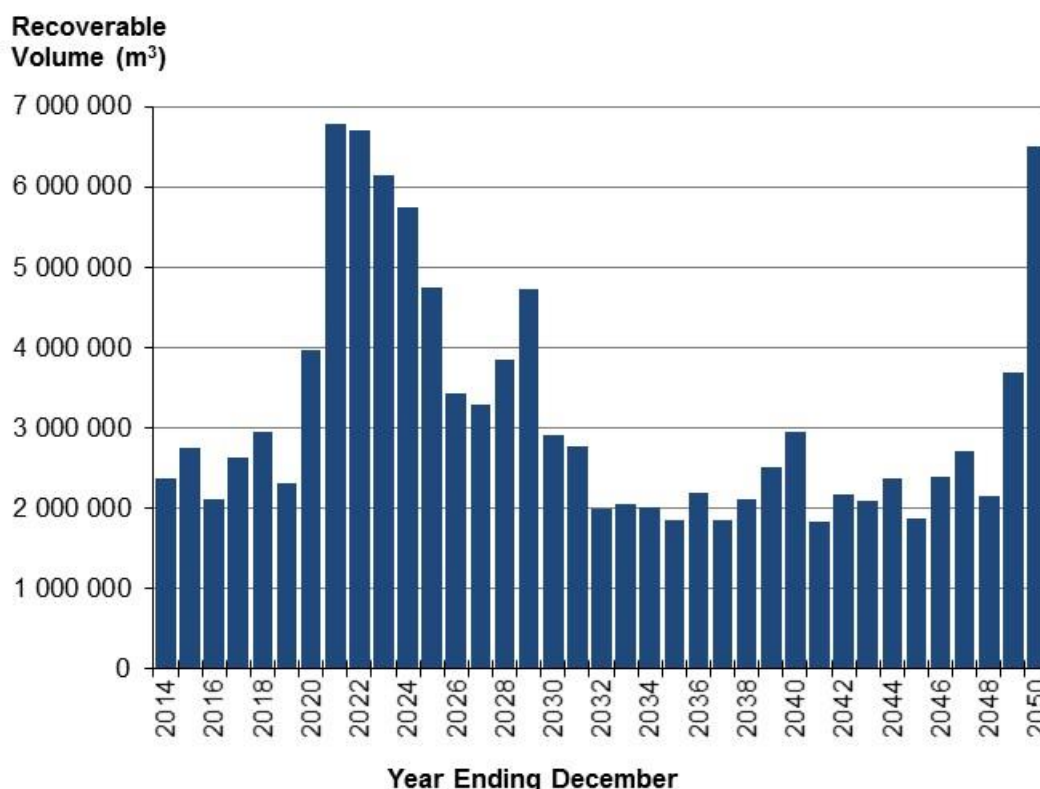
The main limitations of scenarios 2 to 4 are that log prices and other market factors are a significant determinant of harvesting in any given year. When log prices go up, harvesting will generally increase. When log prices fall, the level of harvesting will generally decrease. It is beyond the scope of this analysis to predict future log prices.

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. The target rotation age is 40 years for Douglas-fir (45 years was used in the 2008 forecasts).

Illustration of Wood Availability Scenarios (East Coast Radiata Pine Forecasts)

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





Indufor

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

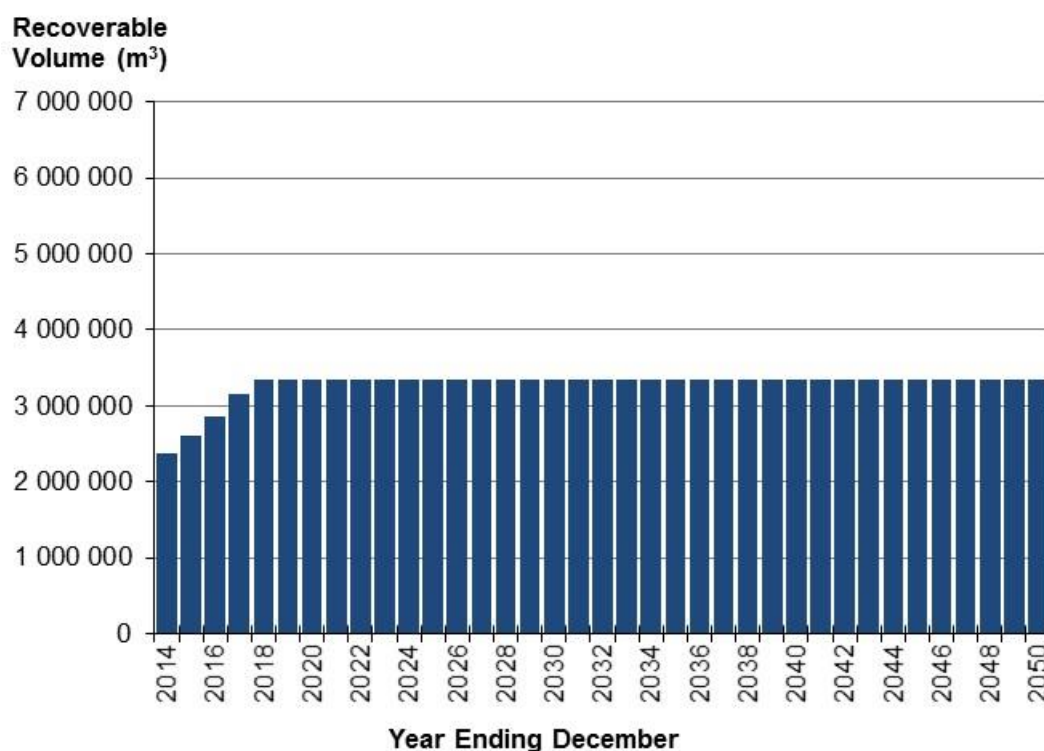
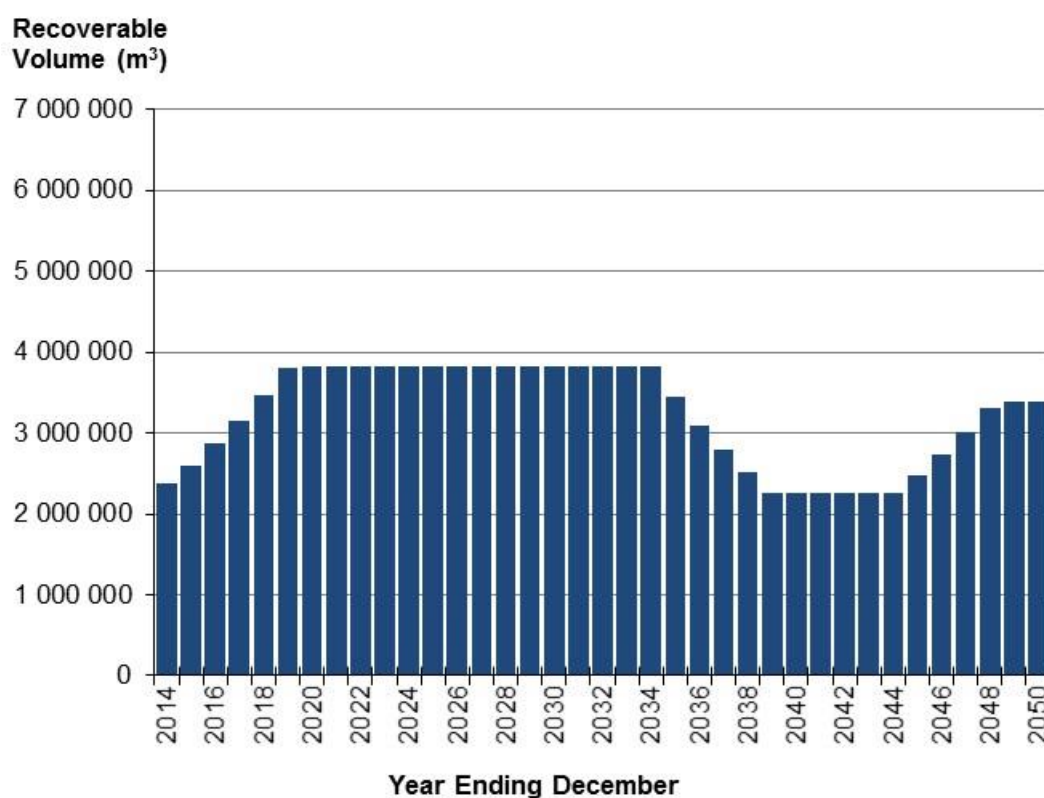


Figure 2-1C: Scenario 3: Large-scale Owners Harvest at Stated Intentions. Overall Split Non-Declining Yield with Target Rotation of 28 Years



3. DATA

3.1 Method Used to Obtain Forest Areas

The forest areas were sourced from the NEFD as at 1 April 2013 (MPI 2013). 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 5% was applied to all areas age 1 to 4 to reflect losses in stocked area due to factors such as erosion and slips.

3.2 Method Used to Develop Yield Tables

In 2006, new yield tables for East Coast 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 2006 were utilised, but were again calibrated to the harvest intentions information provided by large forest owners (essentially the process described in the third bullet point above was redone 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 eight 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.



Indufor

The large-scale owners (as per the definition provided in Section 1) who provided their harvest intentions were:

- Ernslaw One
- Hikurangi Forest Farms
- Juken New Zealand
- Mangatu Blocks Incorporation
- Crown Forestry
- Permanent Forests
- Tauwhareparae Farms
- Timbergrow

4. WOOD AVAILABILITY FORECASTS FOR EAST COAST

4.1 East Coast Region Overview

The East Coast region has a plantation resource of 156 432 ha (as at 1 April 2013), located in one territorial authority – Gisborne.

99% of the modelled resource consists of radiata pine and the remainder Douglas-fir. Figure 4-1 shows the age-class distribution for the East Coast radiata pine and Douglas-fir estate for both large and small-scale owners combined.

56% of the modelled resource is held by large owners and 44% by small owners (Figure 4-2).

