OTAGO/SOUTHLAND FOREST INDUSTRY AND WOOD AVAILABILITY FORECASTS

2008

Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

ACKNOWLEDGEMENTS

The publication of this industry profile and wood availability forecasts has been a joint initiative between the Ministry of Agriculture and Forestry and the Southern Wood Council Inc (SWC). This publication builds on the existing *Otago/Southland Forest Industries Profile* published by the SWC. The forecasts in this report were produced by Dr Bruce Manley (New Zealand School of Forestry). The Otago and Southland regional information was written by Dr Parnell Trost, with input from Chris Perley and the profiled companies. Doris Chan, Bridget Geard, Judith Dennis, Paul Lane and Geoff Cameron provided underpinning forest resource and statistical data. Dr Jaap Jasperse, Mike Candy, Claudia Riley and Janine Pollock provided editorial and publishing services.

The Ministry of Agriculture and Forestry thanks the forest owners, managers and consultants who provided industry data for this report, and for the forest resource data and harvesting intentions essential for producing the wood availability forecasts.

ENQUIRIES

Please direct any enquiries regarding the content of this report to Dr Parnell Trost (tel: +64 3 951 4705 or email: Parnell.trost@maf.govt.nz).

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Published by:

MAF Policy
Ministry of Agriculture and Forestry
Pastoral House
25 The Terrace
PO Box 2526
Wellington
New Zealand
Tel: 64 4 894 0100
Fax: 64 4 894 0742
Website: www.maf.govt.nz

ISBN 978-0-478-31180-8 (Print)

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Cover image: Douglas-fir, Ernslaw One forests, Otago. Photography by John Doogan.

Other photos provided by City Forests Limited, Milligan Seeds and South Wood Export Limited.

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1 INTRODUCTION

This report provides updated wood availability forecasts for the Otago and Southland local government regions. From a forestry perspective, these regions form a single wood supply resource. Both regions have a well-developed transport network, and it is possible for processors to draw their timber requirements from across the supply area.

The forecasts have been prepared in association with the major plantation growers whose support has been critical for completing this project.

In addition to the wood supply forecasts, this report profiles the principal timber processing companies, growers and nurseries within Otago and Southland. These profiles highlight the depth and diversity of the forestry sector in the south.

The report concludes by looking at the opportunities and constraints facing the forest industry and its leaders.

The information in this report is intended to assist planners, the forest industry and the wider public. It will be useful in assessing wood processing opportunities and identifying infrastructure and planning issues.

References to the Otago and Southland wood supply region refer to the combined territorial authorities of the Otago region and the Southland region.

The Otago wood supply region includes five territorial authorities – Central Otago, Clutha, Dunedin City, Queenstown-Lakes and Waitaki.

The Southland wood supply region includes three territorial authorities – Gore, Invercargill City and Southland District.

Readers who plan to use the forecasts for planning or investment decisions are urged to thoroughly review the wood availability forecasts or to engage the services of a professional forestry consultant who is able to review and interpret the forecasts in the context of specific planning or investment decisions.

OVERVIEW

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The combined Otago/Southland wood supply region has a well-established forest growing and wood processing industry, with several forest owners now managing a third rotation crop. The region experienced strong growth in harvest volumes and processing activity during the 1990s and the early part of this decade. The industry was successful in attracting new investment for planting, sawmilling and remanufacturing. A key development was the establishment of a medium density fibreboard (MDF) plant in 1997. The Mataura MDF plant processes much of the region's lower-quality logs and wood residues.

To assist with industry planning, the Ministry of Agriculture and Forestry (MAF) has compiled wood availability forecasts for the combined Otago and Southland regions, covering the period 2007 to 2040. The forecasts were developed in association with the major growers and are based on recently updated yield tables. The report sets out a range of scenarios as to how the timber resource may be harvested. The forecasts cover both radiata pine and Douglas-fir plantings, which account for 90 percent (194 100 hectares) of the plantation estate in Otago and Southland *(A National Exotic Forest Description as at 1 April 2006,* MAF 2007*)*. The forecasts are supply-based, but incorporate the long-term intentions of the larger owners. In utilising these forecasts, users need to recognise that the actual rate of harvesting, at any point in time, is determined primarily by the demand and price for logs.

HARVEST PROJECTIONS FOR THE COMBINED OTAGO/SOUTHLAND WOOD SUPPLY REGION

The wood availability forecasts indicate that the supply of radiata pine and Douglas-fir (from the combined region) will remain relatively static over the next eight years (2007–2015). Although the forecasts indicate a flat supply curve, it is important to recognise that short-term fluctuations will occur as market conditions change.

Looking further out, the forecasts show that an increase in wood supply is possible from 2015, with substantial increases in wood availability leading up to 2020.

The harvest from the combined Otago/Southland region has the potential to increase from the current level of about 1.5 million cubic metres to around 2.6 to 2.8 million cubic metres in the early 2020s. Most of the projected increase in wood availability during this period will come from small-scale forest growers who established forests during the 1990s. The actual timing of the harvest from these forests will depend on market conditions and the decisions of a large number of small-scale owners.

Market conditions and logistical constraints (such as the availability of logging crews, transport capacity, and wood processing capacity) will limit how quickly the additional wood supply from small-scale growers comes on stream between 2016 and the early 2020s.

It is anticipated that a proportion of these smaller owners will harvest early (for family or economic reasons) while others may decide to grow their forests on longer. It is therefore likely that the harvesting of the post-1990 forest plantings will be spread out over a longer period than that indicated by age-class alone. If log prices were to increase in the post-2015 period, harvesting rates could be expected to rise more rapidly than would otherwise be the case. Conversely, if this period sees lower log prices, then owners are likely to delay harvesting.

In the later part of the forecast period (post-2030) the harvest of radiata pine is projected to decline to around 2 million cubic metres per annum. This is in line with the age structure of the resource. The timing (and level) of decrease will depend on the rate at which the regions' post-1990 forests are harvested. While the supply of radiata pine is projected to fall, this period will see increasing volumes of Douglas-fir coming on stream

(primarily from the corporate estate). The Douglas-fir projections indicate that there is potential to maintain, and proportionately increase, the total harvest in the lead up to 2040.

While there is limited potential to increase harvest volumes over the next eight to ten years, there are opportunities to more fully utilise the available resource. Modern scanning and timber sorting technology are enabling improved conversion rates, and a number of mills have moved (or are moving) to process some of the lower-quality logs that are currently exported.

› OTAGO

For Otago, the picture over the next ten years is for a reasonably flat supply of radiata pine from both large and small-scale growers. Production is projected to increase in the lead up to 2020. This longer-term growth will be driven by small-scale growers. The large grower estate has limited growth potential over the forecast period (2007–2040).

Douglas-fir production in Otago will start to increase from the early 2020s. This resource is dominated by the large growers, although increased availability from small growers is possible after 2035. From 2027, production thinnings are an important component of the potentially available resource.

› SOUTHLAND

The forecasts for Southland indicate that little change is likely in the availability of radiata pine from large growers during the forecast period. As in Otago, the maturing of the plantings established by small-scale owners (in the 1990s) has the potential to significantly lift production from 2015 through to the early 2020s.

The trends in Douglas-fir production mirror those of Otago. The resource is dominated by the large growers, and smaller growers are unlikely to contribute to production in a meaningful way until after 2035.

› OTHER SPECIES[1]

The Otago/Southland wood supply region has about 21 600 hectares of plantings in species other than radiata pine or Douglas-fir.

Eucalypts are the principal alternative species, and plantings total about 13 600 hectares. The majority of the plantings have been established in the Clutha and Southland Districts and are being grown on a short rotation basis for wood chip production. The preferred species is *Eucalyptus nitens*. The first of these short-rotation plantings reached harvest age in 2004, and production will progressively increase over the next five to seven years.

The region has a small but developing resource of cypresses (1100 hectares). These plantings have been developed by both the corporate and private sectors on more fertile sites. The intention (amongst the corporate investors) has been to build a strategic resource that will be available for high-value end uses, such as furniture manufacturing.

The region has a further 6900 hectares planted in other softwoods and hardwoods. A proportion of these plantings are located at Naseby Forest, in Central Otago. This forest is one of the region's oldest (established in 1898) and has sizeable areas of Corsican and Ponderosa pine (*Pinus nigra* and *P. ponderosa*), in addition to Douglas-fir.

1 All forest areas are from *A National Exotic Forest Description as at 1 April 2006* (MAF 2007). All areas have been rounded to the nearest 100 hectares.

LONG-TERM INFRASTRUCTURE PLANNING

One of the objectives in preparing updated forecasts, and in developing a detailed industry profile, is to provide roading and infrastructure agencies with reliable data on harvest volumes and the spread of processing activity.

While the forecasts indicate a flat supply curve over the next eight years, they also signal that the transport system of both regions will come under increasing pressure in the years leading up to 2020. With a potential increase in annual harvest volumes of 1.1 to 1.3 million cubic metres, there is a clear need for early planning to develop harvest infrastructure for log and processed timber movements, for example, road, rail and port capacity.

FUTURE OPPORTUNITIES AND CHALLENGES

The timber industry operates in a highly competitive environment, and companies are continually adapting to market and supply conditions. This report examines both the challenges facing the sector over the medium to longer term, along with some of the opportunities for sustainably building the industry, at a plantation and processing level. These opportunities include the greater utilisation of forest residues and the increasing use of automated processing systems to improve productivity.

NEW PLANTINGS

The combined Otago/Southland wood supply region has potential for further farm, syndicate and corporate-scale forestry development, particularly on hill country sites. These sites are likely to favour Douglas-fir over radiata pine. In moving to higher-elevation sites, growers will need to be conscious of community concerns around wilding tree spread, significant landscapes and track access in sensitive environments. While the industry has developed codes of practice to minimise any impacts, past experience has shown that it can be difficult to communicate these actions to the broader community.

PROCESSING ACTIVITY

A high proportion of the regional harvest is already processed in some form (about 75 to 78 percent). With a relatively static harvest to 2015, this leaves limited opportunities for expansion in processing. A number of mills have already adopted small-diameter sawing technology, and this trend is likely to continue. In this environment, greater attention is likely to be placed on ways to improve conversion rates through improved scanning and sawing technologies; utilising lower-grade logs including production thinnings; as well as adding value to sawn timber and remanufactured products.

RENEWABLE ENERGY

Bioenergy and biofuel production from harvest residues has been identified as a potential revenue stream for growers. The processing sector already utilises a high proportion of mill residues, and this trend is forecast to continue, particularly with the recent government initiatives around renewable energy.

REGIONAL PROMOTION OF THE INDUSTRY

One of the distinguishing features of the Otago/Southland forest industry is the level of co-operation that is exhibited (at both corporate and individual level) in addressing sector-wide issues, raising the profile of the industry, and communicating issues to growers and processors.

The major industry body in Otago and Southland is the Southern Wood Council (SWC) formed in 2001. The SWC has played an active role in lifting the profile of the industry and addressing cross-sector issues. The SWC consists of the major growers and timber processors. It also includes both port companies and three economic development agencies.

The SWC has co-ordinated action on:

- energy efficiency;
- drug and alcohol policy;
- skills and training;
- transportation and logistics; and
- careers promotion.

A collective voice has also proved to carry more weight when addressing issues with local authorities and other agencies.

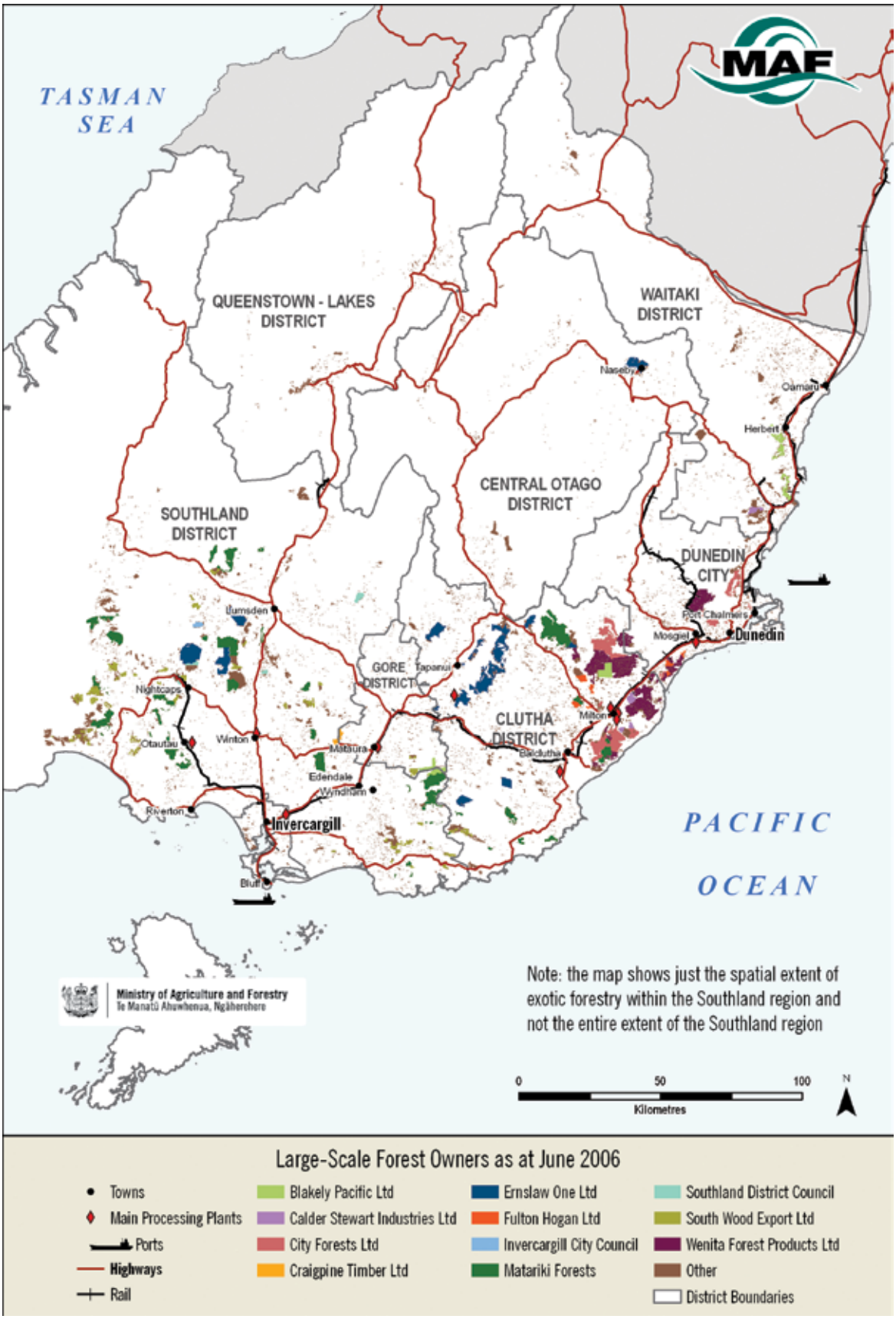
In addition to the SWC, the Otago/Southland region has an active farm forestry association network (FFA). The field days and meetings held by the local branches of the FFA are critical for informing growers about changes in forestry practices and the regulatory environment in which they operate.

TABLE 2.1: OTAGO/SOUTHLAND PRODUCTION DATA 2006–2007

STATISTIC	OTAGO	SOUTHLAND	TOTAL
Stocked forest area as at 1 April 2006 (ha)	127 900	87 800	215 700
Stocked area of radiata pine (ha)	92 500	46 300	138 800
Stocked area of Douglas-fir (ha)	28 400	26 900	55 300
Area weighted average age of forests as at 1 April 2006 (years)	13.64	11.58	12.80
Sawn timber production, year ended 30 June 2007 (m^3) – provisional	–	–	431 981
Exports of sawn timber by port, year ended 30 June 2007 (m^3) – provisional	114 095	95 685	209 780
Exports of logs by port, year ended 30 June 2007 (m^3) – provisional	335 257	95 601	430 858
Direct employment, forestry and first stage processing, February 2006 (FTE)	857	796	1 653

Source
Ministry of Agriculture and Forestry.

FIGURE 2.1: OTAGO/SOUTHLAND FOREST OWNERSHIP



Source
Ministry of Agriculture and Forestry.

3 THE FOREST GROWING SECTOR

The combined Otago/Southland region has a plantation estate of 215 700 hectares. The estate has doubled in size over the past 20 years and has become New Zealand's most diversified, in terms of species composition. The region has 49 percent of all Douglas-fir and 43 percent of all eucalypt plantings nationally.

The region has the youngest age profile of the ten wood supply regions, at just 12.8 years. This means the region has the potential to grow the annual harvest sustainably over the longer term.

The region is also characterised by a high number of small to medium-sized growers; 36.7 percent of the estate is owned by growers with less than 1000 hectares.

FOREST OWNERS

Table 3.1 records the 15 owners (and managers) of large-scale forests in the combined Otago/Southland wood supply region (with estates of 1000 hectares or more).

MATARIKI FORESTS

Rayonier New Zealand manages the 143 000 hectare national estate of Matariki Forests. Rayonier New Zealand is a subsidiary of Rayonier Inc., a publicly listed company in the United States.

Matariki was formed in 2005 to purchase 94 300 hectares of commercial plantations from Carter Holt Harvey and to acquire Rayonier's forestry holdings in New Zealand. Matariki is a consortium consisting of Rayonier (40 percent), AMP Capital Investors (35 percent) and RREEF Infrastructure (25 percent).

In the Otago/Southland region, Matariki owns 39 200 hectares, of which 30 500 hectares are currently in planted forests (net stocked area (nsa)). The cutting rights to these forests were acquired by Rayonier in 1992 (from the Crown), and the company subsequently purchased the freehold title to the land in 2000 (from Ngai Tahu). Three-quarters of the estate is in the Southland region.

TABLE 3.1: OWNERS AND MANAGERS OF PLANTED PRODUCTION FORESTS IN OTAGO/SOUTHLAND (NET STOCKED AREA AS AT 1 APRIL 2006)

OWNER/MANAGER	OTAGO (HA)	SOUTHLAND (HA)	OTAGO AND SOUTHLAND (HA)	PERCENTAGE OF TOTAL AREA
Matariki Forests	7 200	23 300	30 500	14.1
Wenita Forest Products Limited	25 000	–	25 000	11.6
Ernslaw One Limited	16 500	7 000	23 500	10.9
City Forests Limited	15 600	–	15 600	7.2
South Wood Export Limited	800	11 500	12 300	5.7
Blakely Pacific Limited	11 500	–	11 500	5.3
Cainard Forestry LLC	–	3 700	3 700	1.7
Craigpine Timber Company Limited*	–	2 700	2 700	1.3
Fulton Hogan Forestry Limited	2 800	–	2 800	1.3
Calder Stewart Industries Limited*	2 300	–	2 300	1.1
Invercargill City Forests Limited	200	1 800	2 000	0.9
Southland District Council	–	1 500	1 500	0.7
Evergrow Properties Limited	1 100	–	1 100	0.5
Greenvale Forest Ltd (previously JPS/JPS II)*	1 000	–	1 000	0.5
Vela Forest Partnership	1 000	–	1 000	0.5
Small-scale forest owners	42 900	36 300	79 200	36.7
Total	**127 900**	**87 800**	**215 700**	**100.0**

* These areas may differ to some of the areas in the following commentary as subsequent re-mapping and estate expansion have altered areas since 2006.

The estate comprises predominantly radiata pine. There are also holdings of Douglas-fir and cypresses. Rayonier is currently harvesting between 400 000 and 420 000 cubic metres of logs annually. This is the long-term sustainable harvest. Market conditions, and age-class smoothing, may see the harvest vary from this level over the next decade.

Rayonier's preference has been to "sell wood on the stump" through an open tender process rather than engaging in longer-term contracts or direct sales to overseas customers. This means the immediate purchasers of Rayonier's logs are domestic buyers and sawmillers.

› WENITA FOREST PRODUCTS LIMITED

Wenita Forest Products Limited (Wenita) is a private, New Zealand-registered, company with forestry holdings of 25 000 hectares (nsa), and a total estate of almost 30 000 hectares. Wenita is a joint venture between Sinotrans and Fund 7 Foreign LLC, with shareholdings of 62 percent and 38 percent, respectively. Sinotrans (China National Foreign Trade Transportation (Group) Corporation) is one of China's large central enterprises based in Beijing, and approved by the State Council. Fund 7 Foreign LLC is managed by GMO Renewable Resources LLC (GMORR), a United States global investment management company headquartered in Boston.

Wenita was established in 1990 to manage the cutting rights to the Berwick and Otago Coast Forests. The company grew in the 1990s with the purchase of Waronui Forest (ex Tasman Forestry Ltd) in 1991, Mt Allan Forest (ex Tasman Forestry Ltd) and the Brock property in 1993. The forestry assets were complemented in 1994 with the purchase of the Rosebank Sawmill. About 75 percent of the estate is held under a Forestry Right with the Otago Land Company, a wholly owned subsidiary of GMORR. The remaining 25 percent is in freehold ownership. All of the holdings are in the Clutha and Dunedin Districts.

The Wenita estate is predominantly radiata pine (95 percent). The estate has small holdings of Douglas-fir and other softwoods (including Corsican pine). The proportion of Douglas-fir is expected to rise, as radiata pine has shown limitations at higher altitudes. Wenita was accredited with Forest Stewardship Council (FSC) certification in Forest Management (SGS-FM/COC-0831) and FSC chain of custody in sawmilling (SGS-COC-0859) in 2001. The company has a commitment to sustainable forest management and the protection of significant indigenous vegetation, along with cultural and historic sites. The estate is managed on a sustainable harvest (non-declining yield) basis, and silviculture is focused on producing high-quality clearwood. The annual harvest is currently in the vicinity of 340 000 cubic metres of logs, and this level of production is projected to continue over the next decade. Wenita actively participates in the purchase and marketing of logs from the private sector (up to 100 000 cubic metres per annum). The company sawmilling operation at Balclutha draws its log supply primarily from the Wenita estate. Wenita supplies a range of domestic and international customers.

› ERNSLAW ONE LIMITED

Ernslaw One is a New Zealand registered forestry company with a national estate approaching 84 300 hectares. The company is privately owned by the Tiong family of Malaysia. Ernslaw One was established in 1990 to manage the cutting rights to five Crown Forests, including the Blue Mountain Forests around Tapanui. As part of this purchase, Ernslaw acquired the Conical Hill Sawmill (later renamed Blue Mountain Lumber).

Ernslaw One's land holdings in Otago and Southland have grown from 12 700 hectares in 1990 to 28 700 hectares (gross area). This has occurred through new plantings and the purchase of existing forests, such as Naseby Forest in the Maniototo. The planted estate now stands at 23 500 hectares (nsa). About 5000 hectares are in remnant bush

and reserves. In 2006, Ernslaw One purchased all but 77 hectares of the Blue Mountain Forests, which had been held under a forestry right with Ngai Tahu Forest Estates Limited.

Ernslaw One has concentrated on Douglas-fir in its planting and re-planting programmes. The company has considerable experience with this species and considers it is more suited to the climatic conditions that occur in the south. The strong, international reputation of the species has been another motivation for planting. Sixty-four percent of Ernslaw One's estate in Otago and Southland (15 000 hectares) comprises Douglas-fir. Radiata pine makes up 27 percent and Corsican pine 5 percent. The remaining area is in minor exotic species, including firs, spruce, cedars and larch.

The company has had an Environmental Management System in place since 1998, and it received FSC certification in 2001. Significant resources are devoted to monitoring waterways and managing their holdings of indigenous vegetation (to identify and protect rare and endangered species).

The company has reduced harvest volumes in the past two seasons due to the age structure of the resource. This situation will continue for the medium term as the company moves to smooth the age structure, and raise the target cut age. A significant proportion of the annual harvest is on-sold to Blue Mountain Lumber. In addition to its own harvest, Ernslaw One has been active in procuring timber from private forest owners.

› CITY FORESTS LIMITED

City Forests Limited (CFL) is a trading enterprise of the Dunedin City Council. The company manages about 16 100 hectares of commercial forests, which have been progressively developed since 1906. The net stocked area stands at about 15 600 hectares, while a further 500 hectares is normally under preparation for restocking. The original plantings were developed for soil and water conservation purposes. In addition to the planted estate, CFL manages close to 900 hectares of reserves. Reserve areas include natural forest, swamplands and habitats for native species. The estate has grown in recent years with the acquisition of Silverpeaks Forest (from the Crown) and the successful takeover of the Opio Forestry Fund. These acquisitions have complemented the existing estate.

The estate comprises predominantly radiata pine (87 percent), but there are also substantial holdings of Douglas-fir and cypresses. The cypress plantings have been developed with the aim of creating a resource of high-value timber for future furniture manufacturing. The company holds FSC certification, and has a strong commitment to improving the long-term sustainability of the forest resource. CFL provides a range of recreational opportunities for the Dunedin community, including walking tracks and opportunities for fishing and hunting.

Commercial harvesting has been undertaken for the past 60 years, and in the early 1970s the company entered the log export trade. The company supplies prepared sawlogs for domestic processors and export customers. CFL opened a dry-wood processing facility in early 2006. The plant utilises higher-quality pruned logs, from the City Forests estate. The company is planning to progressively increase harvesting volumes over the next decade.

› SOUTH WOOD EXPORT LIMITED (FORESTRY OPERATION)

South Wood Export Limited (SWEL) is a forest management and wood processing company, owned by the Itochu Corporation of Japan. SWEL was established in 1981 to process logs for wood chip production (to supply pulp and paper manufacturers in Japan). In 1985 the company moved into plantation management. The focus for the company has been on the establishment of exotic hardwood plantations as a replacement for indigenous

timber supplies. The principal species planted by SWEL has been *Eucalyptus nitens,* suited to short rotations of 12 to 15 years.

SWEL manages a planted estate of 12 300 hectares (nsa), along with about 4000 hectares of remnant indigenous bush, wetlands, covenanted areas and access roads. The company has focused its planting programme in Southland and South Otago. The majority of the estate (9900 hectares) is managed on behalf of the Southland Plantation Forest Company of New Zealand (SPFL). The principal owners of SPFL are Oji Paper Co (51 percent) and the Itochu Corporation (30 percent). SWEL and a New Zealand based investment company, Hardwood Forests Limited, own the remaining estate (under separate titles).

In 2004 the SPFL forests received environmental certification (from the Forest Stewardship Council), and SWEL attained FSC chain of custody accreditation for its chipping facility and port operation.

Harvesting operations started in 2004, and the first shipment of plantation grown hardwood chip was exported from Bluff in March 2005. The annual harvest is currently sitting at around 100 000 cubic metres, and this will be progressively increased to a sustainable long-term average of 250 000 cubic metres. This level of production is likely to be reached between 2011 and 2013, depending upon market conditions. All production is currently being exported as chip for eventual pulp and paper manufacturing. In the future there may be options to supply some local solid wood markets.

› BLAKELY PACIFIC LIMITED

Blakely Pacific Limited is a New Zealand registered forestry company with land holdings of about 29 500 hectares. The company started operations in 1993 and is a subsidiary of Port Blakely Tree Farms, a private forestry concern based in Seattle, Washington. In the Otago/Southland region, Blakely Pacific has a forest estate of 11 500 hectares (nsa). These holdings are geographically dispersed, from Herbert (in North Otago) through to Clinton (in the Clutha District).

The estate has been built up through the acquisition of existing forests (such as the 1999 purchase of Herbert Forest from Ngai Tahu) and large-scale afforestation plantings on former farm land (from 1995 to 2003). The parent company has extensive experience in managing Douglas-fir, and has transferred these skills to its New Zealand operation. Since 1995 Douglas-fir has been the species of choice for its South Island afforestation projects. The company has a triple bottom line management philosophy and was accredited FSC certification in 2003.

Herbert Forest (and the South Canterbury forests of Geraldine and Waimate) will generate the majority of Blakely Pacific's South Island harvest over the near to medium term. Herbert Forest is predominantly radiata pine. The management of Blakely Pacific's South Island forest operations is based in Timaru.

› CAINARD FORESTRY LLC

Cainard Forestry has established a plantation resource of 3700 hectares (nsa) in the Fairlight/Garston area of northern Southland. The plantings are on elevated sites (normally over 400 metres), and predominantly Douglas-fir. A small proportion of the estate is in Ponderosa pine. The plantings have been progressively developed over the past decade. The estate is owned by the Hill and Hill-Harpur families of Canada and the United States.

› CRAIGPINE TIMBER COMPANY LIMITED

Craigpine is an integrated timber processing and plantation management company based in Winton. The forestry arm of the company manages 4000 hectares, of

which 3400 hectares (nsa) are planted in commercial forestry. The estate is spread across six locations and is predominantly radiata pine. Small holdings of Douglas-fir and macrocarpa have been established (less than 100 hectares in total). About 10 percent of the estate is maintained in native bush and forest.

Craigpine was an active investor in new forestry during the 1990s and the early years of this century. This investment provides a platform for sustainably growing Craigpine's annual harvest. At present, the company is harvesting from its Castledowns, Hokonui and Waitane forests.

Craigpine was the first forestry company in New Zealand to qualify for FSC environmental certification, in 1997. The company has been progressively developing lower-impact, and sustainable, management practices for their entire forestry operation.

› FULTON HOGAN LIMITED

Fulton Hogan is a roading, civil engineering and infrastructure development company, with headquarters in Christchurch. The company established a forestry operation in 1981 (Fulton Hogan Forestry Ltd), to utilise a number of small holdings owned by the company (including former quarry sites). The forestry operation has grown progressively since this time, and the planted estate now stands at 2800 hectares (nsa). The estate is located in Otago and is predominantly radiata pine. The company has developed a *Cupressus* macrocarpa resource, which accounts for about 11 percent of the estate. Sustained harvesting is projected to start in the 2011 season (depending upon market conditions).

› CALDER STEWART INDUSTRIES LIMITED

Calder Stewart is a nationwide construction company, with its headquarters in Milton (South Otago). The company entered the forestry scene in the early 1980s. The move into forestry was promoted by Bruce Stewart, one of the company founders. Forestry has been a secondary activity for the company. Calder Stewart has built up a modest estate in the coastal Otago area. The estate is predominantly radiata pine with some plantings of Douglas-fir, cypress and redwood. The planted estate now stands at 2600 hectares (nsa). Calder Stewart has established a separate forestry division, Calder Stewart Forestry, to manage the operation. The company anticipates that it will harvest its initial blocks in the 2013 season (depending upon market conditions).

› INVERCARGILL CITY FORESTS LIMITED/ INVERCARGILL CITY COUNCIL

The Invercargill City Council has commercial forestry holdings of about 2000 hectares (nsa). The majority of the estate (1500 hectares) is managed by Invercargill City Forests Limited (ICFL), a subsidiary of the Council's holding company. The remaining estate (about 500 hectares) is directly held by the Council. This area includes Bluff Forestry and Sandy Point.

The ICFL holdings are made up primarily of radiata pine. Small areas of Douglas-fir have also been established. The plantings are in their first rotation, and sustained harvesting is projected to start in 2010 (dependent upon market conditions). The Council's holdings are located in both Clutha and Southland. The operational management of the estate is contracted to Independent Forestry Services of Winton.

The Sandy Point and Bluff Forestry blocks comprise radiata pine, and the majority of these plantings were developed under the Government's Forestry Encouragement Loan Scheme. The blocks will be progressively harvested, and re-planted, as they mature.

› SOUTHLAND DISTRICT COUNCIL

The Southland District Council has a planted estate of 1500 hectares (nsa), located in four main blocks at Dipton, Gowan Hill, Ohai and Waikaia. The forests are predominantly radiata pine. The Council has a small holding of Douglas-fir and has undertaken cypress trials. The estate is moving to a sustainable yield cycle, with regular harvesting programmes over the summer months. The forests are operated as a separate business unit, and the operating surplus is returned to the Council for general rates relief. The forests are managed under a 30-year strategic plan, and the Council has a strong focus on environmental best practice (the estate has registration under ISO 14001 – Environmental Management Systems).

› EVERGROW PROPERTIES LIMITED

Evergrow Properties is the holding company for an 1100 hectare forestry development, located at Maraeweka, inland of Maheno (North Otago). Planting was undertaken in the 2002/03 season and consisted of radiata pine. The development is being funded by Taiwanese interests, and is managed by PF Olsen Ltd.

› GREENVALE FOREST LIMITED

Greenvale Forest Limited is a New Zealand registered forestry company, owned by South Island investors. The company was formed in 2007 and has purchased the Otago holdings of JPS and JPS II, companies associated with the Soper and Wheeler families of the United States. The forest estate is 900 hectares (nsa), and the majority of the plantings were established in 1999 and 2000. The past season (2007) has seen some additional planting, focused on Douglas-fir. The forest estate is managed by Gore-based Southern Forests (NZ) Limited.

› VELA FOREST PARTNERSHIP

The Vela Partnership has a forestry license over 1000 hectares of Douglas-fir plantings, located at Lawrence and Roxburgh. The plantings were established in the 1999/2000 season, and the expected rotation of the crop is 50 years. The Partnership is owned by members of the New Zealand-based Vela family, and PF Olsen Ltd manages the property.

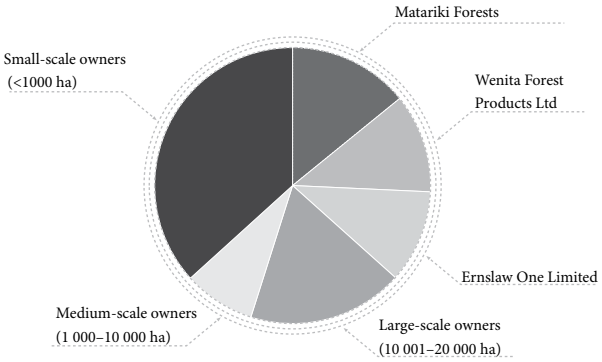
› SMALL-SCALE FOREST OWNERS

About 37 percent of the planted production forests in Otago and Southland are held by small-scale forest owners, with estates of less than 1000 hectares each. These investors are mainly individuals, farmers, partnerships and smaller corporates.

This segment of the industry will play an increasingly important role in the supply of logs over the next 15 to 20 years due to the age structure of the private estate (that is, a large proportion of the estate is less than 15 years old). Co-ordinating this supply is one of the critical issues facing the local industry.

Separate wood availability forecasts have been prepared for this ownership class. This reflects the importance of this segment of the industry and the variation in management regimes that can occur between corporate and private managers.

»» FIGURE 3.1: OWNERS OF OTAGO/SOUTHLAND PLANTED PRODUCTION FORESTS



Source
Ministry of Agriculture and Forestry.

NURSERIES

The forestry sector in Otago and Southland is serviced by four main nurseries located at Edendale, Oamaru and Wyndham. These nurseries supply not only local growers but also national customers. The four nurseries have particular expertise in growing Douglas-fir, eucalypts and indigenous timber species.

In addition to the major nurseries, the region has five smaller operators, including one specialist eucalypt grower and seed supplier. These smaller operations service their immediate communities with tree stocks and they generally offer some specialist services, such as landscape planning.

EDENDALE NURSERY (SOUTHLAND) LIMITED

The Edendale Nursery is a privately owned business located north-east of Invercargill, on a 130-hectare site (including 35 hectares of leased land). The operation was established by the New Zealand Forest Service, and was subsequently acquired by Rayonier New Zealand. The current owners purchased the operation in 1998.

The nursery traditionally focused on supplying tree stocks for plantations and woodlot developments. Since 1998, there has been a greater emphasis on farm sales (for shelter and ornamental purposes) and on native tree species. The nursery provides planning advice on farm shelter plans, riparian developments and landscaping (including boundary smoothing for larger plantations).

The Edendale nursery has a full-time staff of four and a seasonal workforce of 30. The operation produced about five million seedlings and cuttings in the 2007 season. Production levels could be sustainably increased, if market conditions warranted. The operation has a production capacity of nine to ten million seedlings and cuttings per annum. The nursery has continued to invest in new facilities despite the current downturn in new planting rates.

While the majority of the operation's tree stocks are sold within the Otago/Southland region, there are sales throughout New Zealand, particularly for Douglas-fir and eucalypt species. Radiata pine remains the major tree species grown at the nursery but Douglas-fir and other plantation stocks make up between 40 and 45 percent of production annually.

FORD'S NURSERIES LIMITED

Ford's Nurseries is a family-owned business located at Hilderthorpe, north of Oamaru. The business dates back to 1964, when Adrian Ford established his first nursery operation. Ford's has a wide client base, from commercial growers and the farming community (for shelter and woodlots) through to residential clients seeking ornamental species. The nursery grows about 170 species. In addition to the nursery, the business operates a Christchurch depot, which allows it to service a wider geographical area. Otago and Southland account for about 40 percent of total sales.

The current operation covers about five hectares and has two permanent staff. Another five staff are employed on a seasonal basis. The nursery has a production capacity of four million seedlings per annum. With the current downturn in new planting, production is running at just 30 percent of capacity. Radiata pine is the principal tree stock grown at the nursery. The other major species include Douglas-fir, Leyland cypress and poplars. While the nursery has additional capacity, it would take several seasons to substantially raise production, as it takes time to source high quality stock (in terms of seed and cuttings) and to on-grow this material.

The nursery is seeing increasing demand for native trees and shrubs. This is a small but growing area for Ford's.

› LEITHFIELD NURSERY LIMITED

The Leithfield Nursery is a privately owned business located near Wyndham, in eastern Southland. The nursery operation was established in the early 1970s and covers a 35 hectare site. The current owners have managed the business for the past 17 years. The nursery has two permanent staff and a seasonal workforce of 20.

The nursery produces tree stocks for plantations and woodlot developments. The operation has a production capacity of seven million seedlings per annum: this figure was attained during the peak years of the 1990s. In recent seasons, production has been closer to 50 percent of capacity.

About 60 percent of production is in radiata pine. Leithfield also produces significant numbers of Douglas-fir, eucalypts and cypress. The nursery staff have considerable experience in managing these alternative commercial species, and the business supplies growers throughout the country. Around 20 percent of production is sold outside of Otago and Southland.