Figure 4-1: East Coast Age-class Distribution by Species – All Owners as at 1 April 2013

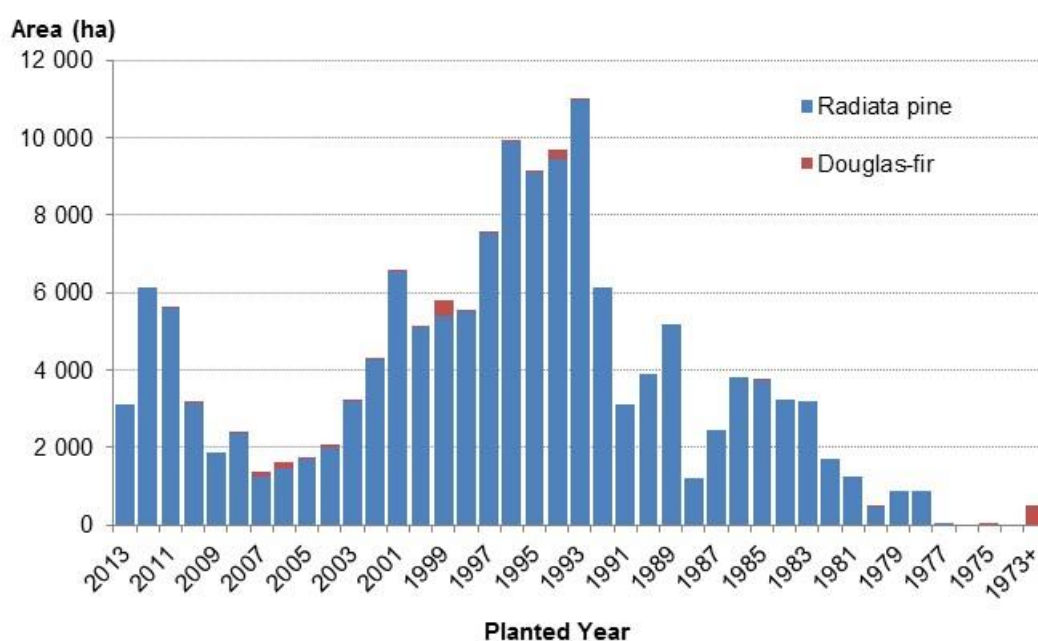
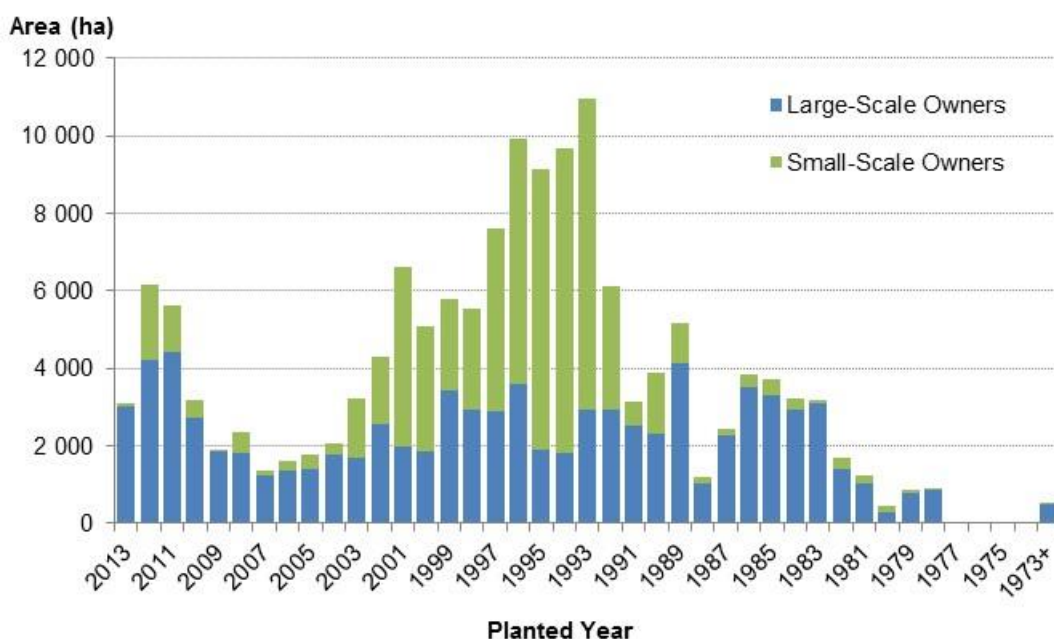


Figure 4-2: East Coast Age-class Distribution by Owner – All Species as at 1 April 2013



4.2 Assumptions

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

- All areas are replanted, with a regeneration lag of one year. In the large-scale resource, all areas currently pruned are replanted into pruned regimes. However, in the small-scale estate, only 50 percent of pruned regimes remain as pruned on regeneration, with the rest transferring to an unpruned regime.
- On regeneration from first rotation to second rotation areas, a 3 percent area loss is assumed to account for roads, skid-sites, slips, and inaccessible areas. Areas planted 1990 and earlier are assumed to be second rotation, and post-1990 are assumed to be first rotation forests.
- Based on discussions with major forest owners and consultants in the region, it was determined that conversion of forests to other land uses was not being undertaken at a sufficient rate for it to be incorporated into the wood availability forecasts.
- The area awaiting replanting as at 31 March 2013 is included as area at age 0 (that is, the area to be replanted in the 2013 planting season).
- Small-scale owner areas awaiting replanting as at 31 March 2012 are assumed to have been replanted in 2012 (small owners are only surveyed every second year for the NEFD).
- Total roundwood removals in the East Coast region were estimated to be 2.4 million m³ for the year ended 31 March 2013, made up entirely of which radiata pine and Douglas-fir removals. This was used to derive the harvest level for the first year of the model.
- Radiata pine areas in the large-scale owners' estate aged over 35 years are assumed to be non-commercial and therefore will not be harvested.
- Radiata pine areas in the small-scale owners' estate aged over 40 years are assumed to be non-commercial and therefore will not be harvested.

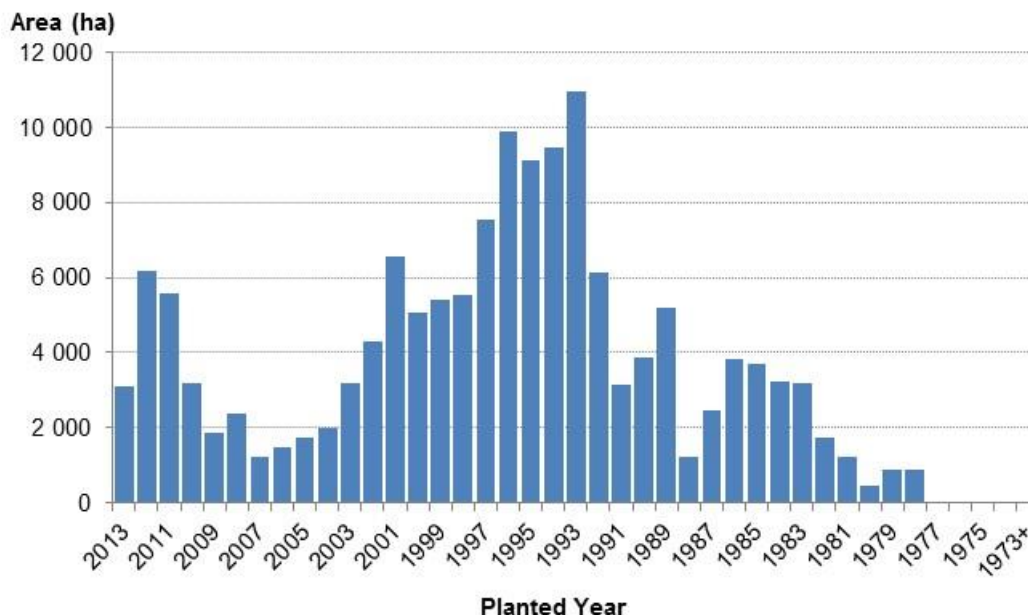
4.3 Scenario 1

In this scenario, large-scale owners harvest in line with their stated intentions and small-scale owners harvest their forests at age 28. Figure 4-3 shows the age-class distribution for the East Coast radiata pine estate for both large and small-scale owners combined.



Indufor

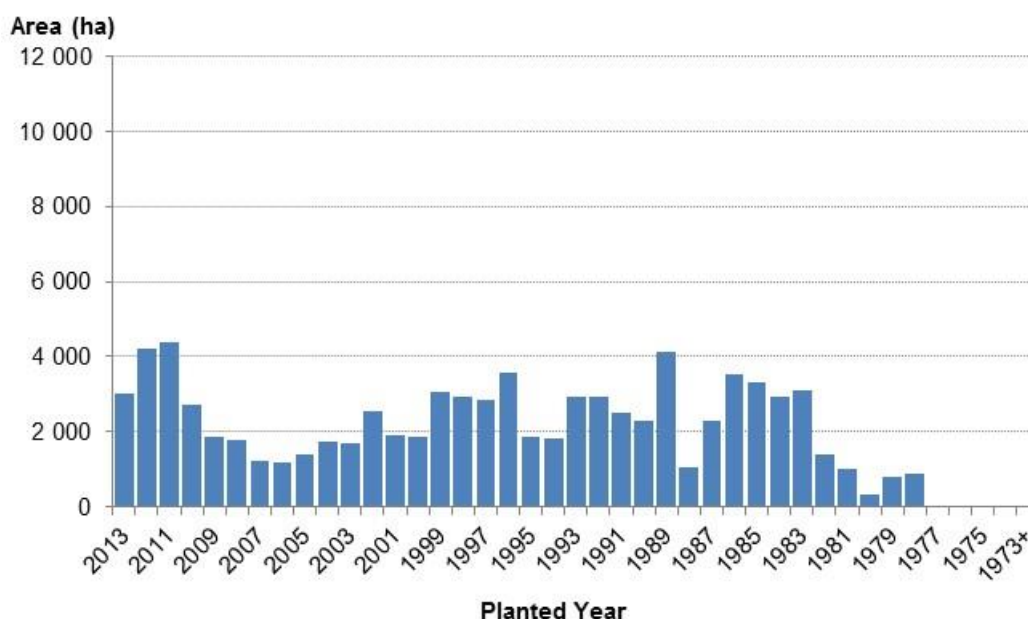
Figure 4-3: East Coast Age-class Distribution of Radiata Pine – All Owners Estate as at 1 April 2013



4.3.1 Large-scale Owners' Estate

The age-class distribution of the large-scale owners' estate is shown in Figure 4-4, and shows a reasonably even age profile. In addition, a total of 3 111 ha of large-scale owner bare land is awaiting replanting.