The nursery has the ability to sustainably increase production, if market conditions warranted. It would however take time to build up production in species such as Douglas-fir, as a two-year planning horizon is required.

› OREGON NURSERIES LIMITED

Oregon Nurseries is a wholesale nursery operation located at Hilderthorpe, north of Oamaru. The nursery covers a 14.5 hectare site and has a purpose-built propagation facility covering one hectare. At any one time the propagation facility can handle five million plants. On an annual basis, the nursery has a production capacity of 14 million seedlings (and cuttings).

The nursery operation was established in 1994, as a joint venture between the Ford family of Oamaru (Ford's Nurseries Ltd) and the Tiong family of Malaysia (the owners of Ernslaw One Limited). The business was then known as Forestart Limited. The operation was developed to produce high-quality seedlings (particularly Douglas-fir) for Ernslaw One and other forest growers. In 2003, the Tiong family acquired full ownership of the operation and re-launched the business as Oregon Nurseries. Oregon maintains a permanent workforce of 11 and employs a further three workers on a seasonal basis.

Oregon continues to produce seedlings for commercial growers, but has diversified into native and ornamental species for landscape designers, specialist retailers and other nurseries. The nursery is producing not only trees, but also grasses, shrubs and tussocks. This is aided by an 800 cubic metre ornamental greenhouse with concrete hotbeds. The nursery has noticed increasing demand for native species, particularly for re-vegetation projects.

Commercial tree sales (for plantations and woodlots) are down significantly on the peak years of the 1990s. Forestry seedling production is currently running at a proportion of its total capacity. Douglas-fir continues to be the principal tree species grown at the nursery, with about 75 percent of sales. The nursery also produces radiata pine and a range of cypress, eucalypt and beech species. A large proportion of Oregon's current production is destined for customers outside of Otago and Southland (including plantings for the North Island).

»» SPECIES COMPOSITION

Otago and Southland have the distinction of being New Zealand's most diversified wood supply region, in terms of the commercial timber species that are being grown. This is due to a combination of climatic conditions, the use of higher-altitude land for plantings, and the support of key growers for alternative commercial species (including Ernslaw One Limited and South Wood Export Limited).

The move to a more diversified estate has occurred particularly in the last 15 years.

Nationally radiata pine makes up 89 percent of all commercial plantings; in Otago/Southland the figure is just 64.3 percent. This variation from the national picture is particularly evident in Southland, where the proportion of radiata pine plantings stands at just 52.7 percent.

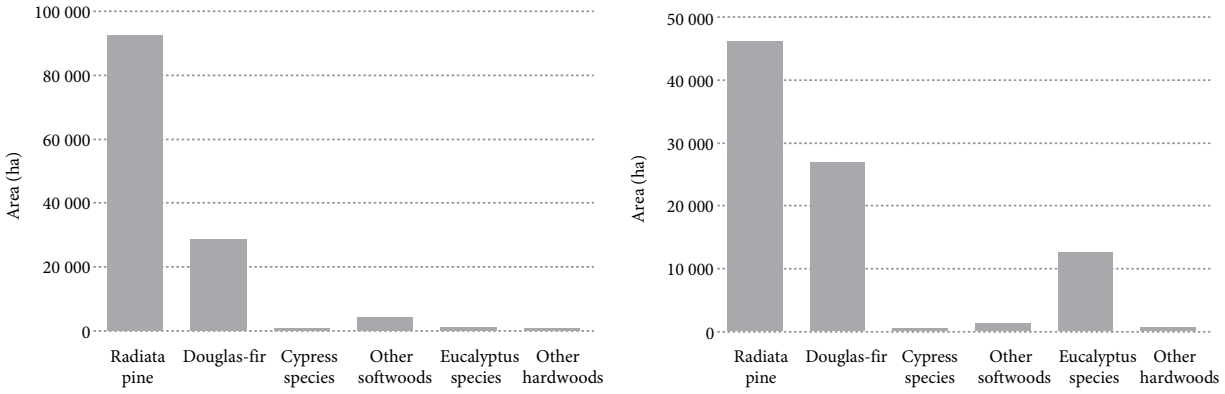
Douglas-fir is the favoured alternative to radiata pine, and constitutes 25.6 percent of the regional estate (55 300 hectares). Otago and Southland account for 49.1 percent of all Douglas-fir plantings in New Zealand. Two-thirds of these plantings have been established in the past decade. This resource provides the region with long-term development opportunities.

As Figure 3.2 indicates, the Otago and Southland wood supply region also has a significant area of eucalyptus plantings. These plantings are concentrated in Southland. Total plantings are estimated at 13 600 hectares, or 6.3 percent of the regional estate. These southern plantings represent about 43.5 percent of all eucalyptus plantings in New Zealand.

As discussed previously, a number of growers have established strategic holdings of higher-value cypresses and other timbers, for furniture, flooring and mouldings. In area terms, these holdings make up about 3.5 percent of the regional estate.

Almost 73 percent (101 000 hectares) of the radiata pine estate is, or is expected to be, pruned to a height of at least four metres. This is a significantly higher figure than the national average (62 percent) and indicates a more intensive approach to crop management. The timber characteristics that have encouraged this trend include: the lighter colouring of the radiata pine grown in Otago/Southland (a preferred trait for appearance grade users); a relatively low incidence of resin pockets; good basal area (diameter) growth relative to height; and long internodes between branch whorls.

FIGURE 3.2: SPECIES COMPOSITION OF THE PLANTED ESTATE (1 APRIL 2006) IN OTAGO (LEFT) AND SOUTHLAND (RIGHT)



Note
For more detailed information refer to the latest edition of *A National Exotic Forest Description* (see www.maf.govt.nz).

AGE-CLASS DISTRIBUTION

The Otago/Southland plantation estate has a relatively young age profile, due to the rapid expansion in new plantings over the past 15 years. In April 1991, the Otago and Southland wood supply region was estimated to have just over 128 000 hectares. In 2006 the estate had grown to 215 700 hectares, an increase of 68.5 percent in 15 years. Over this same period, the national estate grew by 39.6 percent.

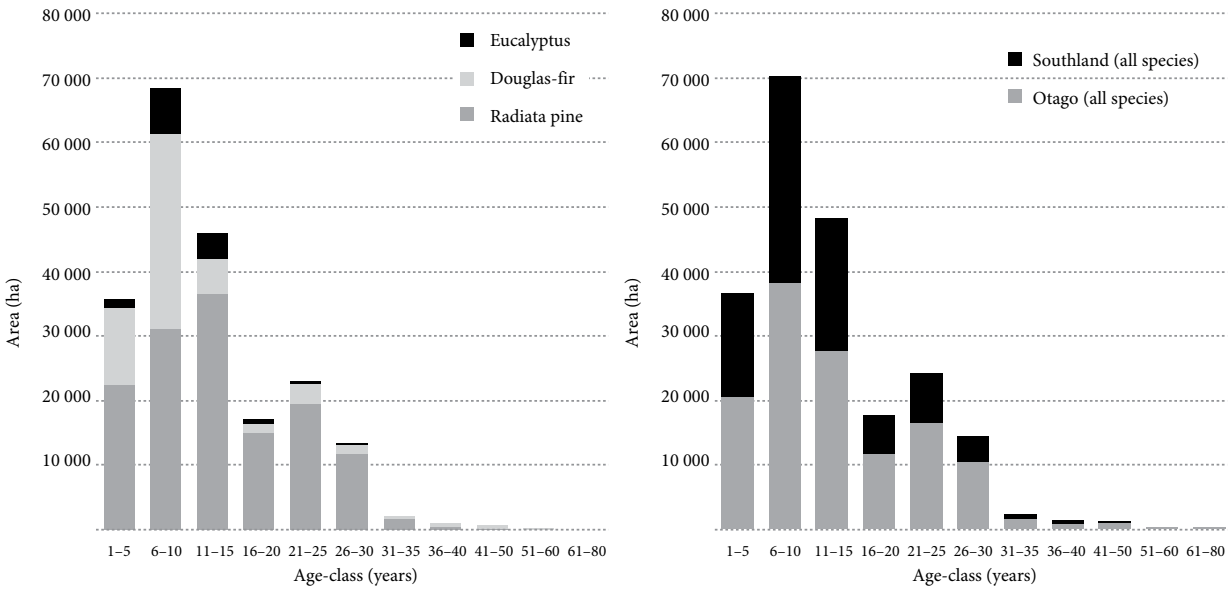
The area-weighted average age of the Otago/Southland estate stands at 12.8 years (as at April 2006). This compares with 13.9 for the South Island, and the national average of 14.3 years. The young age profile means that the region has significant potential to increase harvest volumes. This growth will be realised in the medium to longer term.

An important feature of the Otago/Southland estate is the recent growth in the Douglas-fir resource. Figure 3.3 shows that the majority of Douglas-fir plantings have been in the ground for less than 15 years (86.5 percent of all plantings). As Douglas-fir has a harvest age of 45 to 50 years in New Zealand, the age and production profile of the southern estate is likely to vary from the national model in coming decades. Production thinning will start to see Douglas-fir volumes grow after 2025 but full production will not occur until closer to 2040.

Another variation from the national picture is the presence of a significant resource of *Eucalyptus nitens* (as shown in Figure 3.3). This resource, planted primarily by South Wood Export Limited, has a rotation period of 12 to 15 years.

Looking at the overall structure of the Otago/Southland estate, there are a number of issues on the horizon. Figure 3.3 shows that there will be challenges in smoothing medium and longer-term supply, due to the peaks and troughs in planting. There are also imbalances between the two regions. Otago has a more mature estate, with 30 percent of plantings in the 16 to 30-year age

FIGURE 3.3: AGE-CLASS DISTRIBUTION FOR PLANTED FORESTS (1 APRIL 2006) BY SPECIES (LEFT) AND REGION (RIGHT)



classes, while only 20.3 percent of Southland plantings are in these age classes. This means southern timber processors will continue to rely on South Otago timber supplies for the next decade.

HARVEST TRENDS

Figure 3.4 records the level of logging activity over the past sixteen years in Otago and Southland. While the trend line shows a positive rise in production (of about 80 percent, or 5 percent per annum), the annual totals reveal a more variable pattern. In particular, they show that production peaked in the March 2002 year, and has since declined by about 13 percent.

At the beginning of the 1990s, the region was producing an estimated 780 000 cubic metres of roundwood. This figure grew steadily in the early 1990s and then stabilised at just over 1 million cubic metres. A high dollar in the mid 1990s, followed by the Asian economic crisis subdued export demand for logs and sawn timber. Otago and Southland rode out the Asian economic crisis better than many regions due to developing markets in North America, particularly for rough sawn timber. The period from 1998 through to 2002 saw strong annual growth in production volumes, boosted by positive market demand (particularly in the US housing market) and a favourable exchange rate. Production peaked at an estimated 1.62 million cubic metres in the March 2002 year.

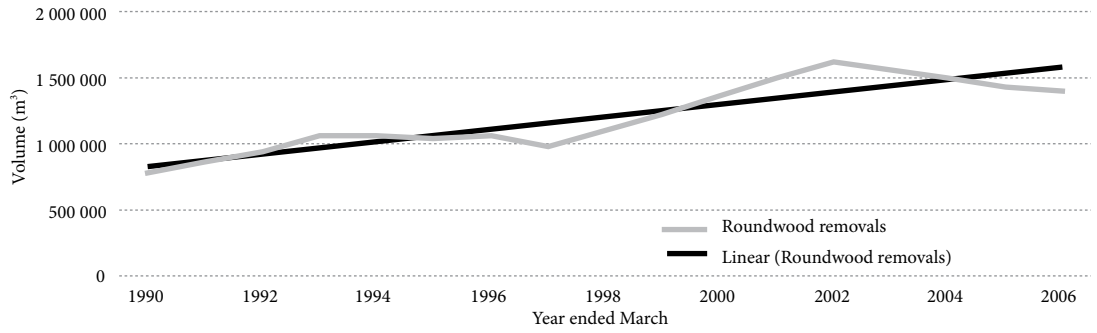
Harvest volumes have subsequently fallen by about 13 percent or 220 000 cubic metres. The factors behind this fall are similar to those affecting the industry as a whole (for example, difficult market conditions, a high exchange rate and increasing freight costs).

HARVEST INTENTIONS SURVEY

A harvesting intentions survey of the 15 largest forest owners in Otago and Southland was completed in late 2006. The companies included in the survey own, or manage, estates of at least 1000 hectares (nsa).

The companies provided data on their actual harvest volumes for 2004 and 2005, and their intentions for the next ten years (up to 2015). This data was provided by species, and broken down into pruned, unpruned and pulp logs. The survey also covered production thinning

FIGURE 3.4: ESTIMATED ROUNDWOOD REMOVALS – OTAGO/SOUTHLAND



Source
Ministry of Agriculture and Forestry.
Notes
The estimates are rounded to the nearest 20 000 cubic metres.
The estimates are indirectly derived from wood processing and log exporting survey returns. Log volumes moving between regions may not be fully captured using this methodology.

TABLE 3.2 HARVEST INTENTIONS SURVEY RESULTS FOR OTAGO/SOUTHLAND (LARGE-SCALE OWNERS)

YEAR ENDING DECEMBER	RADIATA PINE (000 M³)	DOUGLAS-FIR (000 M³)	OTHER SOFTWOODS (000 M³)	OTHER HARDWOODS (000 M³)	TOTAL VOLUME (000 M³)
2004[1]	923	62	17	14	1 016
2005[1]	1 061	70	20	57	1 208
2006	1 048	103	23	71	1 246
2007	1 045	82	24	101	1 253
2008	1 067	82	24	150	1 324
2009	1 162	64	16	180	1 422
2010	1 149	63	11	220	1 443
2011	1 126	80	11	250	1 467
2012	1 215	80	11	250	1 556
2013	1 178	82	11	250	1 521
2014	1 284	80	14	250	1 628
2015	1 251	83	18	250	1 602

Notes
[1] Actual harvest.

and the area harvested. Table 3.2 provides a summary of the harvest intentions data. Appendices A and B have the results broken down by log grade and region.

The harvest intentions of the large-scale growers show that the volume of radiata pine will increase only gradually over the next decade. Increasing volumes start to be seen from 2012. This reflects the fact that several smaller corporates will be commencing harvesting operations in this period. These growers will draw on plantings established since the early 1980s.

The major area of growth over the survey period is in the production of hardwood fibre. This reflects the maturing of the hardwood plantings established by South Wood Export Limited. As discussed previously, the company started harvesting in 2004 and will reach their sustainable harvest between 2011 and 2013.

The production of Douglas-fir has grown in recent years, but is expected to settle at around 80 000 cubic metres for the majority of the survey period. Other softwoods are a minor contributor to the corporate harvest, and are expected to see a decline in the later years of the survey.

4 WOOD AVAILABILITY FORECASTS

This chapter presents the findings from a 2006/07 wood availability study of the Otago and Southland forestry estate. The study was undertaken by MAF, in association with the major plantation owners. The results of the study were analysed by Dr Bruce Manley of the New Zealand School of Forestry, University of Canterbury.

Dr Manley used the results to prepare five production scenarios for wood availability. The scenarios indicate how the maturing timber resource in Otago and Southland could be harvested over the 2007 to 2040 period. The scenarios are based on the available resource in each region and a series of forecasting assumptions.

The forecasts incorporate the harvesting intentions of the region's large-scale forest owners (those with 1000 hectares of forest or more, described in the previous chapter). There has also been consultation with forest managers and consultants to ensure the forecasts represent a realistic range of future wood availability scenarios.

The scenarios clearly indicate that 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 harvest strategy based on the owners' objectives and market conditions. Any change in harvesting strategies by forest owners affect 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 at which small-scale forest owners harvest their plantations or woodlots. The timeframe can vary markedly, even between neighbouring properties. The timing of the harvest from 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 harvest intentions or changes in the resource description (for example, areas and yields), a higher level of confidence can generally be attached to these figures than for the small-scale owner's estate. Not only are harvest intentions less clear for small-scale owners, the resource description is potentially less accurate.

SCENARIOS FOR RADIATA PINE

Five 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.

To ensure the scenarios are realistic, they were developed in consultation with the National Exotic Forest Description (NEFD) Steering Committee and feedback was received from major forest owners and consultants in the Otago/Southland wood supply region.

SCENARIO 1: HARVEST ALL AREAS AT AGE 30

All owners are assumed to harvest their trees at age 30. This scenario shows the potential future harvest in any given year, based on the area of radiata pine forest that reaches 30 years of age in that year.

SCENARIO 2: LARGE-SCALE OWNERS HARVEST AT STATED INTENTIONS, SMALL-SCALE OWNERS HARVEST AT AGE 30

Large-scale owners' wood availability is assumed to be at stated harvest intentions for the period 2005 to 2015 (calendar year estimates). After 2015, the wood availability from large-scale owners is assumed not to decrease.

Small-scale owners are assumed to harvest their forest holdings at age 30.

› SCENARIO 3: NON-DECLINING YIELD (NDY) – TARGET ROTATION 30 YEARS

Large-scale owners' wood availability is assumed to be at stated harvest intentions (as for scenario 2). The total wood availability of radiata pine from the region is modelled to be non-declining in perpetuity.

› SCENARIO 4: SPLIT NDY – TARGET ROTATION 30 YEARS

This is the same as scenario 3 except that the total wood availability of radiata pine from the region is allowed to step down from 2034 (at the end of the current rotation). Thereafter, an annual reduction of up to 10 percent was allowed before the yield was required to be non-declining for the next rotation (from 2037 on).

› SCENARIO 5: TARGET ROTATION AGE VARIATIONS

This is similar to scenario 4 except that target rotation ages of 28 and 32 years are also modelled.

› ADDITIONAL DETAILS ON THE SCENARIOS USED TO MODEL THE RADIATA PINE HARVEST

The variation in harvest volumes between the five scenarios is illustrated in Figure 4.1. The figure presents the radiata forecasts for the Otago region from 2007 to 2040.

With the exception of scenario 1, the small-scale forest owners have been modelled separately from the large-scale owners. Future harvesting by small-scale owners is generally less certain than for large-scale owners.

In scenarios 1 and 2 (Figures 4.1A and 4.1B, respectively), the forests owned by small-scale owners are assumed to be harvested at age 30. In scenario 1, all forests (large and small-scale) are harvested at 30 years. Both scenarios show the "potential" availability of mature forest in any given year. These scenarios directly reflect the area of forest in each age-class in the Otago and Southland region. For practical reasons already described, it is unlikely that the future harvesting would occur this way. The two scenarios simply show the potential magnitude of harvesting under favourable market conditions in any given year.

Scenarios 3 to 5 (Figures 4.1C and 4.1D, respectively) are based on yield regulation. 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. Yield regulation provides a more orderly harvesting volume profile that takes logistical and market constraints into account, to some extent.

Scenarios 3 to 5 avoid the large year-to-year fluctuations seen in scenario 1. A fundamental property of the forests in Otago and Southland (like many regions in New Zealand) is the large area of forests established during the 1990s. Scenarios 4 and 5 illustrate the harvesting of these forests by applying a non-declining yield constraint for the period 2006 to 2034. Then once the "bulge" of forests planted during the 1990s has been harvested, the model lets the volume decline again.

The main limitations of scenarios 3 to 5 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 timber prices.

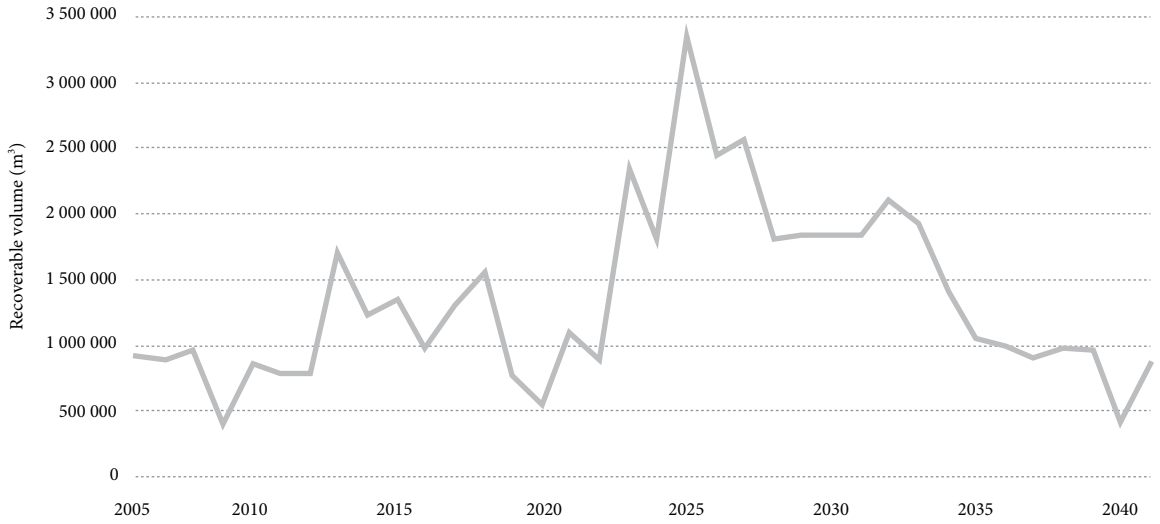
› SCENARIO FOR DOUGLAS-FIR

One scenario is presented for Douglas-fir (all owners). This is similar to scenario 4 for radiata pine. It is based on the harvest intentions of large-scale owners for 2005 to 2015 with yield regulated in subsequent years. Target rotation age is 45 years for Douglas-fir.

Wood availability from other species has not been modelled.

FIGURE 4.1 – COMPARISON OF THE WOOD AVAILABILITY SCENARIOS (OTAGO RADIATA PINE FORECASTS)

4.1A – SCENARIO 1 EXAMPLE: HARVEST ALL AREAS AT AGE 30



4.1B – SCENARIO 2 EXAMPLE: LARGE-SCALE OWNERS HARVEST AT STATED INTENTIONS, SMALL-SCALE OWNERS HARVEST AT AGE 30

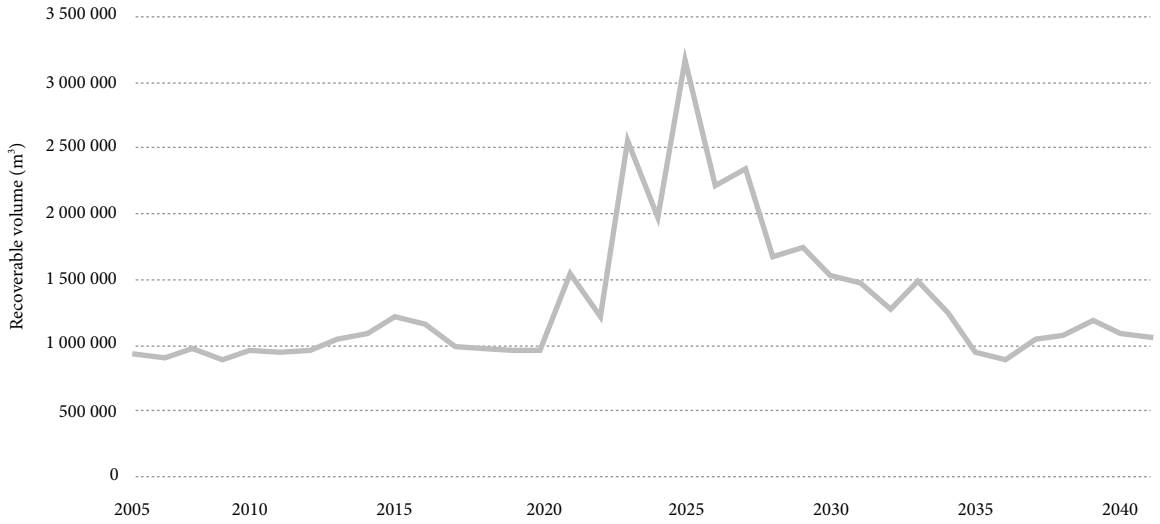
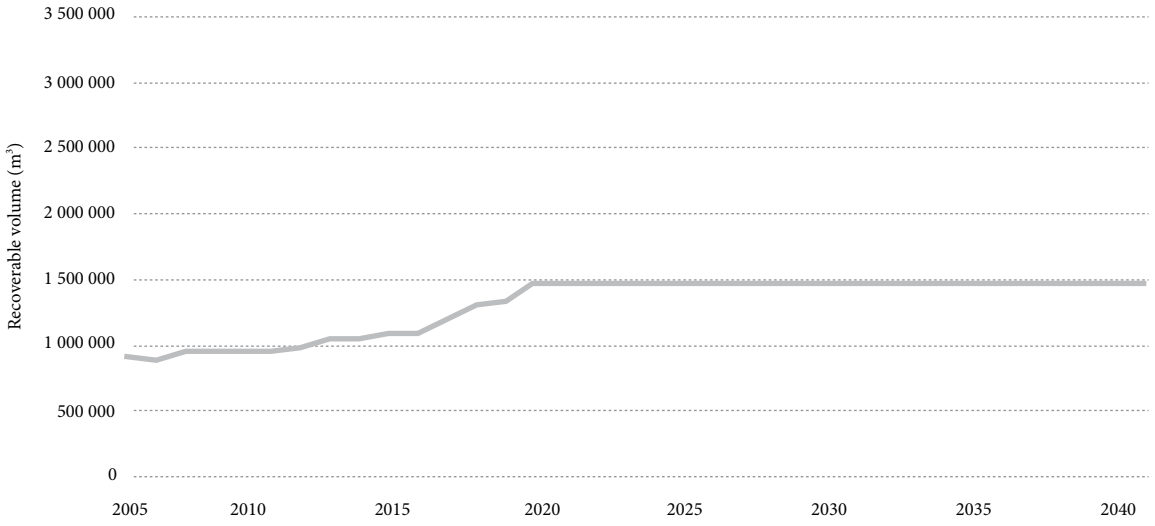
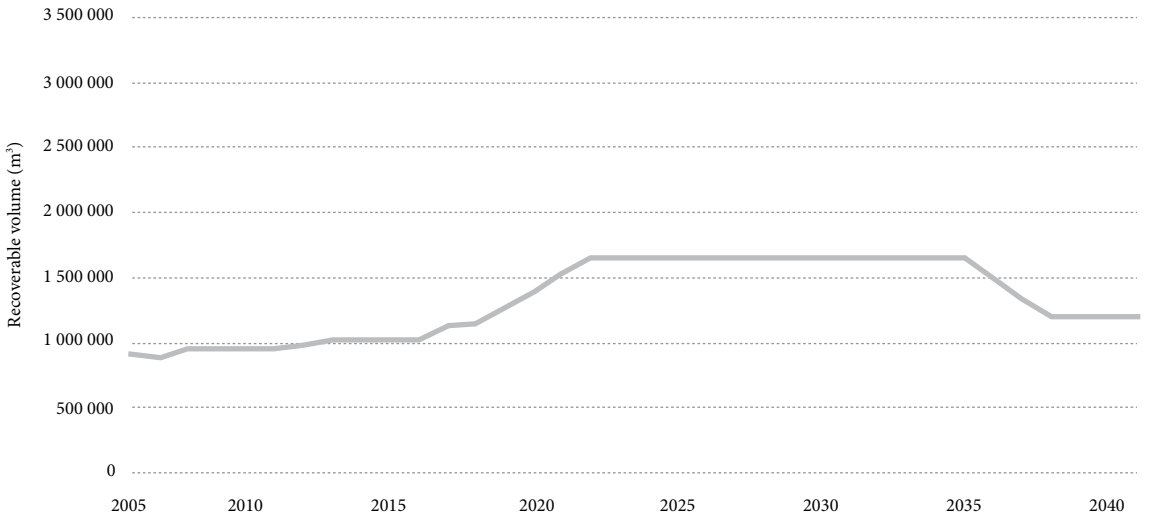


FIGURE 4.1: COMPARISON OF THE WOOD AVAILABILITY SCENARIOS (OTAGO RADIATA PINE FORECASTS)

4.1C – SCENARIO 3 EXAMPLE: NON-DECLINING YIELD WITH TARGET ROTATION 30 YEARS



4.1D – SCENARIO 4 EXAMPLE: SPLIT NON-DECLINING YIELD WITH TARGET ROTATION 30 YEARS (SCENARIO 5 IS THE SAME CONCEPT EXCEPT IT SHOWS WOOD AVAILABILITY PROFILES AT VARYING HARVEST AGES)



DATA

METHOD USED TO OBTAIN FOREST AREAS

Forest areas were obtained from *A National Exotic Forest Description as at 1 April 2005* (MAF 2006). The area for the large-scale owners was unadjusted, while the area for the small-scale owners' estate was reduced by 15 percent. 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 and wetlands). In addition to this, reductions were also made to the area of over-mature stands in the small-scale owners estate (as described later in this chapter).

METHOD USED TO DEVELOP YIELD TABLES

In 2006, new yield tables for Otago and Southland 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 get regional yield tables for each crop-type;
- yield tables for old radiata pine (planted before 1989 and aged 16 years+), 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;
- yield tables for young radiata pine crop-types (planted in 1990 and later) were also adjusted in consultation with large-scale owners; and
- the yield tables developed for the large-scale owners' estate were also applied to the small-scale forest owners' estate.

LARGE-SCALE OWNERS' HARVEST INTENTIONS

Large-scale owners were asked to provide details of their projected harvest volumes (by log grade and area) for the 2005 to 2015 period. The 15 largest owners all provided yearly (31 December) summary data for the project. Including the harvest intentions data was critical, as it provides realistic company projections as to wood availability over this period.

WOOD AVAILABILITY FORECASTS FOR OTAGO

THE OTAGO REGION

The Otago region has a plantation resource of 127 900 hectares, spread across five territorial authorities – Central Otago, Clutha, Dunedin City, Queenstown-Lakes and Waitaki. The majority of the resource is concentrated in the Clutha District, with 83 200 hectares (as at 1 April 2006).

ASSUMPTIONS

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

- All areas are replanted, with a regeneration lag of one year. Replanting is as follows:
  - large-scale forest owners: all areas are planted back into the same species and regime apart from about 7000 hectares of radiata pine that is replanted into Douglas-fir;
  - small-scale forest owners: all areas are planted back into the same species and regime.
- Based on a recent deforestation survey (*2006 Deforestation Intentions Survey*, Bruce Manley, 2006), the Otago and Southland regions are likely to experience a relatively low rate of deforestation between 2006 and 2020 (about 3900 hectares). This level of deforestation is not sufficient to warrant changes to the forecast models.
- The area awaiting replanting as at 31 March 2005 is included as area at age 0 (that is, the area to be replanted in the 2005 planting season).
- The total volume of radiata pine harvested in 2005 and 2006 was 925 000 and 895 000 cubic metres respectively (MAF estimate).
- The total volume of Douglas-fir harvested in 2005 and 2006 was 66 000 and 94 000 cubic metres respectively (MAF estimate).
- It was assumed that any radiata pine forest in the small-scale owners' estate that was aged over 40 years would not be harvested. The area in the small-scale owners' estate that was aged 31 to 40 years was reviewed. Local knowledge was used to determine whether the forest was still standing and, if so, whether or not it was likely to be harvested. As a result of this exercise, the area data was reduced by 212 hectares (aged 31 to 40 years).

› SCENARIO 1

In this scenario, all trees are harvested at age 30. This modelling approach views the Otago wood flow as unconstrained (or pure), meaning that wood availability reflects the age-class distribution of the resource. Figure 4.2 shows the age-class distribution of radiata pine in Otago, and Figure 4.3 shows the wood availability. The low point in wood availability in 2019 (Figure 4.3) occurs because of planting conditions in 1989. Just 1167 hectares were planted in the 1989 season. These plantings were aged 16 years in the 2005 age-class distribution (Figure 4.2). Conversely, the high point in wood availability in 2024 (Figure 4.3) occurs because of the large area planted in 1994 (6380 hectares), aged 11 in Figure 4.2.

Figure 4.3 indicates that wood availability does not have the potential to increase markedly for about 15 years.

FIGURE 4.2: AGE-CLASS DISTRIBUTION OF OTAGO RADIATA PINE – COMBINED ESTATE AS AT 1 APRIL 2005

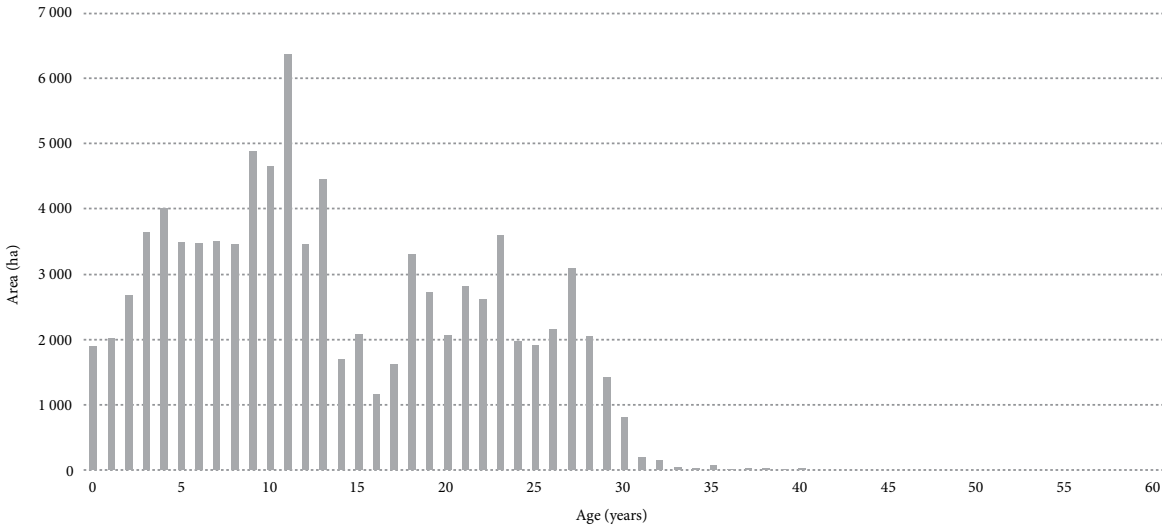
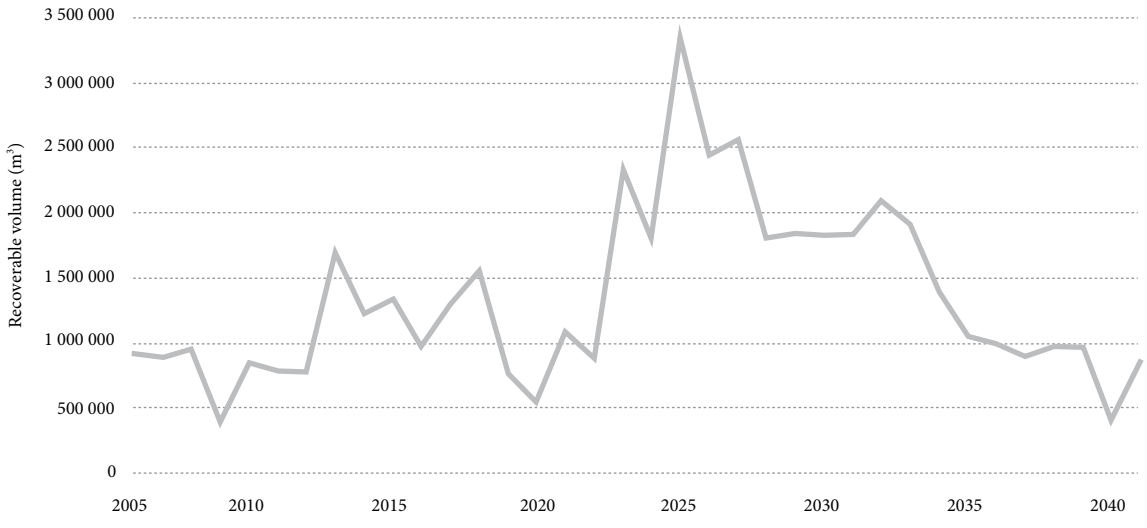


FIGURE 4.3: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 1 (ALL TREES HARVESTED AT AGE 30)



› SCENARIO 2

In this scenario, large-scale owners harvest in line with their stated intentions and small-scale owners harvest their holdings at age 30.

LARGE-SCALE OWNERS' ESTATE

The age-class distribution of the large-scale owners' estate (Figure 4.4) shows that there is about 2000 hectares in most age-classes up to age 28. The area at age 0 is the area awaiting replanting as at 31 March 2005 (to be replanted in the 2005 planting season).