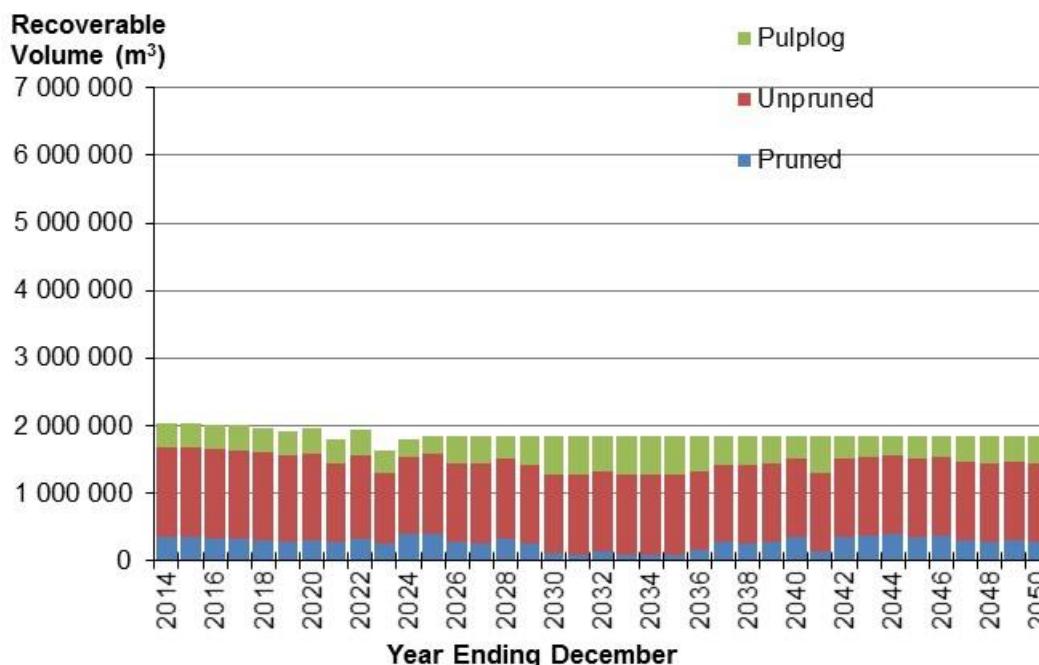
Figure 4-4: East Coast Age-class Distribution of Radiata Pine – Large-Scale Owners as at 1 April 2013



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. Reflecting the relatively even age class distribution of the

large-scale resource, the wood availability of large-scale owners (Figure 4-5) is forecast to reduce slightly from current and near term levels, to steady at just under 2 million m³ per year.

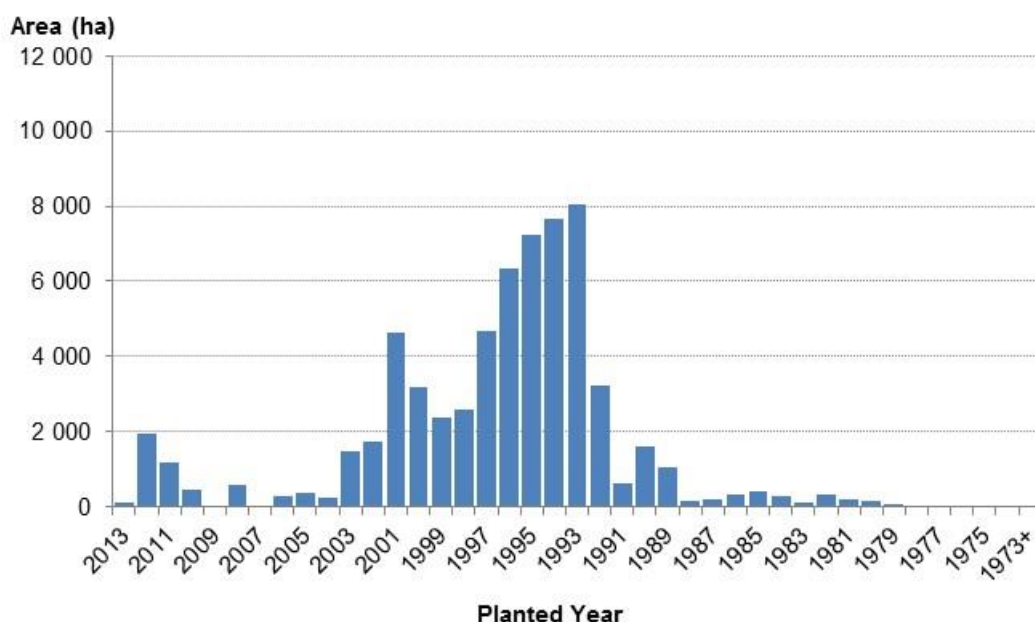
Figure 4-5: East Coast Radiata Pine Availability under Scenario 1 – Large-Scale Owners



4.3.2 Small-scale Owners' Estate

In contrast to the large owners' estate, the age-class distribution of the small-scale owners' estate (Figure 4-6) is very irregular, with significant areas planted between 1993 and 2001 (currently 12 to 20 years old) and much less area in all other age-classes. The wood availability from this estate will be significantly influenced by the timing of the harvest of these age classes.

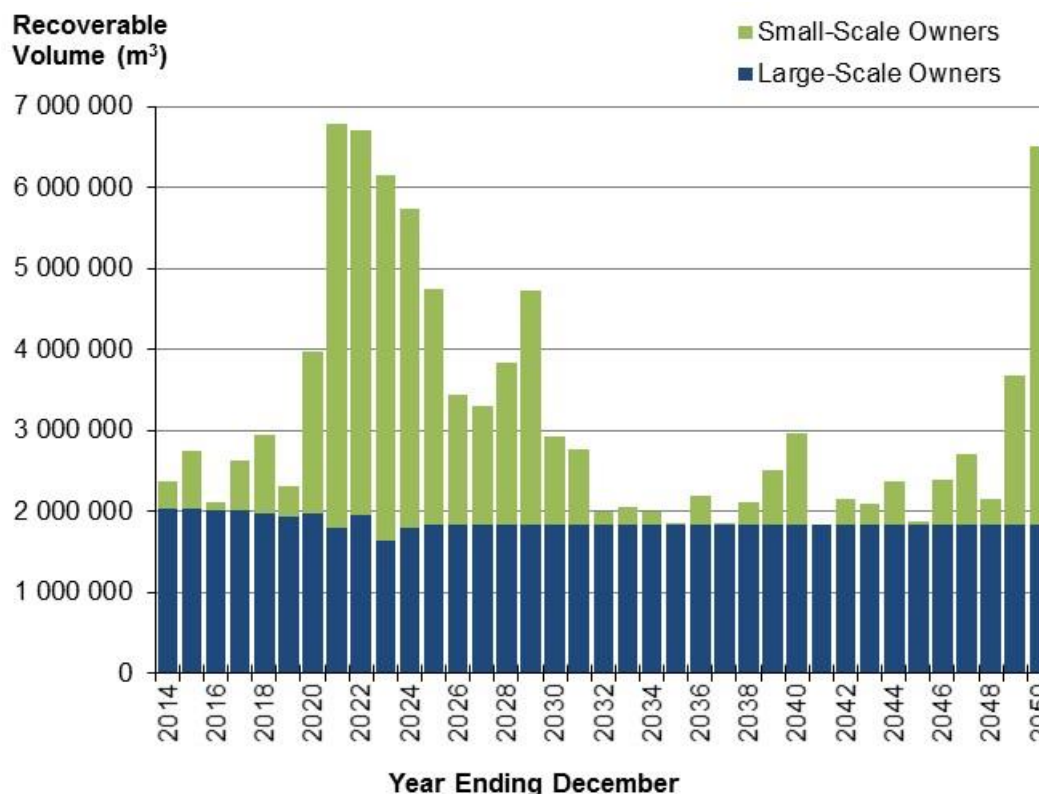
Figure 4-6: East Coast Age-class Distribution of Radiata Pine – Small-Scale Owners as at 1 April 2013



4.3.3 Wood Availability from the Combined Estate for Scenario 1

The wood availability from all owners in East Coast is presented in Figure 4-7. The large-scale owners' resource is shown as the "base" volume, and the forecasts match the volumes in Figure 4-5. 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 4-7: East Coast Radiata Pine Availability under Scenario 1 – by Owner



The large increase in harvest volume after 2020 (Figure 4-7) reflects the maturing of the small-scale owners' estate. For example, the increase in 2021 is a consequence of the 8 039 ha planted by small-scale owners in 1993 (Figure 4-6) being harvested at age 28 years.

Fluctuations in harvest volumes of the magnitude shown in Figure 4-7 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).