FIGURE 4.4: AGE-CLASS DISTRIBUTION OF THE OTAGO RADIATA PINE ESTATE – LARGE-SCALE OWNERS AS AT 1 APRIL 2005

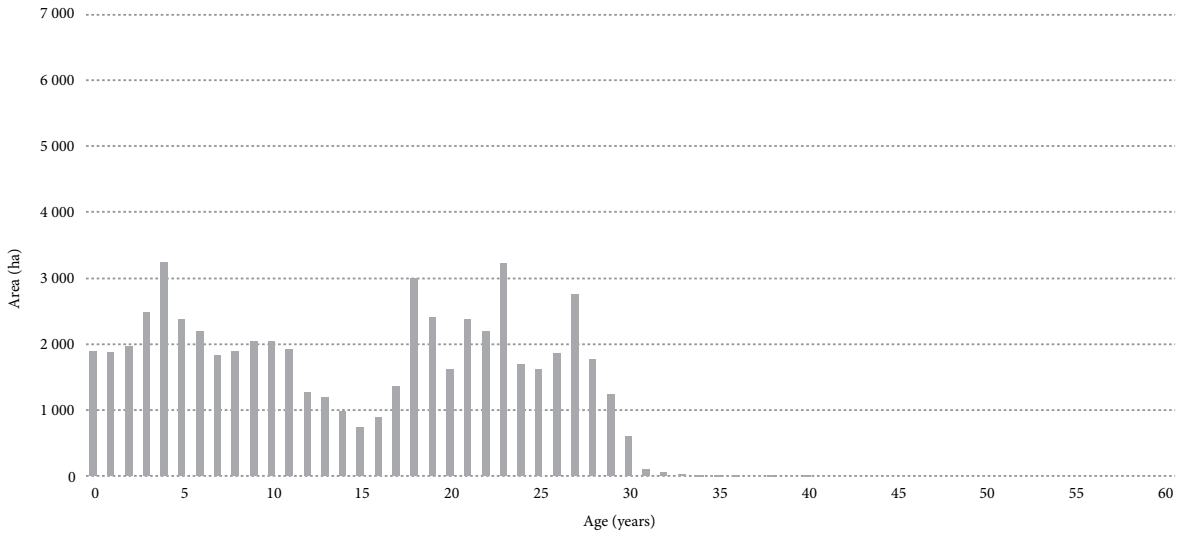
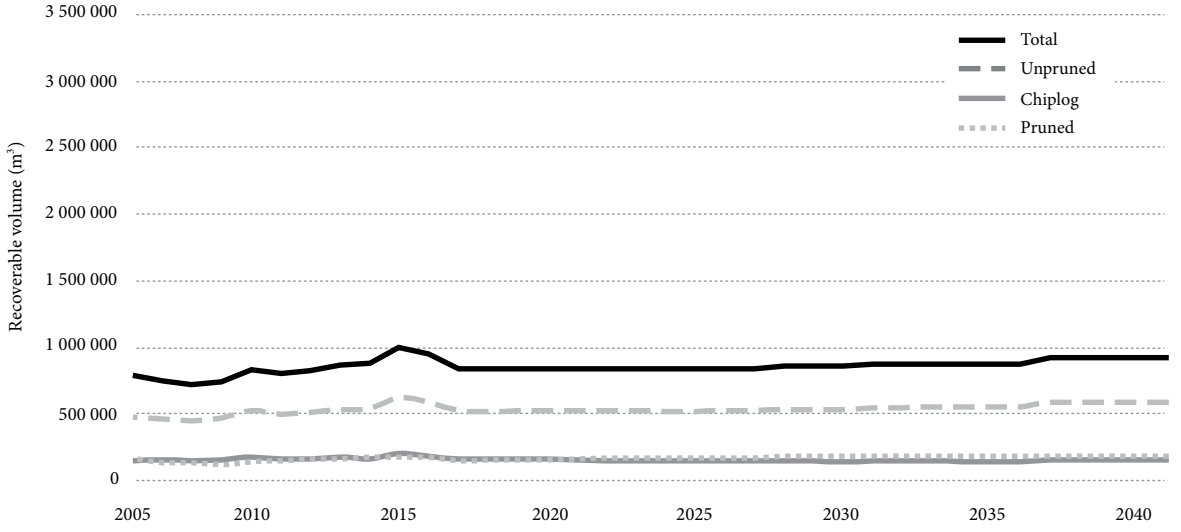


FIGURE 4.5: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – LARGE-SCALE OWNERS



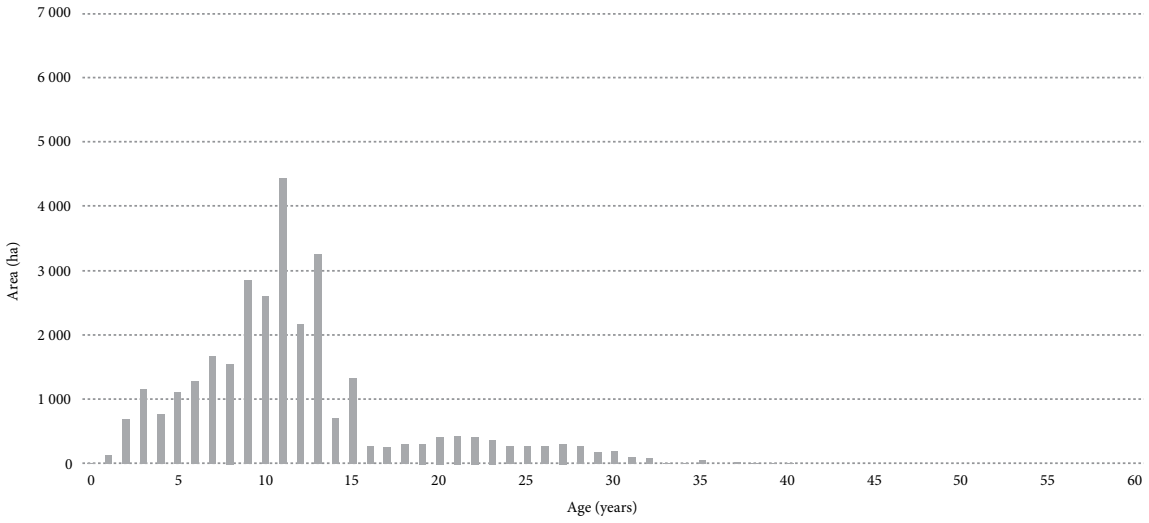
For this scenario, the availability of wood from large-scale owners is based on stated harvest intentions for 2005 to 2015. Thereafter the availability is constrained to be non-declining with a target rotation age of 30 years. The wood availability of large-scale owners (Figure 4.5) is forecast to be relatively static through the forecast period. Although there is replanting of some radiata pine area into Douglas-fir, the volume of radiata pine can be sustained. The higher yield (cubic metres per hectare) anticipated for younger stands and replanted stands compensates for the reduced area in radiata pine.

SMALL-SCALE OWNERS' ESTATE

The age-class distribution of the small-scale owners' estate (Figure 4.6) is very irregular, with over 2000 hectares in ages 9 to 13 years (planted in 1992 to 1996) and much less area in all other age-classes. Forecasting the wood availability from this estate depends on how the large areas in ages 9 to 13 will be harvested:

- at a fixed rotation age (scenario 2);
- spread over many years (scenario 3); or
- spread over an intermediate number of years (scenario 4).

FIGURE 4.6: AGE-CLASS DISTRIBUTION OF THE OTAGO RADIATA PINE ESTATE – SMALL-SCALE OWNERS AS AT 1 APRIL 2005



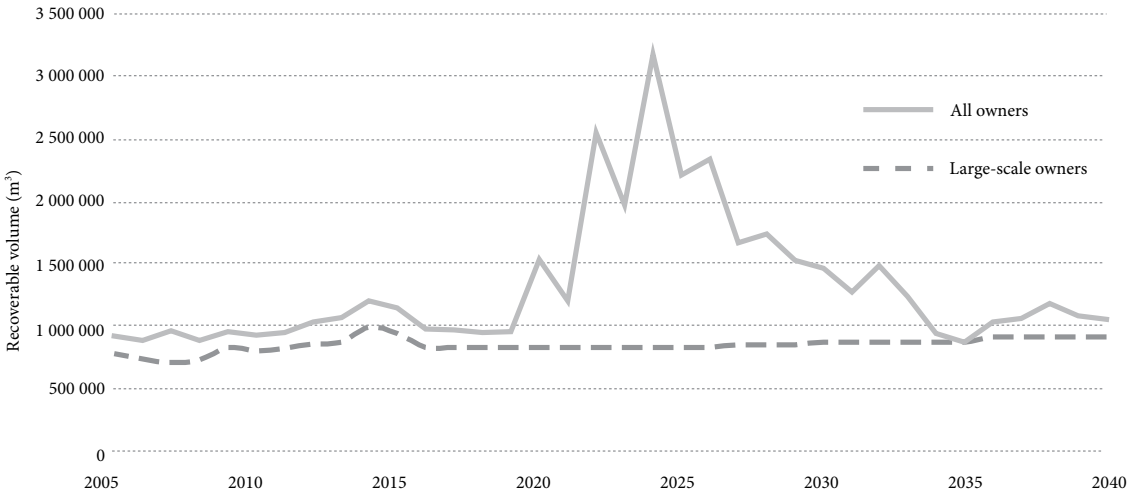
WOOD AVAILABILITY FROM THE COMBINED ESTATE FOR SCENARIO 2

The wood availability from all owners in Otago is presented in Figure 4.7. The large-scale owners' resource is shown as the base load, and the data matches Figure 4.5. The fluctuation in the total volume harvested reflects the variation in the age-class distribution of the small-scale owners' estate, and the assumption that this estate is harvested at age 30.

The large increase in harvest volume after 2022 (Figure 4.7) reflects the maturing of the small-scale owners' estate. For example, the increase in 2022 is a consequence of the 3269 hectares planted by small-scale owners in 1992 (aged 13 in Figure 4.6) being harvested at age 30 years.

Fluctuations in harvest volumes of the magnitude shown in Figure 4.7 would be impractical because of marketing and logistical realities. There would not be enough harvesting capacity (harvesting crews and equipment) to cut all the volume available during the peak period, and it would be difficult to get short-term sales contracts to cover this volume.

FIGURE 4.7: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – COMBINED ESTATE



› SCENARIO 3

The third scenario assumes a non-declining yield, with a target rotation age of 30 years. Figure 4.8 indicates that when the small-scale owners' estate is harvested to complement the large-scale owners' estate, the total volume (of radiata pine) only increases slightly through to 2017. The potentially available volume increases to 1.5 million cubic metres per year from 2021. An extra constraint was modelled, with the total volume increasing by no more than 10 percent annually. This simulates the logistical limitations of rapidly moving to a higher production volume.

This scenario is similar to the base case scenario adopted *in the National Exotic Forest Description 2000* (MAF 2000) wood supply forecasts. However, it results in the small-scale owners' estate being harvested at rotation ages that differ markedly from 30 years (Figure 4.9).

FIGURE 4.8: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 3 – ALL OWNERS

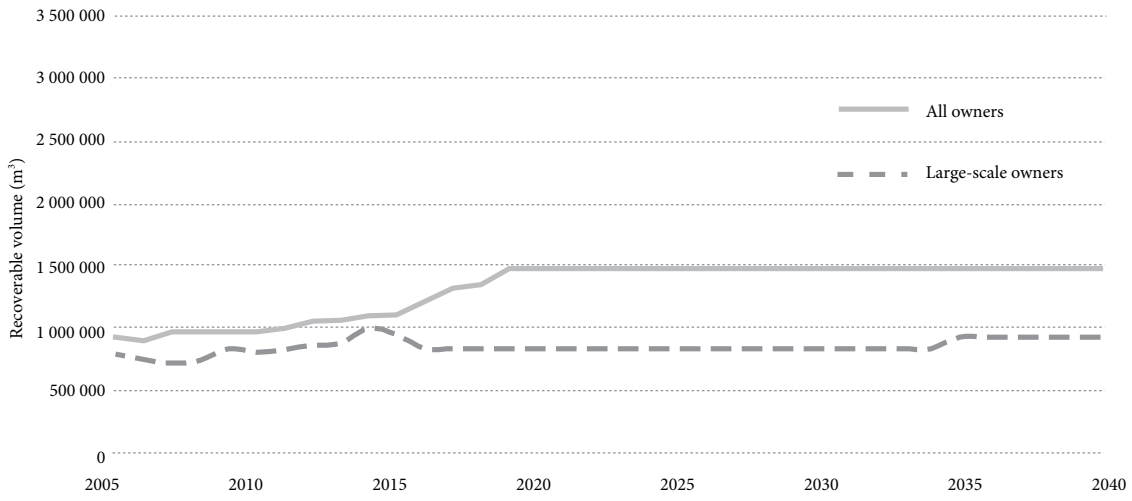
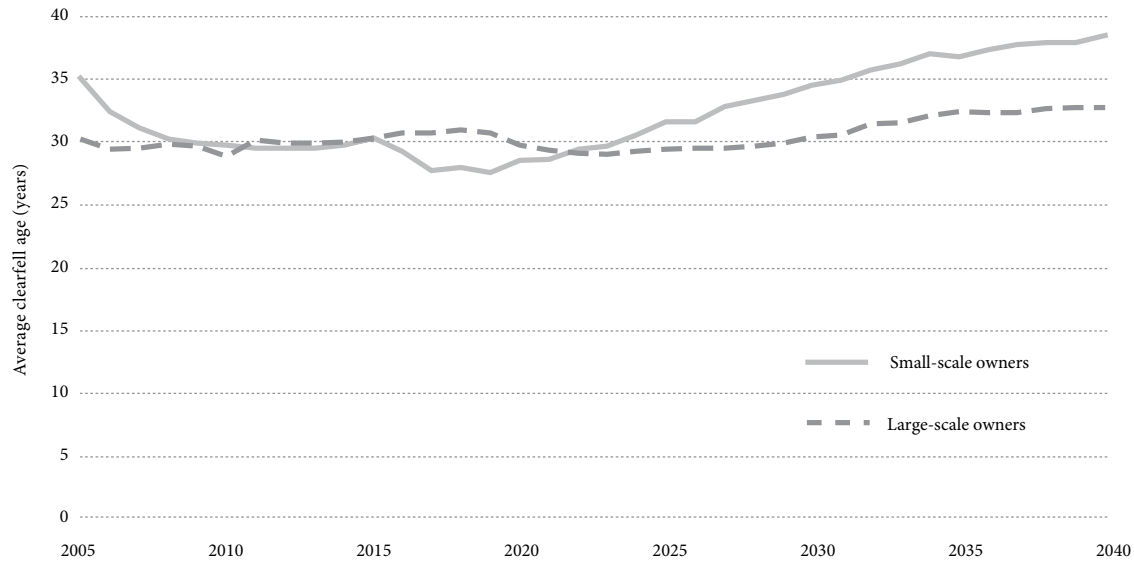


FIGURE 4.9: AVERAGE RADIATA PINE CLEARFELL AGE IN OTAGO UNDER SCENARIO 3 – BY OWNERSHIP CATEGORY



SCENARIO 4

The fourth scenario is based on a split non-declining yield, with a target rotation age of 30 years. This scenario gives a forecast wood availability that is similar to scenario 3 through to 2021 (Figure 4.10). Wood availability increases to 1.7 million cubic metres per year from 2022 before reducing to 1.25 million cubic metres per year from 2037.

The main difference from scenario 3 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. The total volume was modelled not to decrease between 2006 and 2034, that is, for the current rotation.

Thereafter an annual reduction of up to 10 percent was assumed, with the yield to be non-declining for the next rotation (from 2037). As a consequence, the average clearfell age for small-scale owners stays closer to the

FIGURE 4.10: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 4 – ALL OWNERS

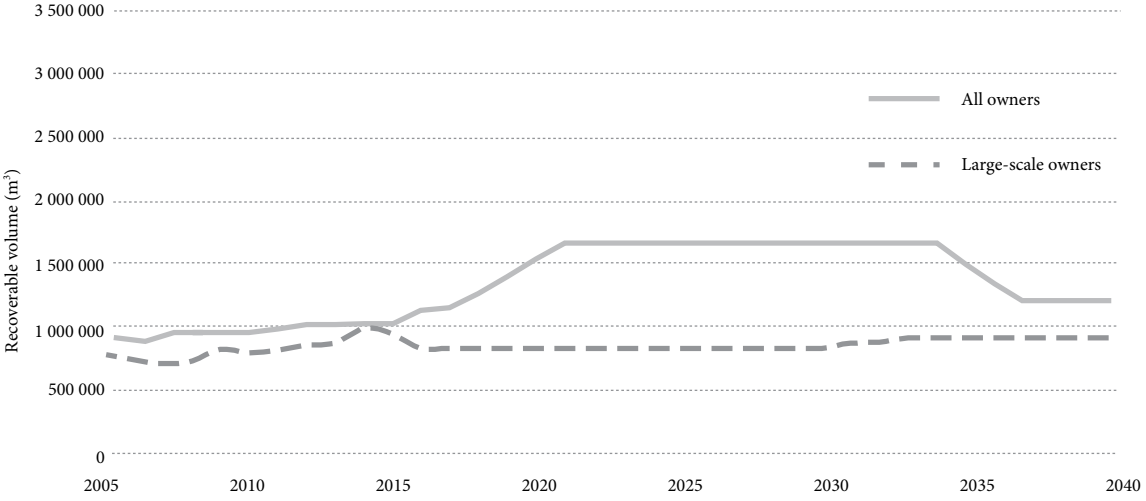
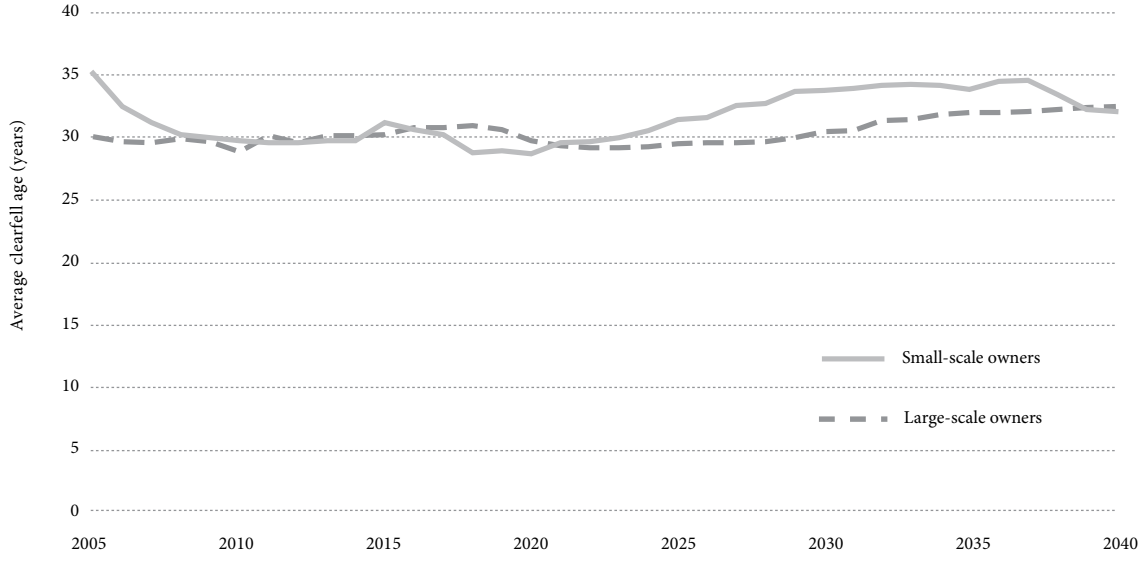


FIGURE 4.11: AVERAGE RADIATA PINE CLEARFELL AGE IN OTAGO UNDER SCENARIO 4 – BY OWNERSHIP CATEGORY



target of 30 years than in scenario 3 (Figure 4.11).

The harvest volumes forecast under scenario 4 are broken down by log grade in Figure 4.12.

› SCENARIO 5

Different wood availability profiles are generated if the target rotation age is changed from 30 years to either 28 or 32 years (Figure 4.13).

Because of the limitations imposed by the current age-class distribution and large-scale owners' stated harvest intentions, it takes some time to achieve separation of average clearfell age (Figure 4.14). The results indicate that the potential to markedly increase the wood harvest is limited before at least 2013.

FIGURE 4.12: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 4 – BY LOG GRADE (ALL OWNERS)

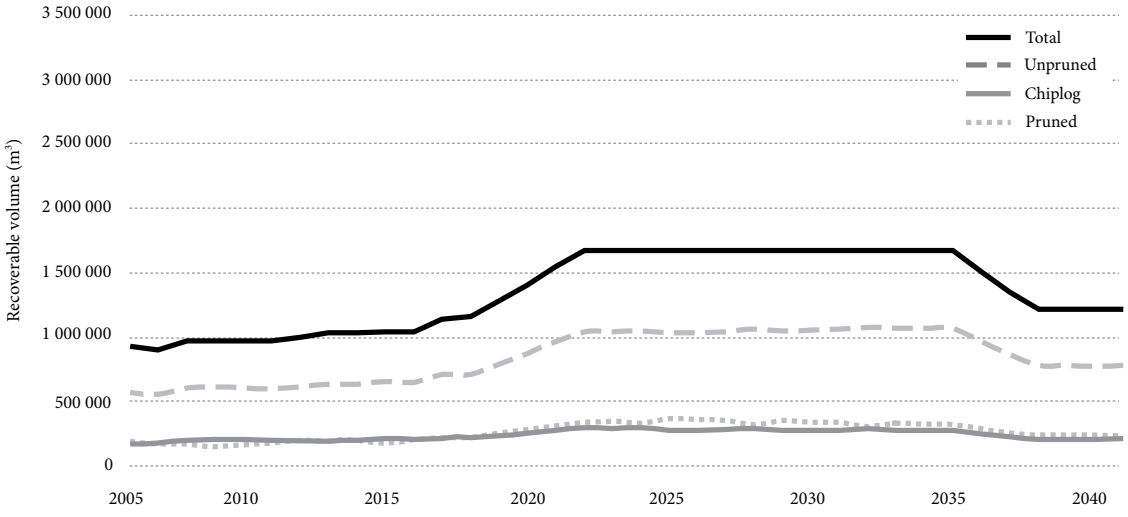
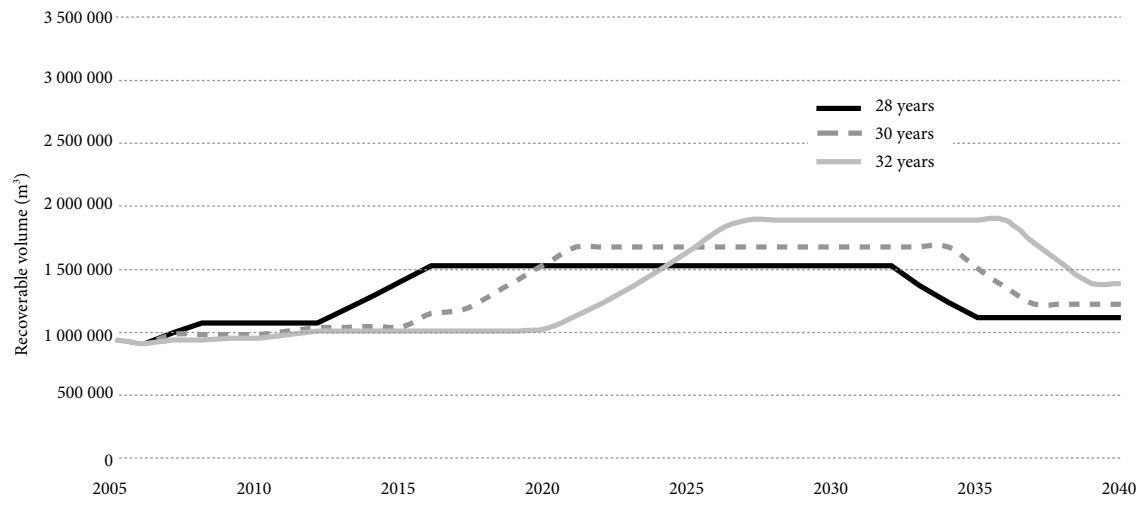


FIGURE 4.13: OTAGO RADIATA PINE AVAILABILITY BY TARGET ROTATION AGE UNDER SCENARIO 5 – ALL OWNERS



DOUGLAS-FIR

The age-class distribution of Douglas-fir in Otago is far from uniform, as shown in Figure 4.15. Large areas of Douglas-fir were established from 1997 to 2000, mainly by large-scale forest owners. This imposes challenges for future yield regulation. To illustrate this, the wood availability graph for Douglas-fir has been extended to 2060.

The Douglas-fir harvest for the large-scale owners' estate is based on intentions for 2005 to 2015. From 2015 to

FIGURE 4.14: AVERAGE RADIATA PINE CLEARFELL AGE IN OTAGO BY TARGET ROTATION AGE UNDER SCENARIO 5 – ALL OWNERS

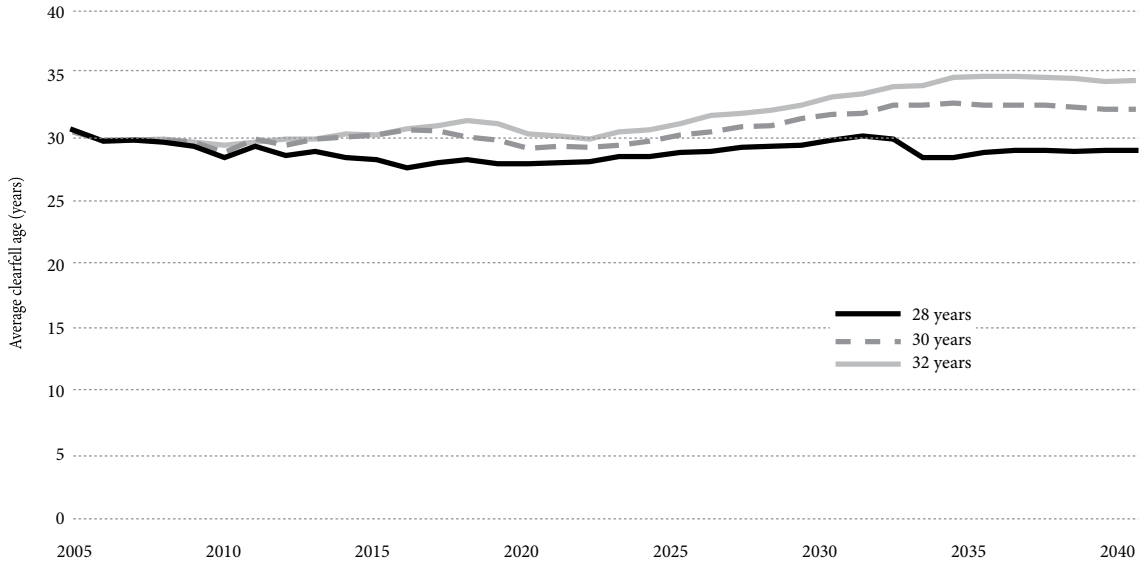
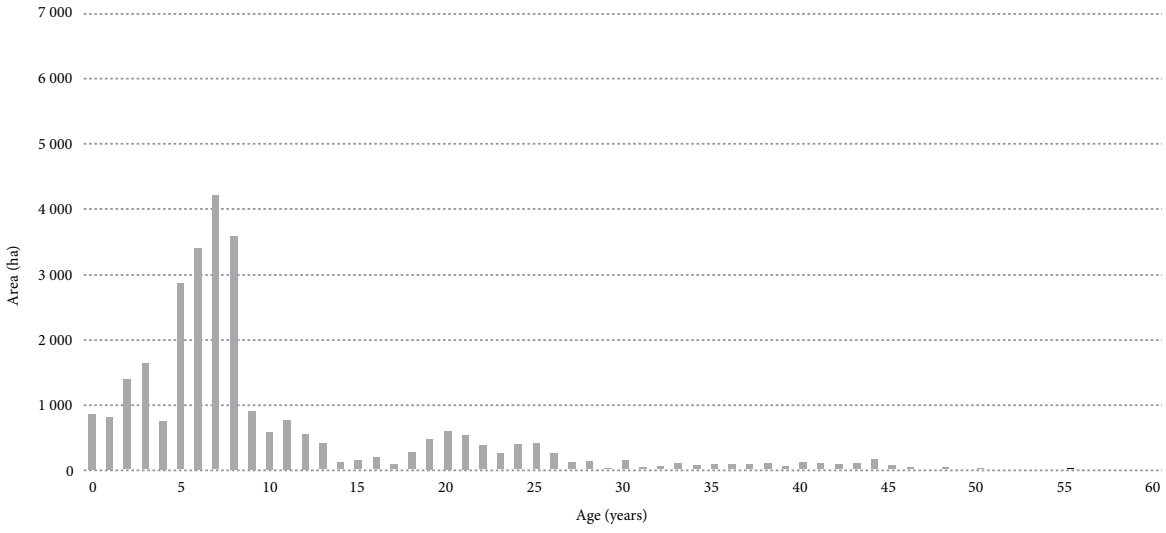


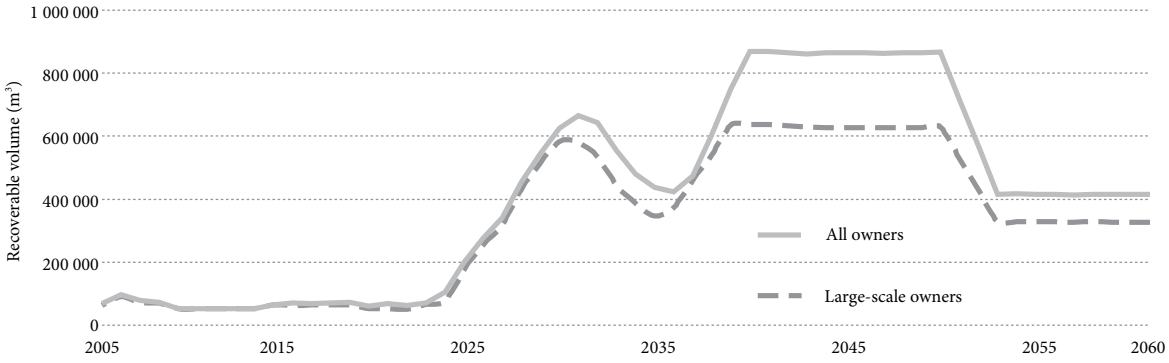
FIGURE 4.15: AGE-CLASS DISTRIBUTION OF OTAGO DOUGLAS-FIR – COMBINED ESTATE AS AT 1 APRIL 2005



2049, clearfell volume is constrained to be non-declining – both for large-scale owners and for the combined estate. Clearfell volumes can change by 100 000 cubic metres per year for the large-scale owners' estate and by 150 000 cubic metres per year for the combined estate.

Figure 4.16 clearly shows how large-scale owners dominate the potential supply of this species. About 50 percent of the volume between 2027 and 2032 comes from production thinning.

FIGURE 4.16: OTAGO DOUGLAS-FIR AVAILABILITY – COMBINED ESTATE (VOLUMES INCLUDE PRODUCTION THINNING AS WELL AS CLEARFELL)



Logging operations in the City Forests Estate.

WOOD AVAILABILITY FORECASTS FOR SOUTHLAND

THE SOUTHLAND REGION

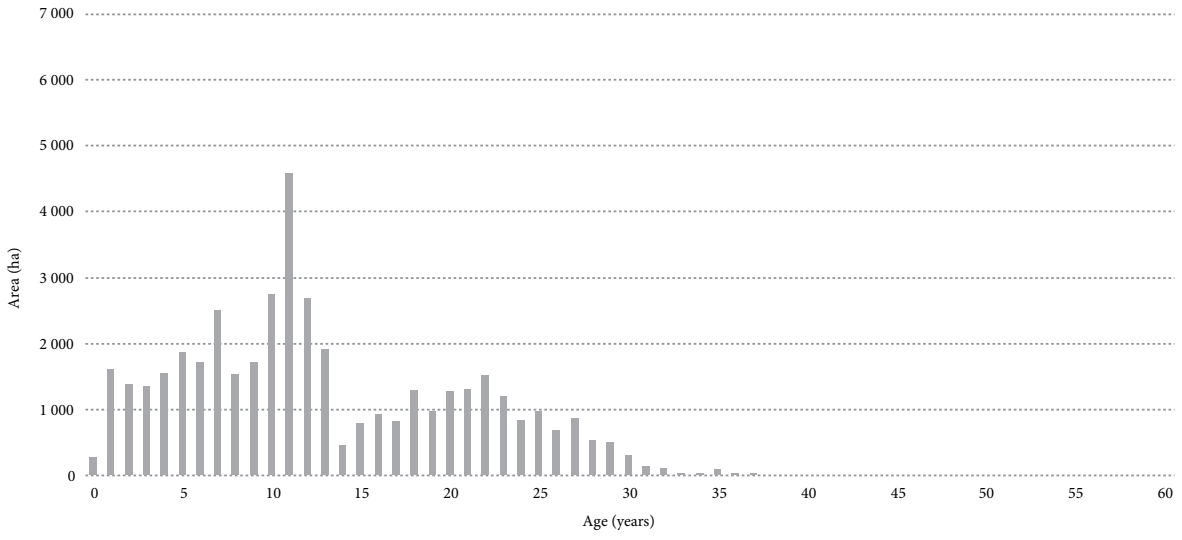
The Southland region has a plantation resource of 87 800 hectares, spread across three territorial authorities – Gore, Invercargill City and Southland District. The majority of the resource is concentrated in the Southland District, with 82 700 hectares (1 April 2006).

ASSUMPTIONS

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

- All areas are replanted, with a regeneration lag of one year. Replanting is as follows:
  - large-scale forest owners: all areas are planted back into the same species and regime;
  - small-scale forest owners: all areas are planted back into the same species and regime.
- Based on a recent deforestation survey (*2006 Deforestation Intentions Survey,* Bruce Manley 2006), the Otago and Southland regions are likely to experience a relatively low rate of deforestation between 2006 and 2020 (about 3900 hectares). This level of deforestation is not sufficient to warrant changes to the forecast models.
- The area awaiting replanting as at 31 March 2005 is included as area age 0 (the area to be replanted in the 2005 planting season).
- The total volume of radiata pine harvested in 2005 and 2006 was 507 000 and 527 000 cubic metres respectively (MAF estimate).
- The total volume of Douglas-fir harvested in 2005 and 2006 was 15 000 and 19 000 cubic metres respectively (MAF estimate).
- It was assumed that any radiata pine forest in the small-scale owners' estate that was aged over 40 years would not be harvested. The area in the small-scale owners' estate that was aged 31 to 40 years was reviewed. Local knowledge was used to determine whether the forest was still standing and, if so, whether or not it was likely to be harvested. As a result of this exercise, the area data was reduced by 175 hectares (aged 31 to 40 years).

FIGURE 4.17: AGE-CLASS DISTRIBUTION OF SOUTHLAND RADIATA PINE – COMBINED ESTATE AS AT 1 APRIL 2005



› SCENARIO 1

In this scenario, all trees are harvested at age 30. This modelling approach views the Southland wood flow as unconstrained (or pure), meaning that wood availability reflects the age-class distribution of the resource. Figure 4.17 shows the age-class distribution of radiata pine in Southland, and Figure 4.18 shows the wood availability. The 2021 low point in wood availability (Figure 4.18) occurs because of planting conditions in 1991. These plantings were aged 14 in the 2005 age-class distribution (Figure 4.17). Conversely, the 2024 high point in wood availability (Figure 4.18) occurs because of the large area planted in 1994, aged 11 in Figure 4.17.

› SCENARIO 2

In this scenario, large-scale owners harvest in line with their intentions, and small-scale owners harvest at age 30.

LARGE-SCALE OWNERS' ESTATE

The age-class distribution of the large-scale owners' estate (Figure 4.19) shows a variable area in each age-class. The area at age 0 is the area awaiting replanting as at 31 March 2005 (to be replanted in the 2005 planting season).

For this scenario the availability of wood from large-scale forest owners is based on stated harvest intentions for 2005 to 2015. Thereafter the availability is constrained to be non-declining with a target rotation age of 30 years. The wood volume available from large-scale owners (Figure 4.20) is forecast to fluctuate around 300 000 cubic metres per year until 2016, before increasing to over 400 000 cubic metres per year from 2019.

FIGURE 4.18: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 1 – COMBINED ESTATE

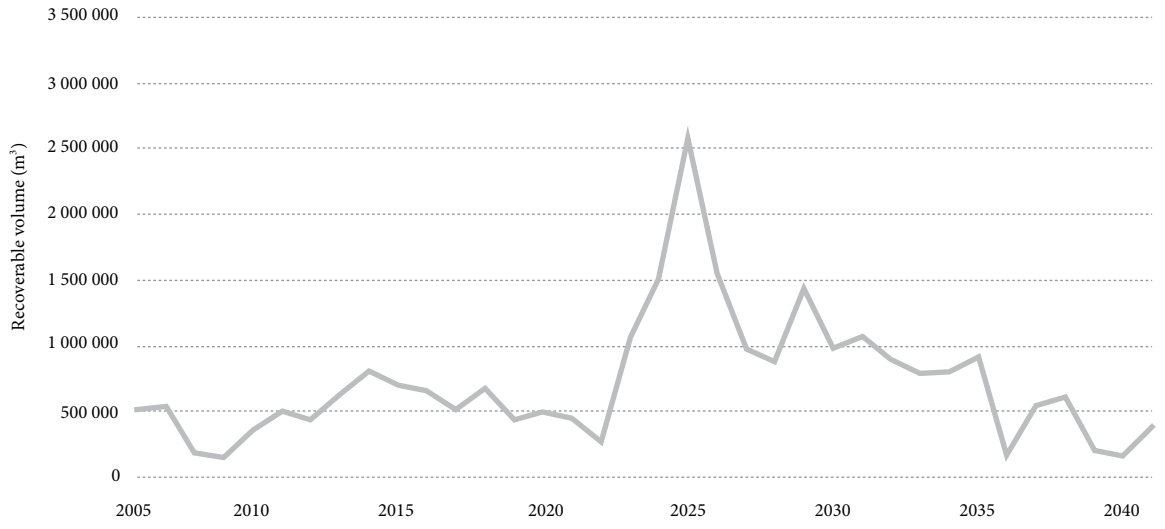


FIGURE 4.19: AGE-CLASS DISTRIBUTION OF THE SOUTHLAND RADIATA PINE ESTATE – LARGE-SCALE OWNERS AS AT 1 APRIL 2005

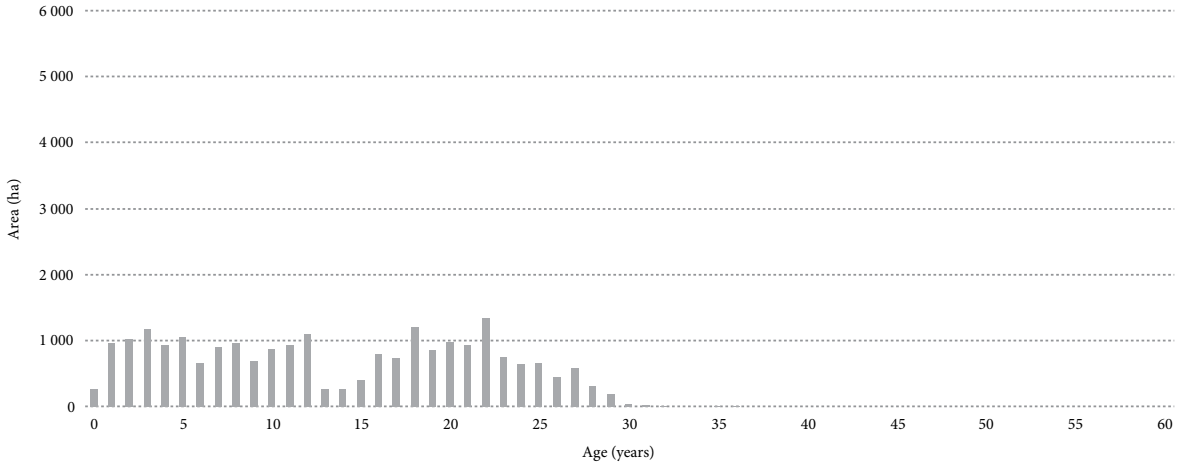
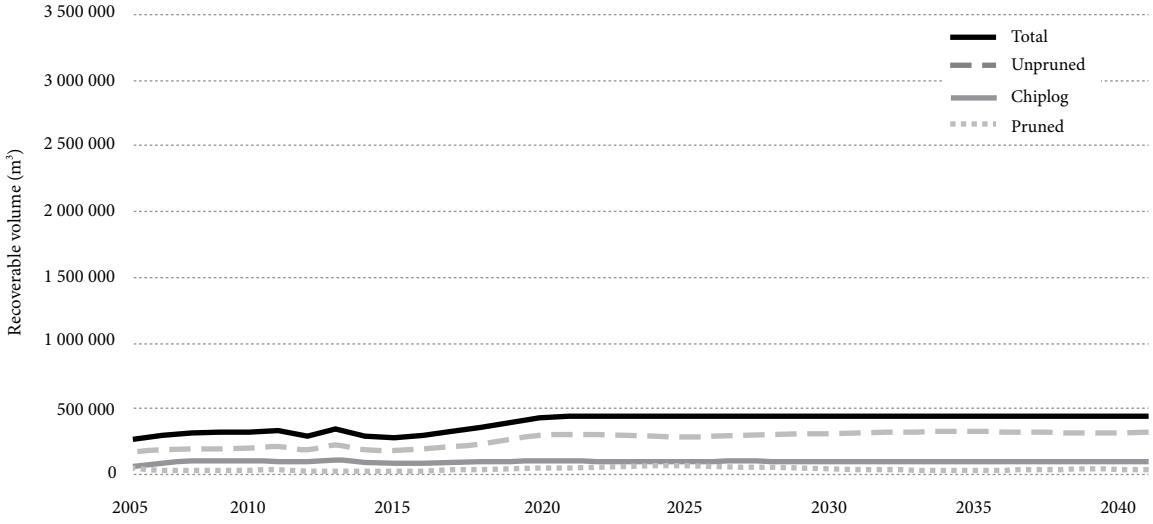