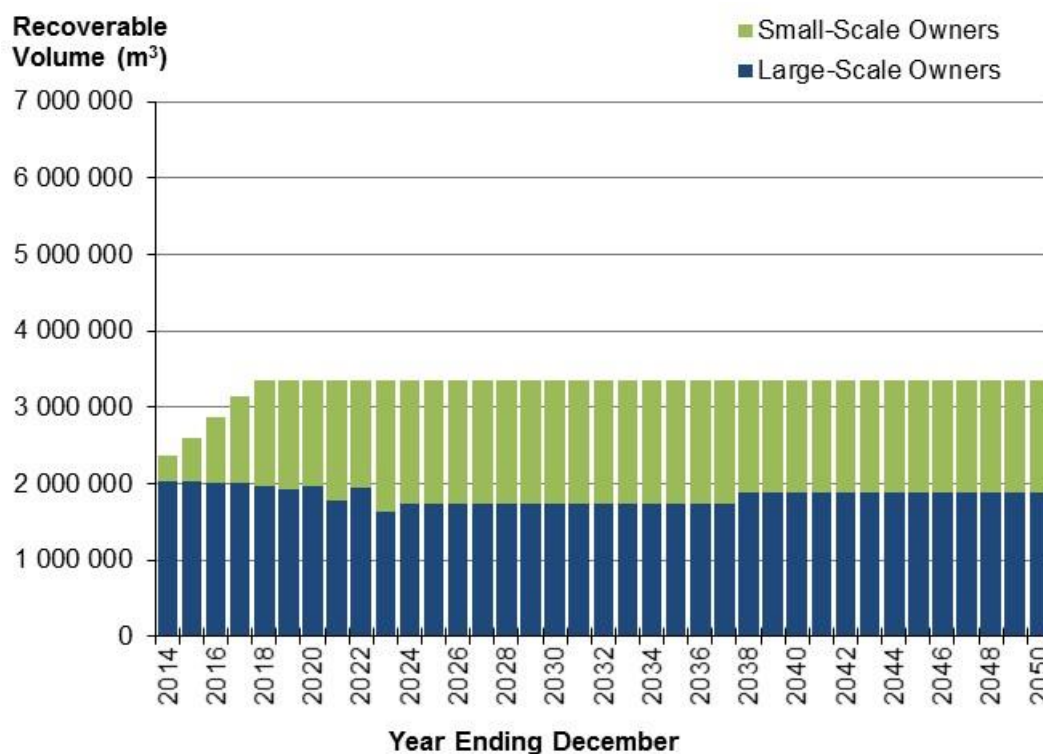
4.4 Scenario 2

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, with a target rotation age of 28 years. Figure 4-8 indicates that a gradual increase in the small-scale owners' estate is possible. This could increase from 0.34 million m³ in 2014 to 1.5-1.7 million m³ from 2023. The overall harvest level is steady at a little under 3.4 million m³ per year.



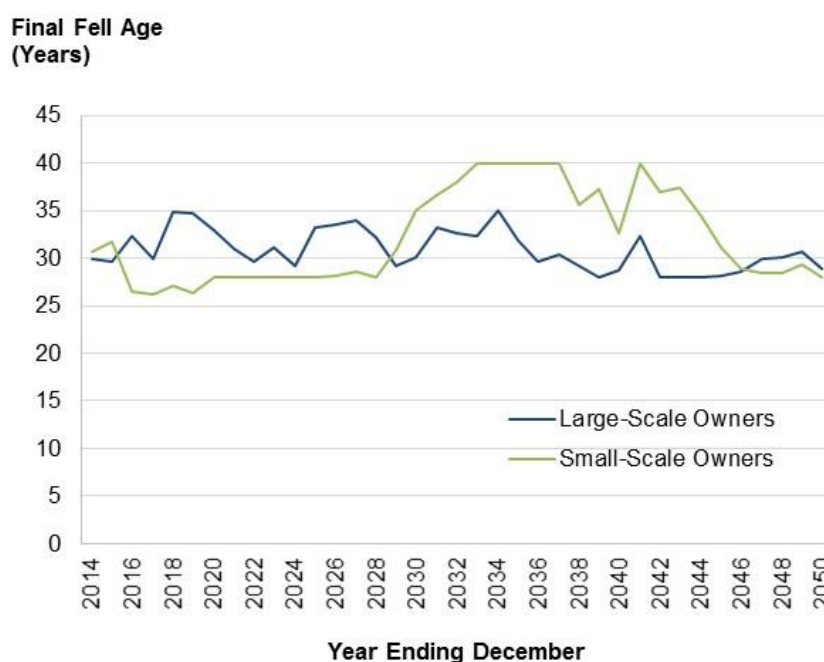
Indufor

Figure 4-8: East Coast Radiata Pine Availability under Scenario 2 – by Owner



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 4-9).

Figure 4-9: East Coast Average Radiata Pine Clearfell Age under Scenario 2 – by Ownership Category



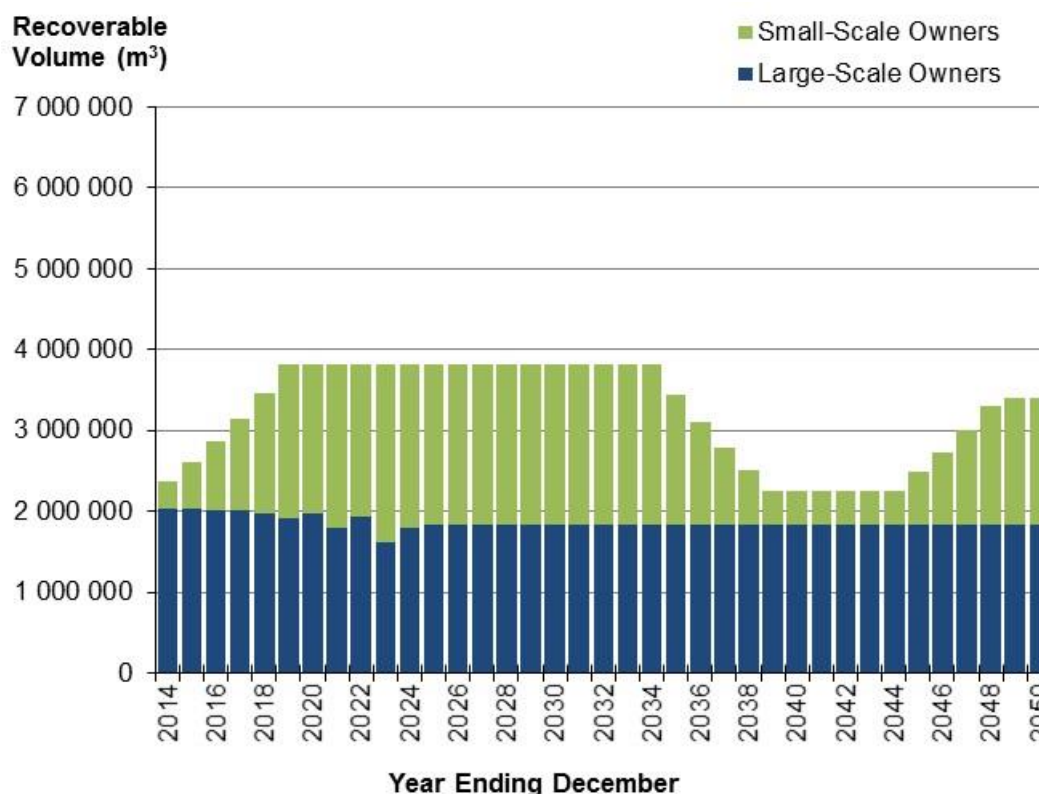
4.5 Scenario 3

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). Wood availability increases from 2.4 million m³ in 2014 to 3.8 million m³ in 2019, and this is maintained until 2034. Harvest volumes then dip to around 2.2 million m³ in 2039 to 2044, before increasing to 3.4 million m³ per year from 2049.

The main difference from scenario 2 is that the large area of young stands in the small-scale owners' estate is assumed to be harvested over a shorter period of time, although the total volume was modelled not to decrease between 2014 and 2034.

A consequence of there being more flexibility over when the small-scale owner estate is harvested, is that the average clearfell age for small-scale owners stays closer to the target of 28 years than in scenario 2 (Figure 4-11).

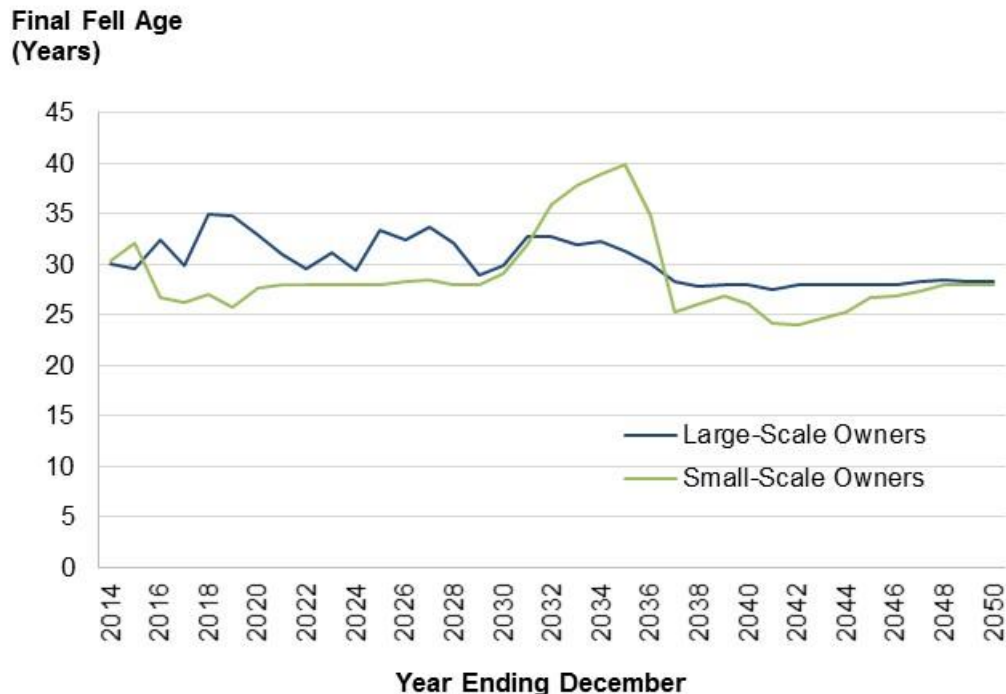
Figure 4-10: East Coast Radiata Pine Availability under Scenario 3 – by Owner





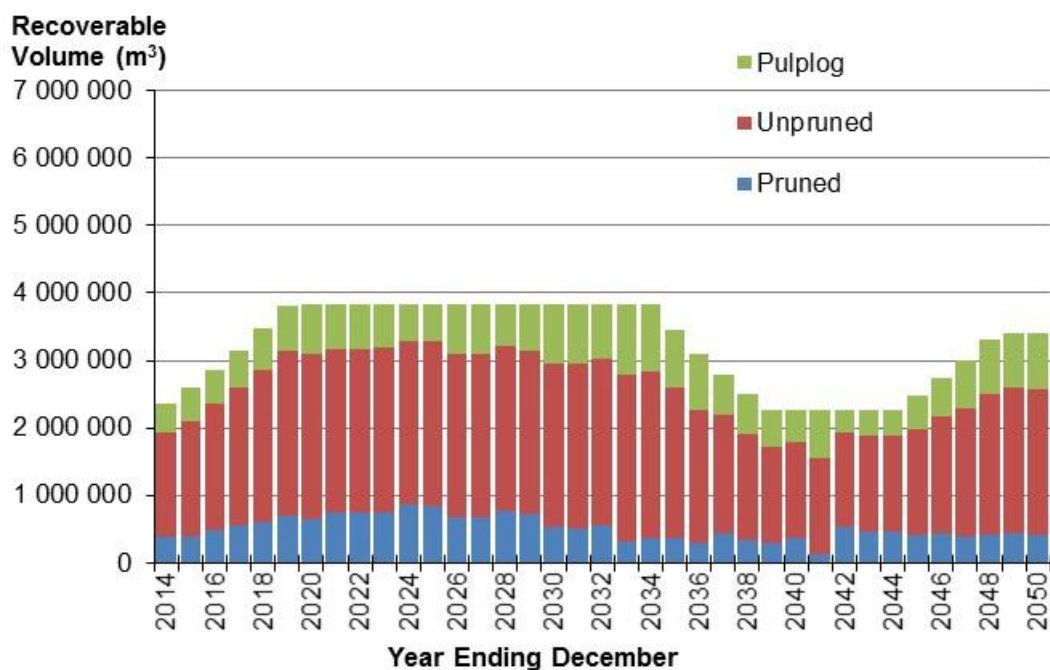
Indufor

Figure 4-11: East Coast 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: East Coast Radiata Pine Availability under Scenario 3 – by Log Grade (all owners)



4.6 Scenario 4

Target rotation ages of 26 and 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 partially loosened for the 26 and 30 year target rotations to allow these rotation lengths to be more closely matched. Figure 4-14 still illustrates however the difficulty in achieving the desired rotation lengths within the overall harvesting constraints imposed by the scenario.

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

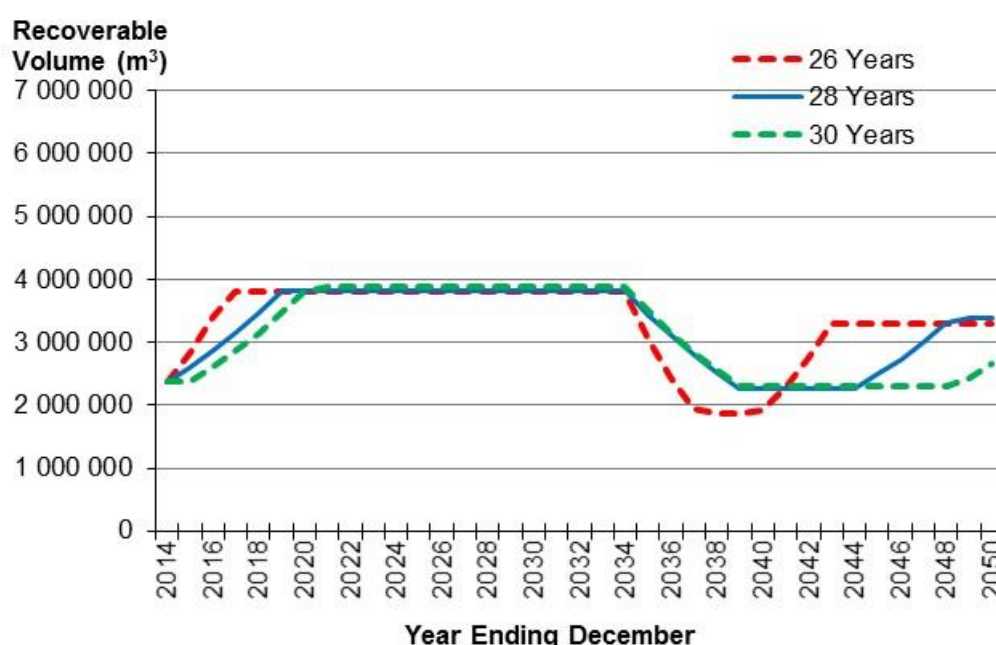
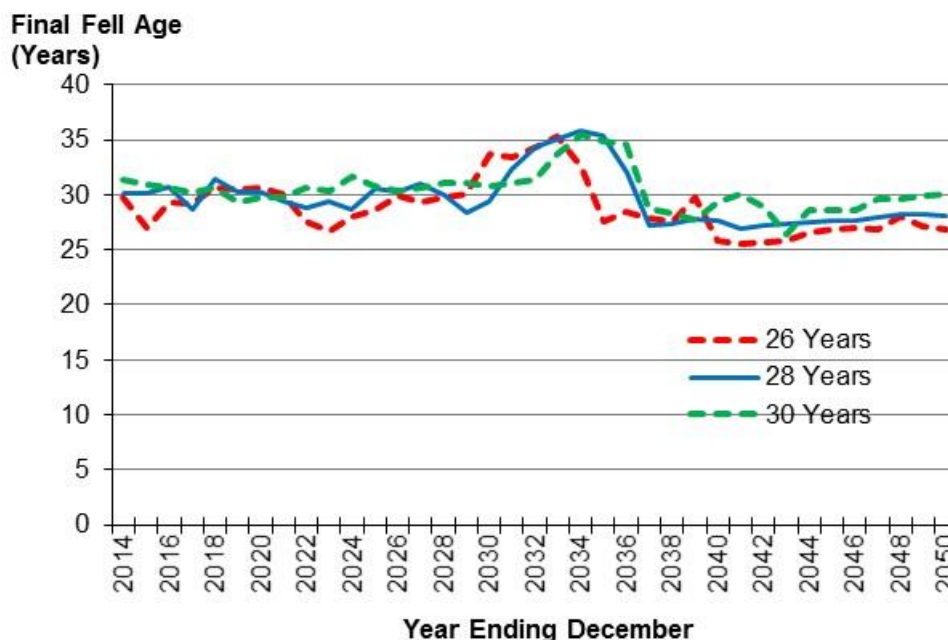


Figure 4-14: East Coast Average Radiata Pine Clearfell Age by Target Rotation Age under Scenario 4 – All Owners



4.7 Douglas-fir

The area of Douglas-fir in the East Coast is less than 2 000 ha, and exhibits an uneven age class distribution, as shown in Figure 4-15.

The Douglas-fir harvest for the large-scale owners' estate is based on intentions for 2014 to 2023. After 2023, the wood availability from large-scale owners is limited to an upper limit of 50 000 m3 per year (Figure 4-16).

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 4-17.



Indufor

Figure 4-15: East Coast Age-class Distribution of Douglas-fir – All Owners as at 1 April 2013