FIGURE 4.20: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – LARGE-SCALE OWNERS

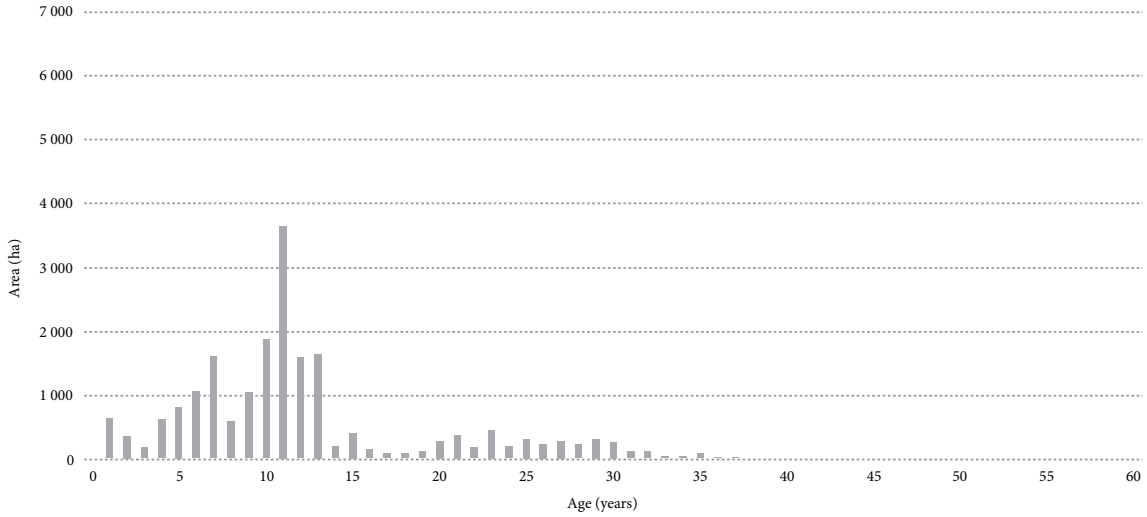


SMALL-SCALE OWNERS' ESTATE

The age-class distribution of the small-scale owners' estate (Figure 4.21) is very irregular, with over 1500 hectares in ages 10 to 13 years (planted in 1992 to 1995) and aged 7 (planted in 1998). Plantings have been significantly lower in all other age-classes. Forecasting the wood availability from this estate depends on how the large areas in ages 7 to 13 will be harvested:

- at a fixed rotation age (scenario 2);
- spread over many years (scenario 3); or
- spread over an intermediate number of years (scenario 4).

FIGURE 4.21: AGE-CLASS DISTRIBUTION OF THE SOUTHLAND RADIATA PINE ESTATE – SMALL-SCALE OWNERS AS AT 1 APRIL 2005



Farm Forestry Plantings, Dipton (Graham and Heather Milligan).

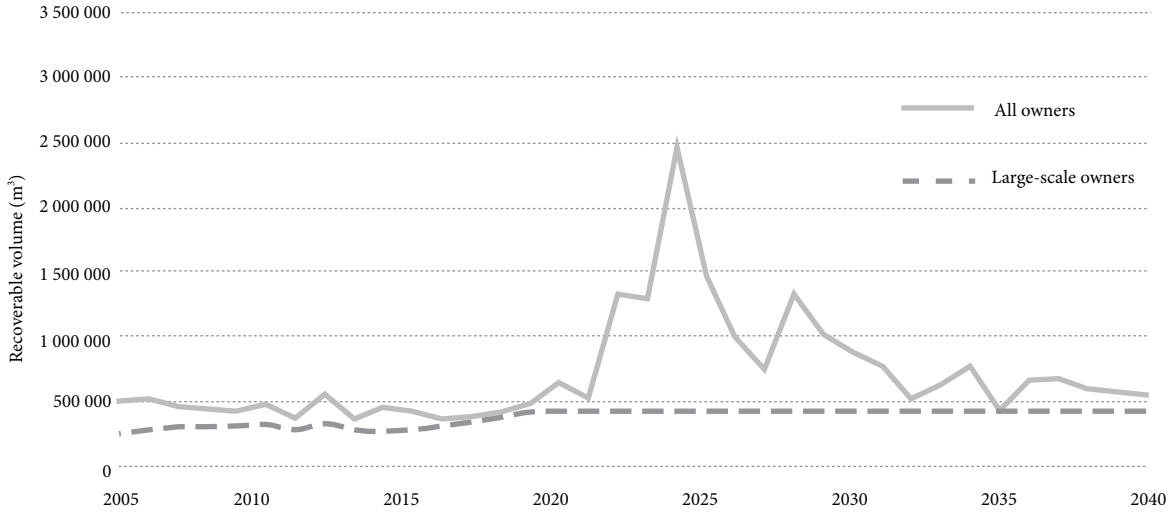
COMBINED ESTATE

The wood availability from all owners in Southland is presented in Figure 4.22. The large-scale owners' resource is shown as the base load, and the data mirrors Figure 4.20. The fluctuation in the total volume harvested reflects the variation in the age-class distribution of the small-scale owners' estate, and the assumption that this estate is harvested at age 30.

The large increase in harvest volume after 2022 (Figure 4.22) reflects the maturing of the small-scale owners' estate. For example, the increase in 2022 is a consequence of the 1638 hectares planted by small-scale owners in 1992 (aged 13 in Figure 4.21) being harvested at age 30 years. The spike in 2024 is caused by the harvest of 3636 hectares planted by small-scale owners in 1994 (aged 11 in Figure 4.21).

Volume fluctuations of the magnitude shown in Figure 4.22 would be impractical because of marketing and logistical realities. There would not be enough harvesting capacity (harvesting crews and equipment) to cut all the volume available during the peak period, and it would be difficult to get short-term sales contracts to cover this volume.

FIGURE 4.22: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 2 – COMBINED ESTATE



› SCENARIO 3

The third scenario is based on non-declining yield, and a target rotation age of 30 years. Figure 4.23 indicates that there is the potential for the total radiata pine volume (from the combined large and small-scale owner estate) to increase to over 850 000 cubic metres per year from 2023. However, it also indicates that wood availability is only 450 000 cubic metres per year from 2007 to 2016. The drop from 2006 to 2007 is a consequence of the current level of harvest from the small-scale estate not being sustainable over the next 10 years.

This scenario is similar to the base case scenario adopted in the *National Exotic Forest Description 2000* (MAF 2000) wood supply forecasts. However, it results in the small-scale owners' estate being harvested at rotation ages that differ markedly from 30 years (Figure 4.24).

FIGURE 4.23: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 3 – ALL OWNERS

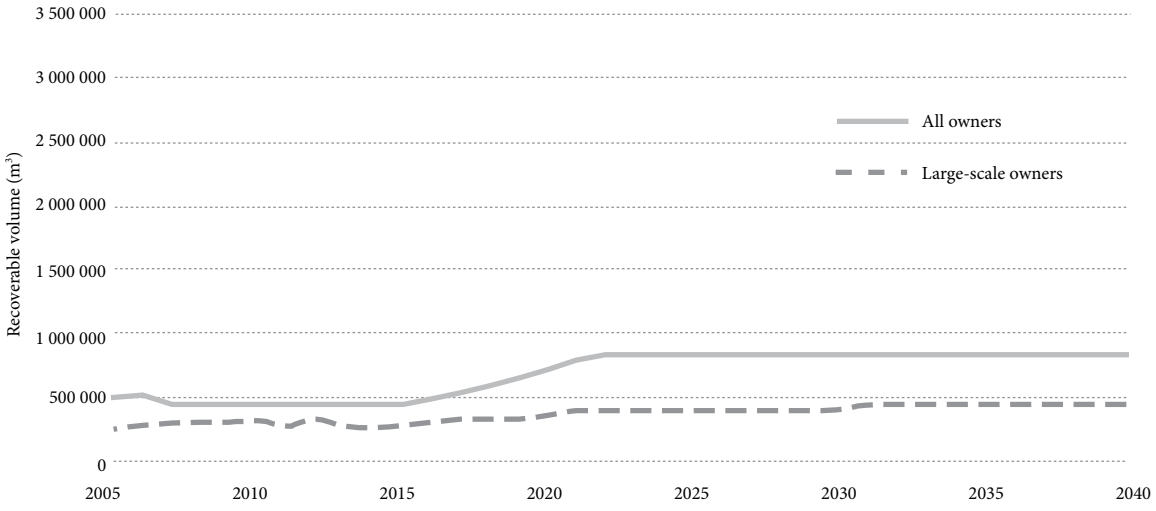
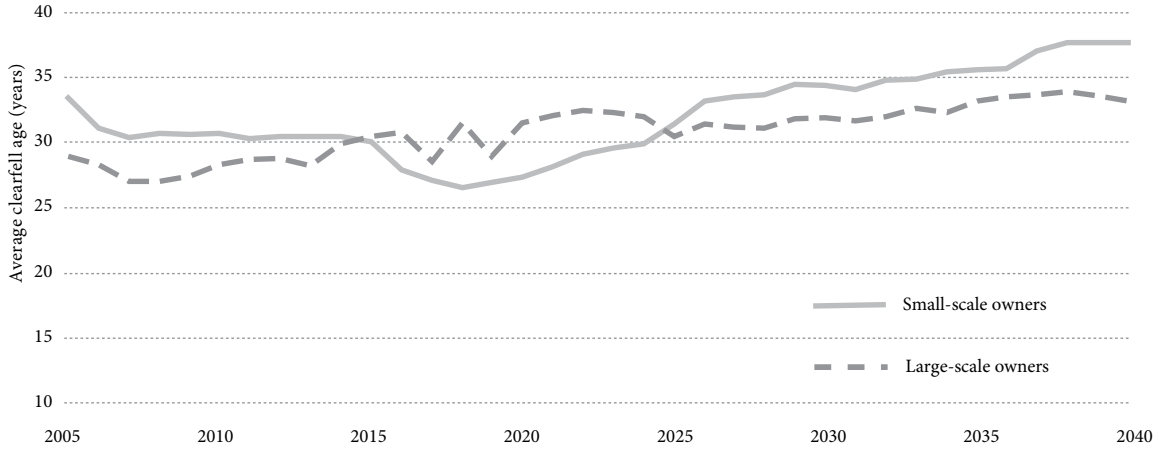


FIGURE 4.24: AVERAGE RADIATA PINE CLEARFELL AGE IN SOUTHLAND UNDER SCENARIO 3 – BY OWNERSHIP CATEGORY



› SCENARIO 4

The fourth scenario is based on a split non-declining yield, with a target rotation age of 30 years. This scenario gives a similar forecast of wood availability to scenario 3 through to 2023. Thereafter, there is an increase to over 1 million cubic metres per year from 2025 (Figure 4.25), with a subsequent reduction to 750 000 cubic metres per year from 2037 on. The main difference from scenario 3 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. As a consequence, the average clearfell age for small-scale owners stays closer to the target of 30 years than in scenario 3 (Figure 4.26).

The harvest volumes forecast under scenario 4 are broken down by log grade in Figure 4.27.

FIGURE 4.25: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 4 – ALL OWNERS

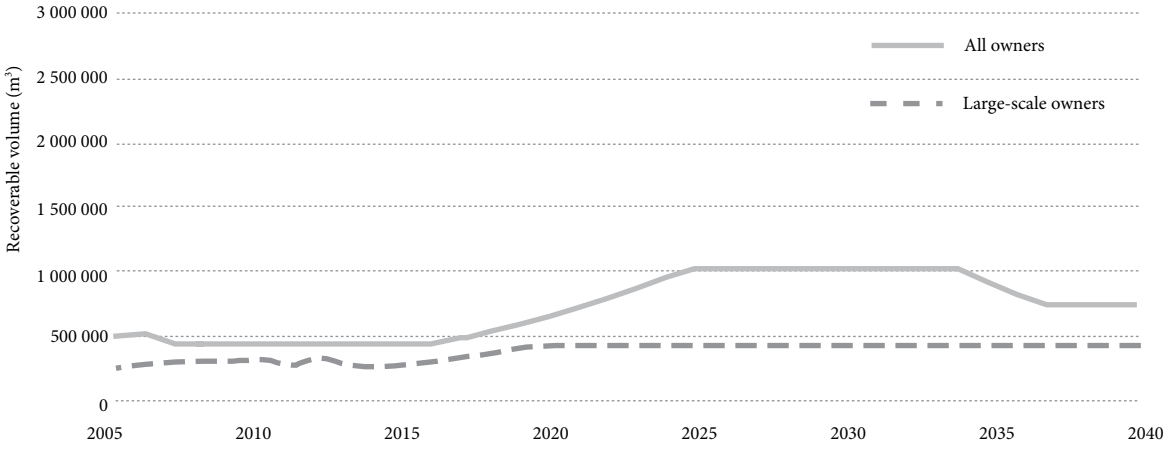


FIGURE 4.26: AVERAGE RADIATA PINE CLEARFELL AGE IN SOUTHLAND UNDER SCENARIO 4 – BY OWNERSHIP CATEGORY

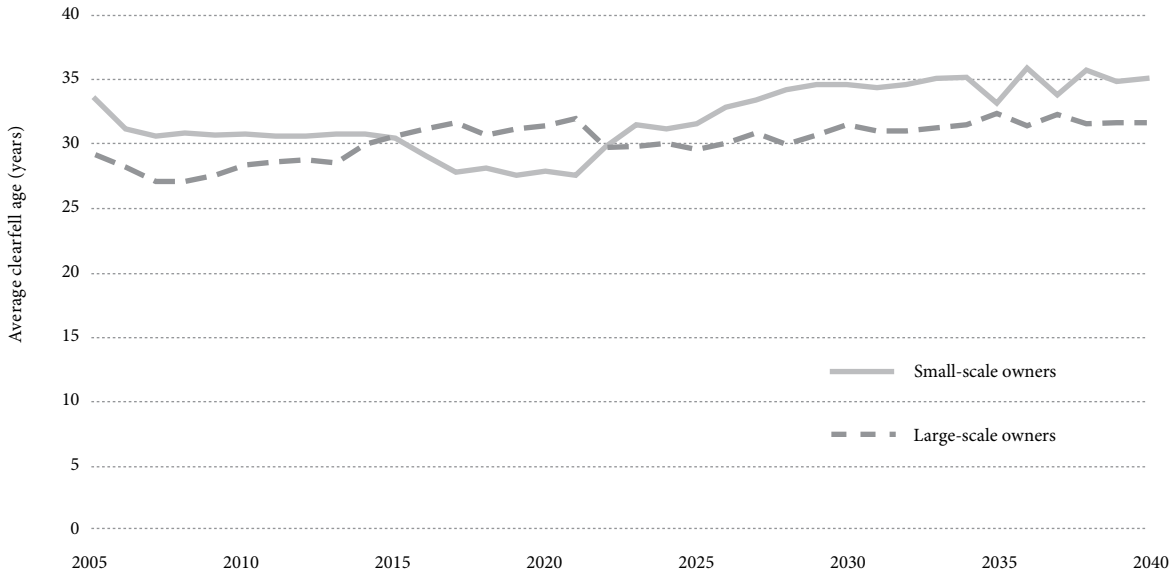
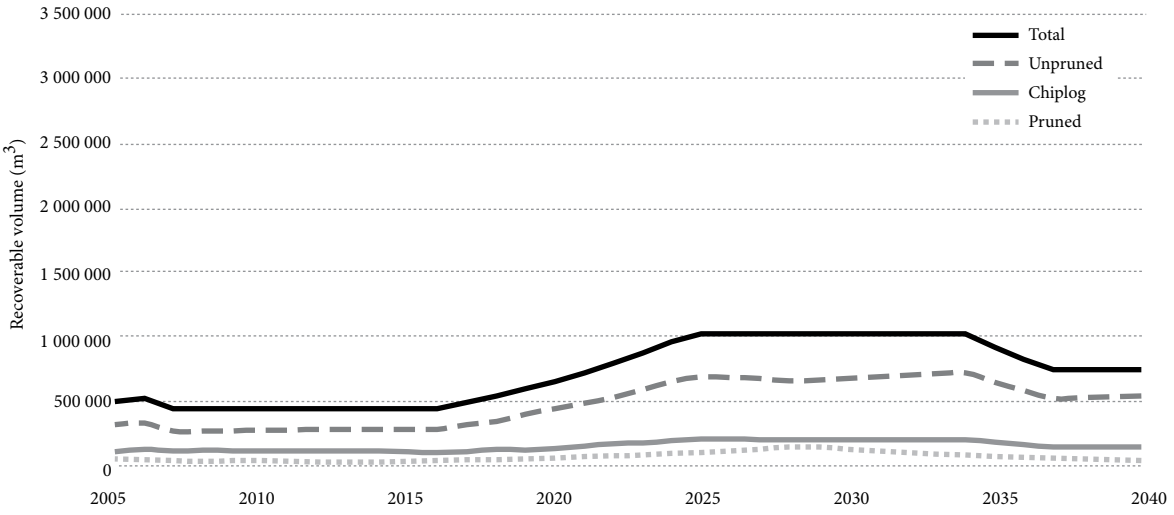


FIGURE 4.27: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 4 – BY LOG GRADE



› SCENARIO 5

Different wood availability profiles are generated if the target rotation age is altered from 30 years to either 28 or 32 years (Figure 4.28). To get separation in harvest volumes from 2006 onwards, the annual increase allowed for the 32-year rotation (over the 2005 to 2019 period) was limited to 1 percent, rather than 10 percent.