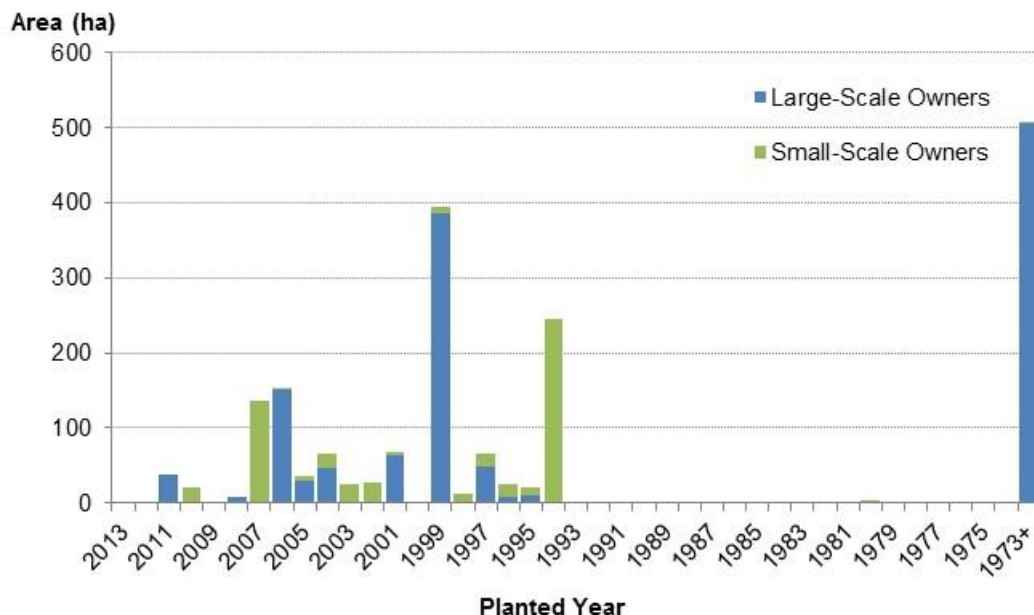


Figure 4-16: East Coast Douglas-fir Availability under Scenario 5 – by Owner

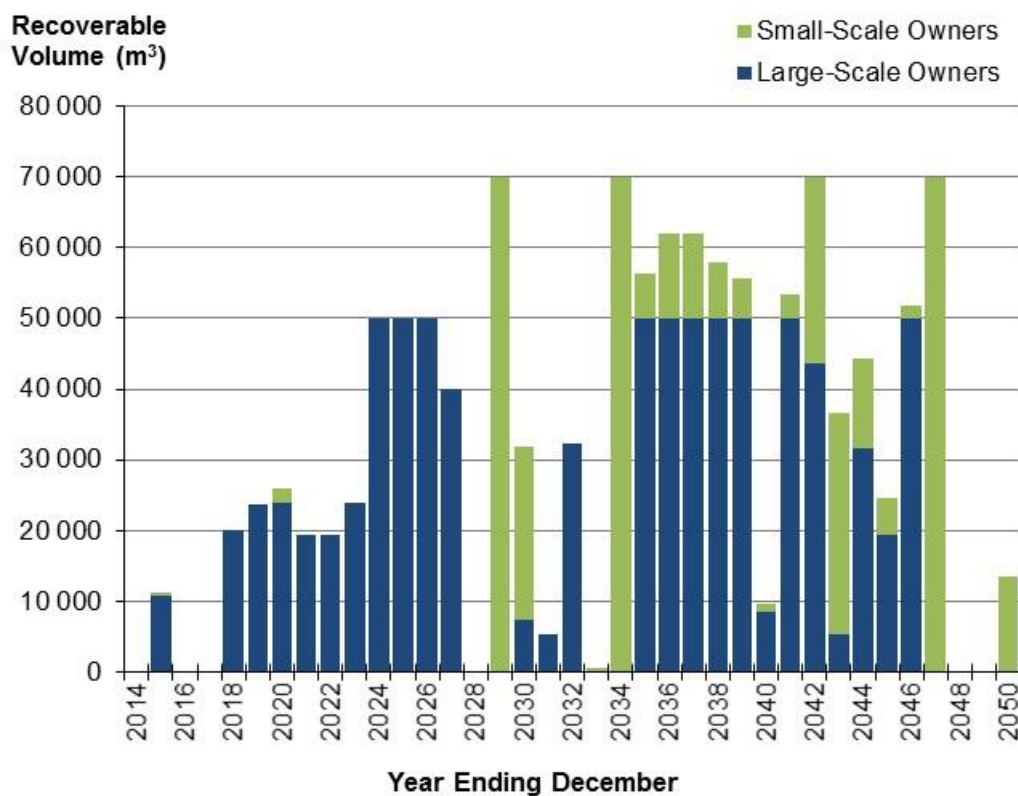
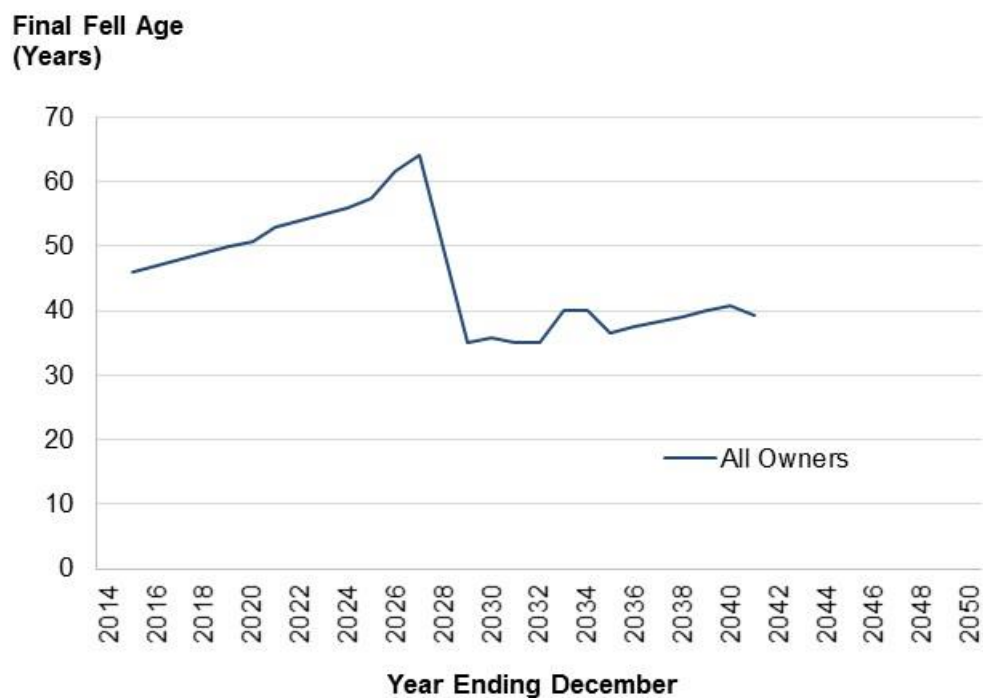


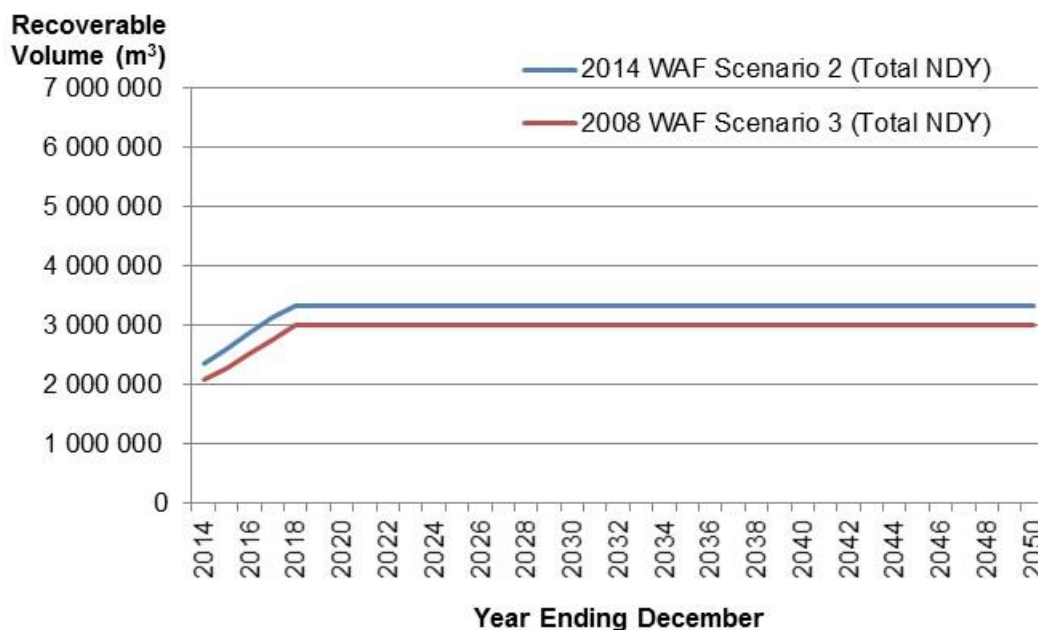
Figure 4-17: East Coast Average Douglas-fir Clearfell Age – All Owners



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). The 2014 forecast shows a sustained harvest level of just under 3.4 million m³ per year, up from the 3.0 million m³ projected from the 2008 forecast (a 12% increase).

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



There are several factors that are contributing to the variations. These factors include (refer Table 5-1):

- There has been some maturing of the East Coast resource; the average age has increased from 12.9 years in 2005, to 16.4 years in 2013, and the total area has increased by 3.2%. A comparison of the area-age class distribution at each reporting date is shown in Figure 5-2.
- The calibrated 2014 yield tables are 6.2% higher than the equivalent yield tables used in the 2008 forecasts (see Figure 5-3 to Figure 5-6). Discussions with forest owners indicate this will be due to a combination of improved genetic material, and higher final crop stockings. In addition, there is now a greater proportion of the estate described by the higher yielding post-1989 yield tables.
- Furthermore, radiata pine's target rotation age for the 2008 forecasts was 30 years, whereas the target rotation for the 2014 forecasts is 28 years. This allows the forests to be cut earlier and sustain a higher non-declining yield.

Table 5-1: Key Differences between 2008 and 2014 WAF

Item	2008 WAF	2014 WAF	Change
Stocked Area (ha)	142 214	146 737	3.2%
Average Age (years)	12.9	16.4	26.4%
Productivity (m ³ /ha @ age 30)	596	633	6.2%
CF Age Target (years)	30	28	-6.7%
Harvested Volume (million m ³)	108.7	121.4	11.7%
Harvested Area (ha)	164 584	180 337	9.6%
Annual Sustainable Harvest (million m ³)	3.0	3.4	13.3%

Figure 5-2: Area Age-Class Comparisons: NEFD 2005 vs NEFD 2013

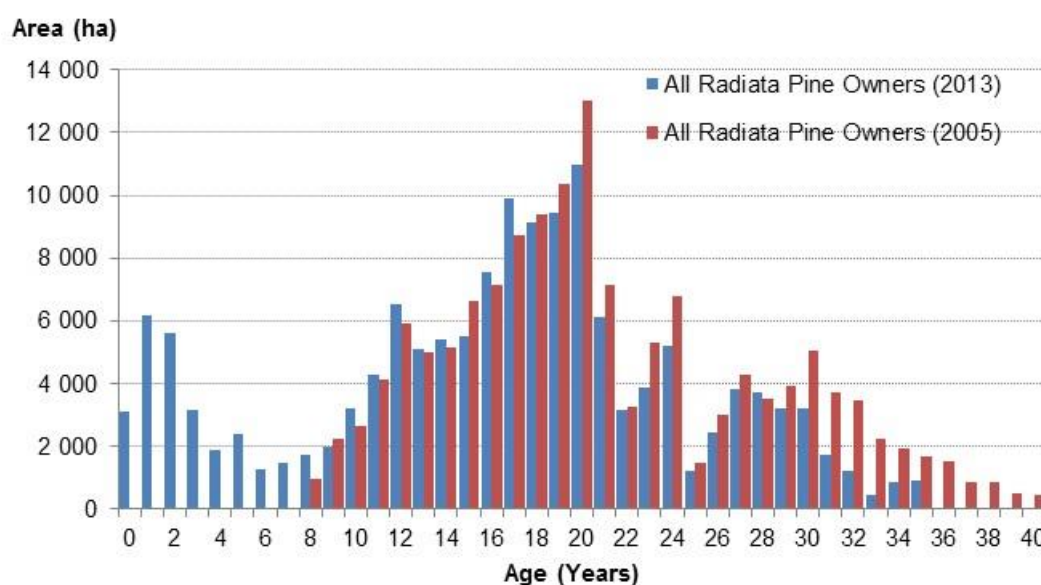


Figure 5-3: Pre 1990 Unpruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts

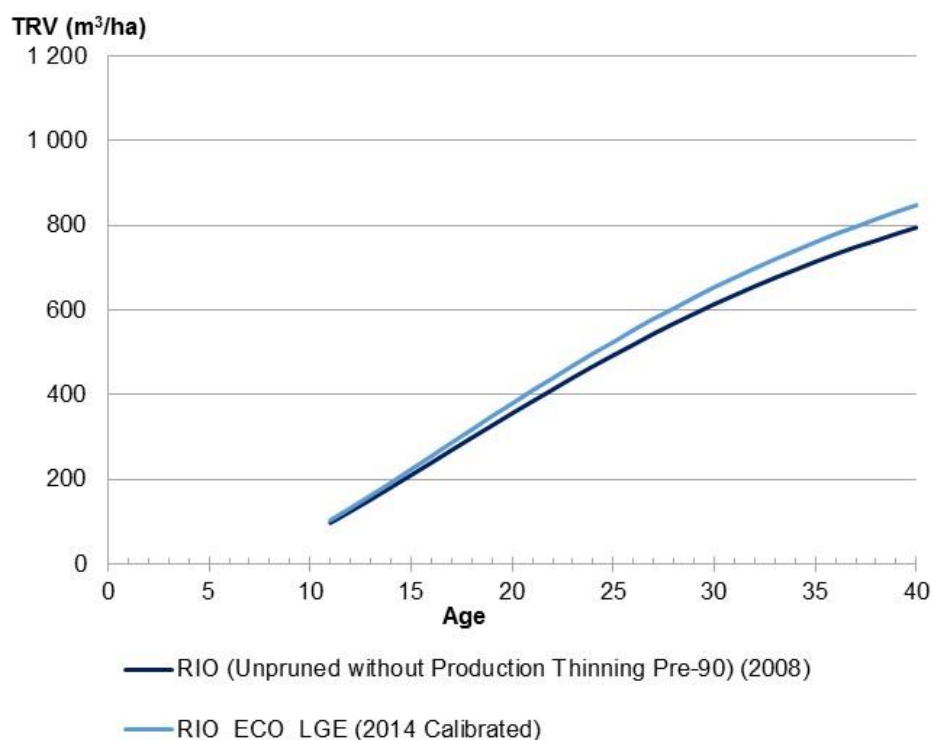
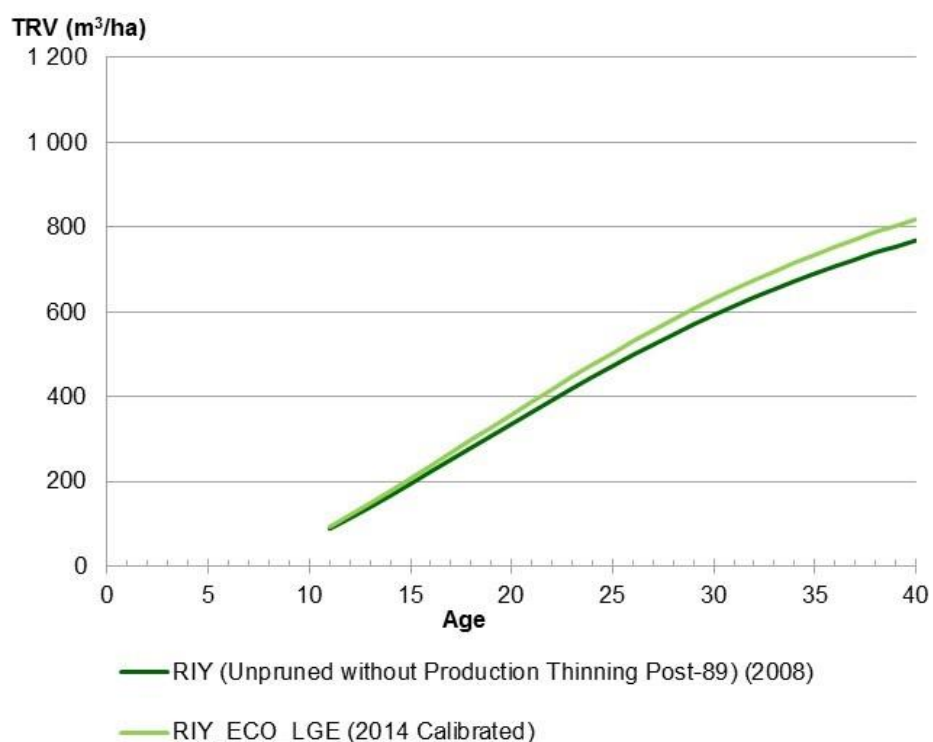


Figure 5-4: Post 1989 Unpruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts





Indufor

Figure 5-5: Pre 1990 Pruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts

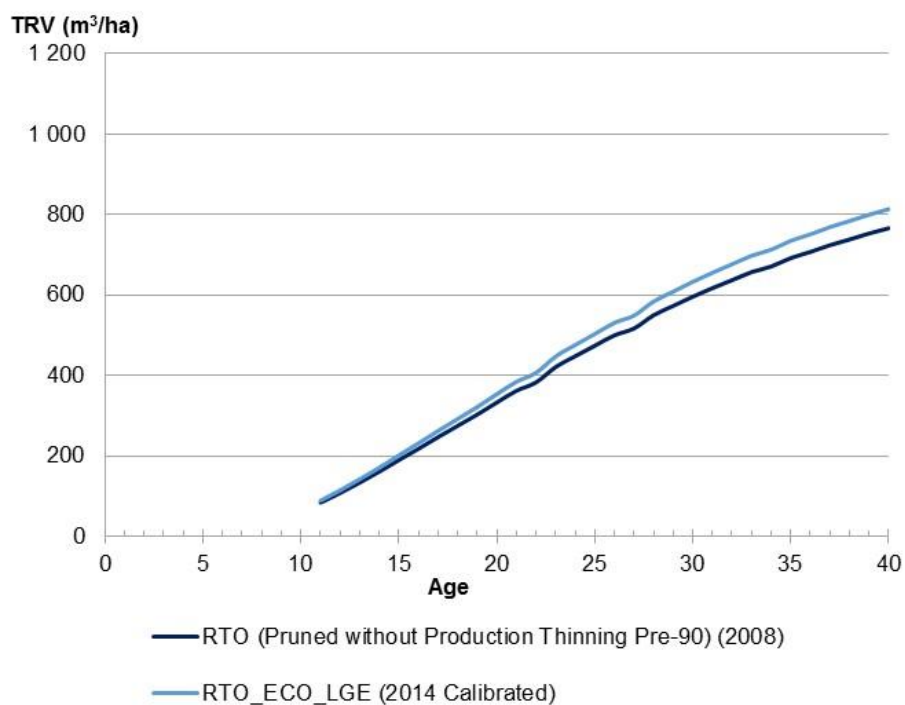
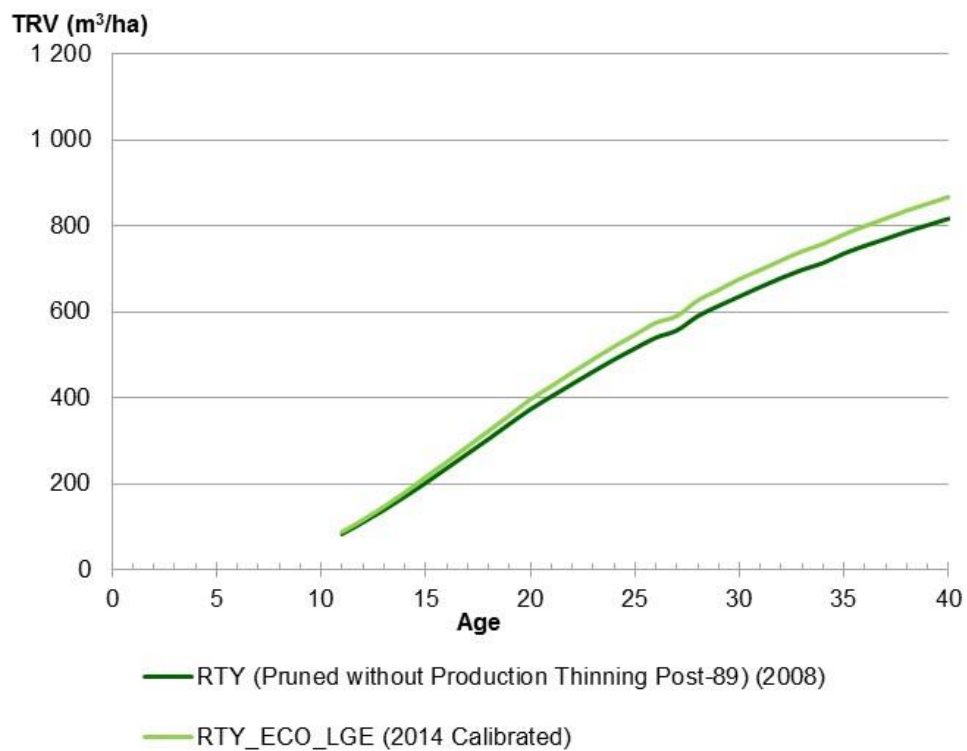


Figure 5-6: Post 1989 Pruned Yield Tables: 2008 vs 2014 Wood Availability Forecasts



6. CONCLUDING COMMENTS

Wood availability from the East Coast wood supply region's planted forest resource has the potential to increase significantly between 2020 and 2030. However, this increase would not be sustainable. In non-declining yield terms, a harvest level of just under 3.4 million m³ per year can be maintained, compared to the current harvest of 2.4 million m³.

Scenario 3 showed that the harvest could increase to 3.8 million m³ by 2018, and this could be sustained until 2034.

A more variable target clearfell age allows the harvest profile to be extended or retracted (Scenario 4a and 4b), although the periods of sustained harvest are at a similar level.

Most of the potential increase in wood availability from 2020 to 2030 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 to what level is reached.

It should also be noted that some of the assumptions and inputs used for the 2014 forecasts have been modified from those applied in the 2008 forecasts. For example, some of the forest owners were previously categorised as small-scale owners but they have been now categorised as large-scale owners.

Furthermore, the area information from the NEFD as at 1 April 2013 has reported some variations from the NEFD as at 1 April 2005, which was used in the 2008 forecasts. MPI has applied a consistent methodology and approach in compiling the NEFD data in both 2005 and 2013. Therefore, these area variances are more likely due to how the forest owners have responded to the MPI survey. Indufor has relied on the area descriptions provided in the NEFD as at 1 April 2013 without further investigating these area variations.

Appendix – East Coast Wood Availability Forecast for the Period 2014 to 2050

Table 1: East Coast 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	2 026	342	2 368
2015	2 029	723	2 752
2016	2 015	92	2 107
2017	2 018	614	2 632
2018	1 967	978	2 945
2019	1 925	382	2 307
2020	1 969	1 996	3 965
2021	1 788	4 992	6 780
2022	1 944	4 756	6 700
2023	1 628	4 516	6 143
2024	1 791	3 955	5 745
2025	1 836	2 917	4 753
2026	1 836	1 596	3 433
2027	1 836	1 459	3 295
2028	1 836	2 001	3 838
2029	1 836	2 890	4 726
2030	1 836	1 079	2 915
2031	1 836	925	2 761
2032	1 836	156	1 992
2033	1 836	211	2 047
2034	1 836	165	2 001
2035	1 836	14	1 850
2036	1 836	356	2 192
2037	1 836	5	1 841
2038	1 836	269	2 105
2039	1 836	670	2 506
2040	1 836	1 120	2 956
2041	1 836	0	1 836
2042	1 836	323	2 159
2043	1 836	256	2 092
2044	1 836	538	2 374
2045	1 836	38	1 875
2046	1 836	554	2 390
2047	1 836	875	2 711
2048	1 836	317	2 153
2049	1 836	1 848	3 684
2050	1 836	4 678	6 514

Note: IB denotes inside bark.

Table 2: East 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**

	Large-Scale Owners (000 m3 IB)	Small-Scale Owners (000 m3 IB)	All Owners (000 m3 IB)
2014	2 026	342	2 368
2015	2 029	576	2 605
2016	2 015	850	2 865
2017	2 018	1 134	3 152
2018	1 967	1 380	3 347
2019	1 925	1 422	3 347
2020	1 969	1 377	3 347
2021	1 788	1 558	3 347
2022	1 944	1 403	3 347
2023	1 628	1 719	3 347
2024	1 729	1 617	3 347
2025	1 729	1 617	3 347
2026	1 729	1 617	3 347
2027	1 729	1 617	3 347
2028	1 729	1 617	3 347
2029	1 729	1 617	3 347
2030	1 729	1 617	3 347
2031	1 729	1 617	3 347
2032	1 729	1 617	3 347
2033	1 729	1 617	3 347
2034	1 729	1 617	3 347
2035	1 729	1 617	3 347
2036	1 729	1 617	3 347
2037	1 729	1 617	3 347
2038	1 878	1 468	3 347
2039	1 878	1 468	3 347
2040	1 878	1 468	3 347
2041	1 878	1 468	3 347
2042	1 878	1 468	3 347
2043	1 878	1 468	3 347
2044	1 878	1 468	3 347
2045	1 878	1 468	3 347
2046	1 878	1 468	3 347
2047	1 878	1 468	3 347
2048	1 878	1 468	3 347
2049	1 878	1 468	3 347
2050	1 878	1 468	3 347

Note: IB denotes inside bark.

Table 3: East Coast 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	2 026	342	2 368	389	1 555	425	2 368
2015	2 029	576	2 605	387	1 704	513	2 605
2016	2 015	850	2 865	487	1 863	516	2 865
2017	2 018	1 134	3 152	548	2 041	563	3 152
2018	1 967	1 500	3 467	599	2 248	619	3 467
2019	1 925	1 889	3 814	691	2 448	674	3 814
2020	1 969	1 856	3 825	657	2 451	718	3 825
2021	1 788	2 037	3 825	736	2 443	647	3 825
2022	1 944	1 882	3 825	746	2 423	656	3 825
2023	1 628	2 198	3 825	752	2 435	638	3 825
2024	1 791	2 035	3 825	859	2 427	540	3 825
2025	1 837	1 988	3 825	851	2 432	543	3 825
2026	1 837	1 988	3 825	665	2 432	729	3 825
2027	1 837	1 988	3 825	661	2 437	727	3 825
2028	1 837	1 988	3 825	775	2 429	622	3 825
2029	1 837	1 988	3 825	715	2 419	692	3 825
2030	1 837	1 988	3 825	519	2 430	877	3 825
2031	1 837	1 988	3 825	497	2 449	879	3 825
2032	1 837	1 988	3 825	552	2 462	812	3 825
2033	1 837	1 988	3 825	318	2 467	1 040	3 825
2034	1 837	1 988	3 825	362	2 472	991	3 825
2035	1 837	1 606	3 443	371	2 223	849	3 443
2036	1 837	1 262	3 099	290	1 982	826	3 099
2037	1 837	952	2 789	444	1 747	598	2 789
2038	1 837	673	2 510	336	1 583	592	2 510
2039	1 837	422	2 259	297	1 428	533	2 259
2040	1 837	422	2 259	368	1 425	465	2 259
2041	1 837	422	2 259	136	1 427	695	2 259
2042	1 837	422	2 259	519	1 417	323	2 259
2043	1 837	422	2 259	462	1 419	378	2 259
2044	1 837	422	2 259	467	1 420	371	2 259
2045	1 837	648	2 485	407	1 567	511	2 485
2046	1 837	896	2 733	445	1 724	565	2 733
2047	1 837	1 170	3 007	396	1 901	710	3 007
2048	1 837	1 470	3 307	401	2 096	810	3 307
2049	1 837	1 559	3 396	437	2 151	808	3 396
2050	1 837	1 559	3 396	421	2 151	824	3 396

Note: IB denotes inside bark.

Table 4: East Coast 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)	Average Age (Years)	Recoverable Volume target age 28 (000 m3 IB)	Average Age (Years)	Recoverable Volume target age 30 (000 m3 IB)	Average Age (Years)
2014	2 368	29.8	2 368	30.1	2 367	31.4
2015	2 842	26.9	2 605	30.1	2 367	31.0
2016	3 410	29.3	2 865	30.7	2 604	30.7
2017	3 804	29.1	3 152	28.6	2 865	30.3
2018	3 804	30.6	3 467	31.5	3 151	30.6
2019	3 804	30.5	3 814	30.3	3 466	29.3
2020	3 804	30.7	3 825	30.3	3 813	29.8
2021	3 804	30.0	3 825	29.4	3 892	29.7
2022	3 804	27.6	3 825	28.8	3 892	30.7
2023	3 804	26.8	3 825	29.3	3 892	30.4
2024	3 804	28.0	3 825	28.7	3 892	31.7
2025	3 804	28.5	3 825	30.6	3 892	30.8
2026	3 804	29.9	3 825	30.3	3 892	30.3
2027	3 804	29.3	3 825	31.0	3 892	30.7
2028	3 804	29.7	3 825	30.0	3 892	31.0
2029	3 804	30.1	3 825	28.4	3 892	31.0
2030	3 804	33.7	3 825	29.5	3 892	30.7
2031	3 804	33.4	3 825	32.3	3 892	31.1
2032	3 804	34.3	3 825	34.4	3 892	31.3
2033	3 804	35.3	3 825	35.0	3 892	33.6
2034	3 804	32.5	3 825	35.8	3 892	35.5
2035	3 043	27.6	3 443	35.3	3 503	34.8
2036	2 434	28.5	3 099	32.0	3 153	34.5
2037	1 947	27.8	2 789	27.2	2 837	28.8
2038	1 863	27.6	2 510	27.3	2 554	28.3
2039	1 863	29.7	2 259	27.8	2 298	27.7
2040	1 922	25.9	2 259	27.6	2 298	29.3
2041	2 306	25.6	2 259	26.9	2 298	30.0
2042	2 768	25.7	2 259	27.3	2 298	28.8
2043	3 308	25.8	2 259	27.4	2 298	26.5
2044	3 308	26.6	2 259	27.5	2 298	28.6
2045	3 308	26.8	2 485	27.7	2 298	28.6
2046	3 308	27.0	2 733	27.6	2 298	28.6
2047	3 308	26.9	3 007	27.9	2 298	29.7
2048	3 308	28.1	3 307	28.3	2 298	29.7
2049	3 308	27.1	3 396	28.2	2 419	30.0
2050	3 308	26.8	3 396	28.1	2 661	30.0

Note: IB denotes inside bark.

Table 5: East Coast 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	0	0	0	
2015	11	1	11	46.1
2016	0	0	0	
2017	0	0	0	
2018	20	0	20	49.0
2019	24	0	24	50.0
2020	24	2	26	50.7
2021	19	0	19	53.0
2022	19	0	19	54.0
2023	24	0	24	55.0
2024	50	0	50	56.0
2025	50	0	50	57.5
2026	50	0	50	61.6
2027	40	0	40	64.1
2028	0	0	0	
2029	0	70	70	35.0
2030	7	25	32	35.8
2031	5	0	5	35.0
2032	32	0	32	35.0
2033	0	1	1	40.0
2034	0	70	70	40.0
2035	50	6	56	36.4
2036	50	12	62	37.6
2037	50	12	62	38.4
2038	50	8	58	39.1
2039	50	6	56	40.0
2040	9	1	10	40.9
2041	50	3	53	39.3
2042	44	26	70	
2043	5	31	37	
2044	32	13	44	
2045	19	5	25	
2046	50	2	52	
2047	0	70	70	
2048	0	0	0	
2049	0	0	0	
2050	0	13	13	

Note: IB denotes inside bark.



Indufor ...forest intelligence

Indufor Oy
Töölönkatu 11 A, FI-00100 Helsinki
FINLAND
Tel. +358 9 684 0110
Fax +358 9 135 2552
indufor@indufor.fi

Indufor Asia Pacific
7th Floor, 55 Shortland St, PO Box 105 039
Auckland City 1143
NEW ZEALAND
Tel. +64 9 281 4750
www.indufor-ap.com