FIGURE 4.28: SOUTHLAND RADIATA PINE AVAILABILITY BY TARGET ROTATION AGE UNDER SCENARIO 5

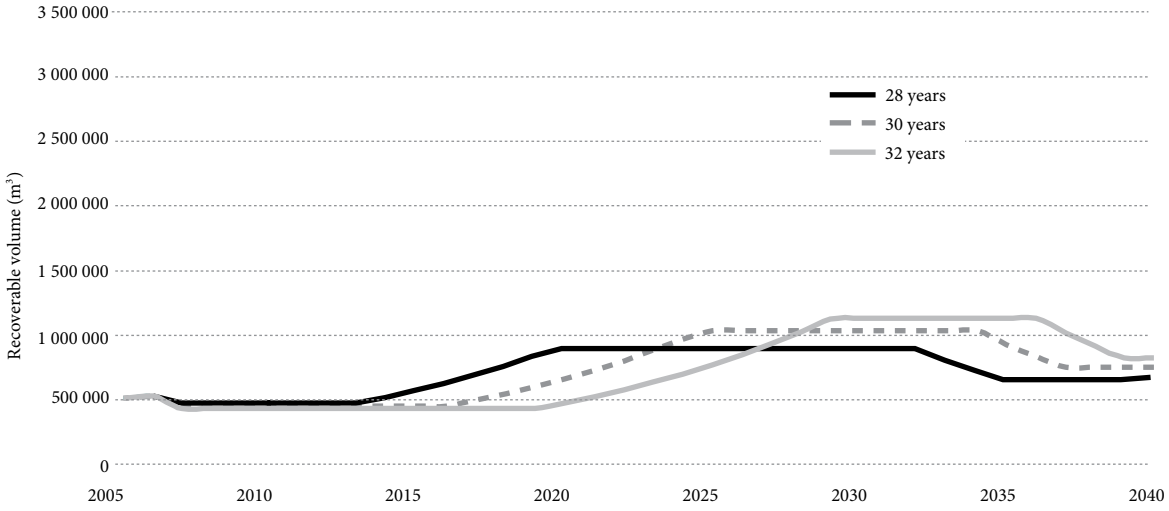
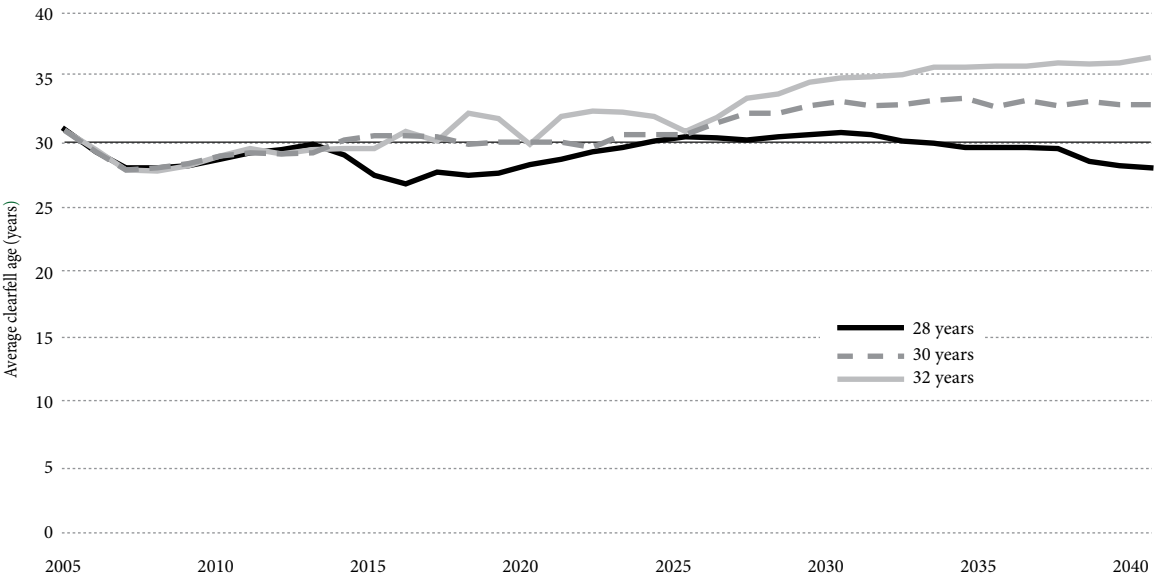


FIGURE 4.29: AVERAGE RADIATA PINE CLEARFELL AGE IN SOUTHLAND BY TARGET ROTATION AGE UNDER SCENARIO 5



DOUGLAS-FIR

The age-class distribution of Douglas-fir in Southland is far from uniform (Figure 4.30). Large areas of Douglas-fir were established from 1995 to 2003. This age class structure imposes challenges for yield regulation.

The Douglas-fir harvest for the large-scale forest owners' estate is based on harvesting intentions for the period 2005 to 2015. From 2015 to 2049 clearfell volume is constrained to be non-declining – both for large-scale owners and for the combined estate. Clearfell volumes can change by 100 000 cubic metres per year for the large-scale owners' estate and by 150 000 cubic metres per year for the combined estate.

Figure 4.31 clearly shows the potential for an increase in the supply of this species in the long-term. Over 50 percent of the volume between 2025 and 2032 will come from production thinning.

FIGURE 4.30: AGE-CLASS DISTRIBUTION OF SOUTHLAND DOUGLAS-FIR – COMBINED ESTATE AS AT 1 APRIL 2005

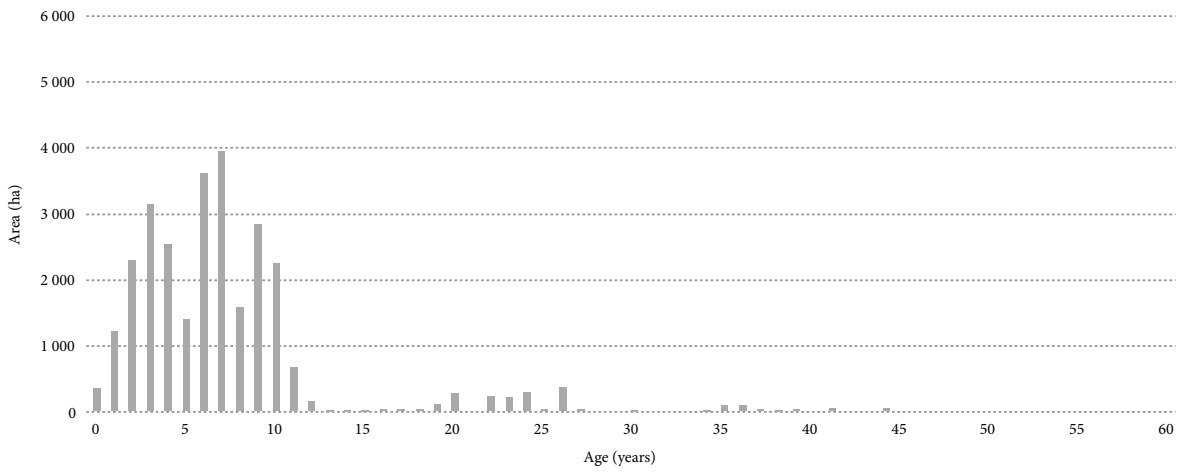
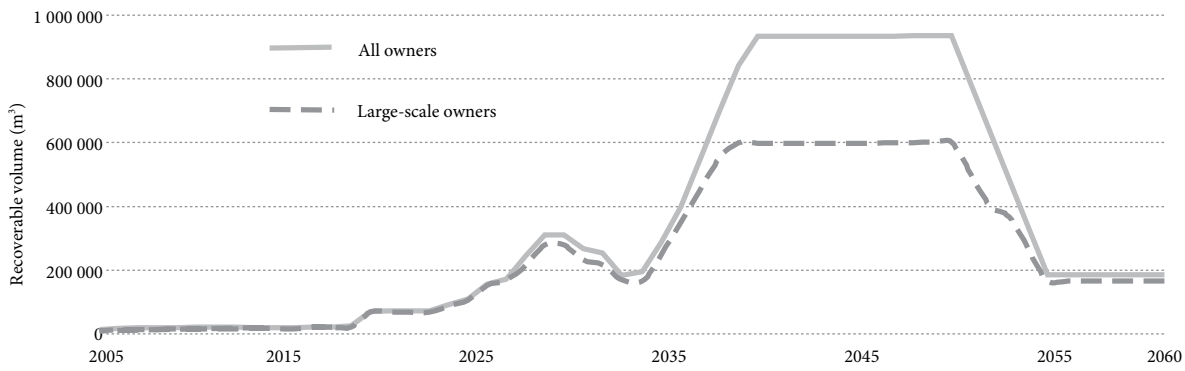


FIGURE 4.31: SOUTHLAND DOUGLAS-FIR AVAILABILITY – COMBINED ESTATE (VOLUMES INCLUDE PRODUCTION THINNING AS WELL AS CLEARFELL)



WOOD AVAILABILITY FORECASTS FOR THE COMBINED OTAGO AND SOUTHLAND ESTATE

The combined radiata pine forecasts for Otago and Southland are presented for scenario 3 (Figure 4.32), scenario 4 (Figures 4.33, 4.34 and 4.35) and scenario 5 (Figure 4.36).

SCENARIO 3

The third scenario is based on non-declining yield, and a target rotation of 30 years. Figure 4.32 indicates that wood availability from the Otago and Southland regions will increase only marginally over the next 10 years. This scenario shows there is potential for wood availability to increase after 2016.

FIGURE 4.32: OTAGO AND SOUTHLAND COMBINED WOOD AVAILABILITY UNDER SCENARIO 3 – SPLIT BY OWNERSHIP CATEGORY

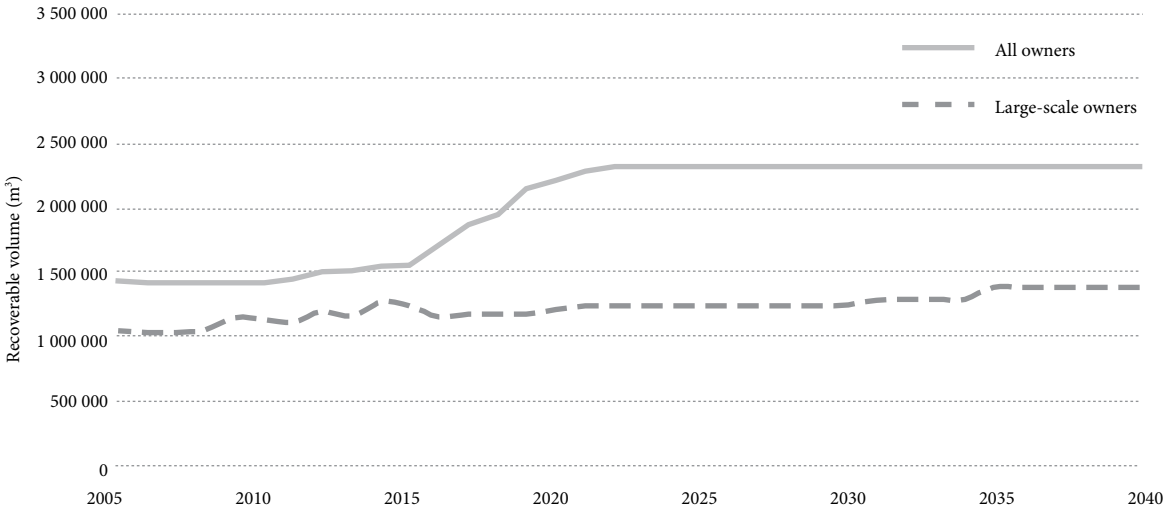
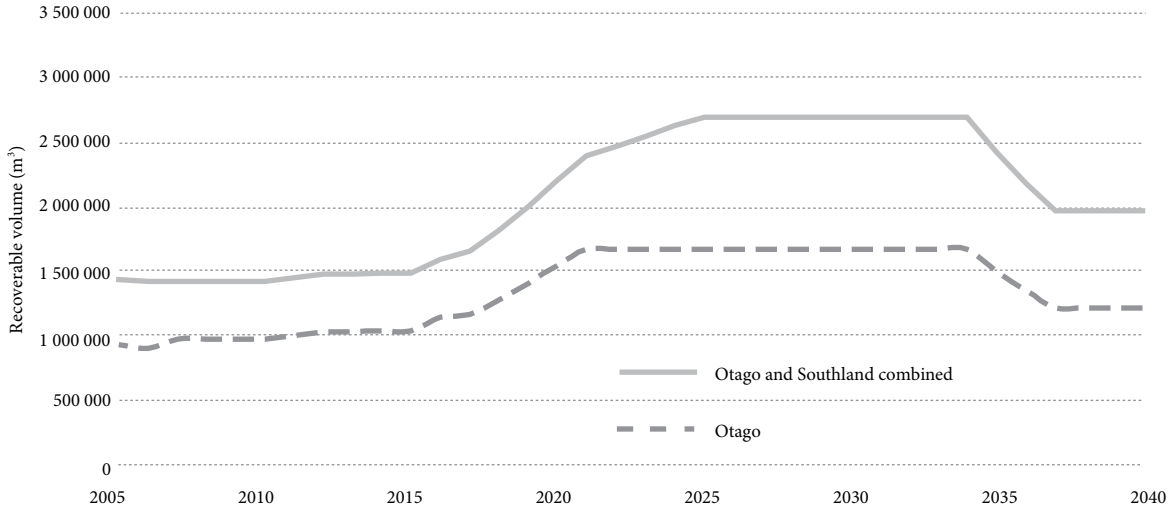


FIGURE 4.33: OTAGO AND SOUTHLAND COMBINED WOOD AVAILABILITY UNDER SCENARIO 4 – ALL OWNERS



› SCENARIO 4

The fourth scenario is based on a split non-declining yield, with a target rotation age of 30 years. The results of this scenario are similar to scenario 3 until 2021 (Figures 4.33 to 4.35).

FIGURE 4.34: OTAGO AND SOUTHLAND COMBINED WOOD AVAILABILITY UNDER SCENARIO 4 – SPLIT BY OWNERSHIP CATEGORY

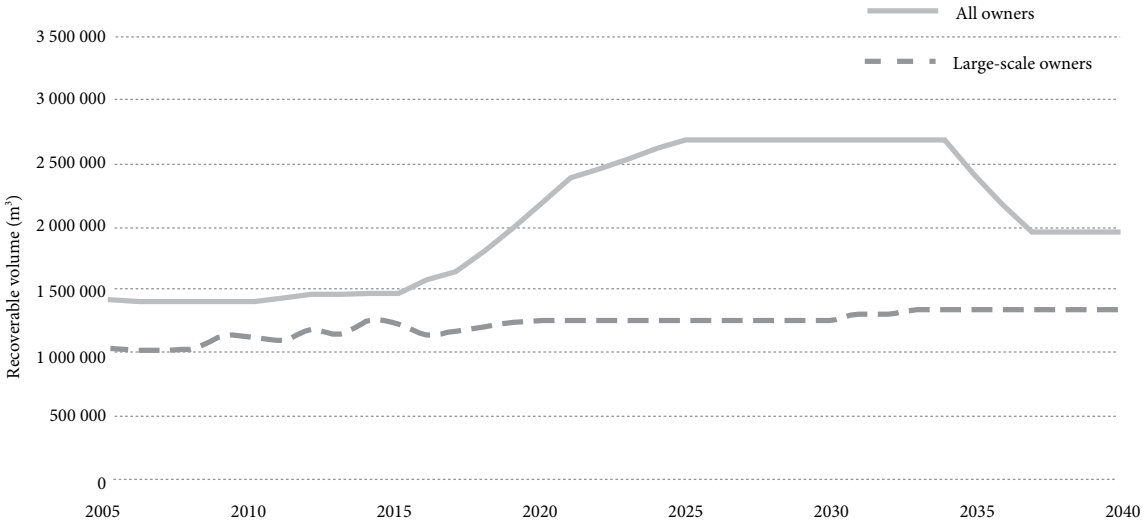
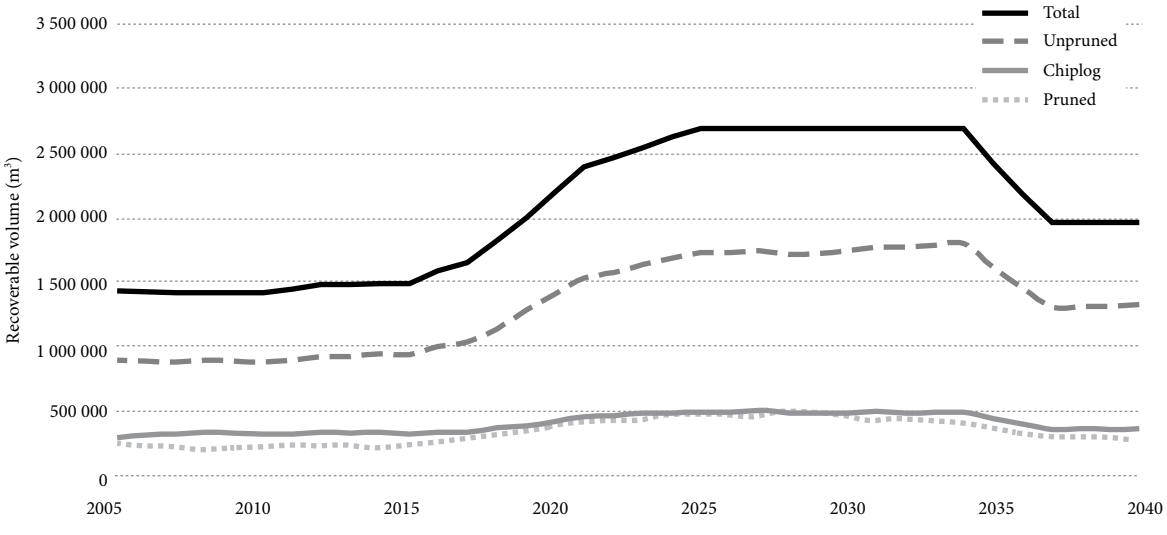


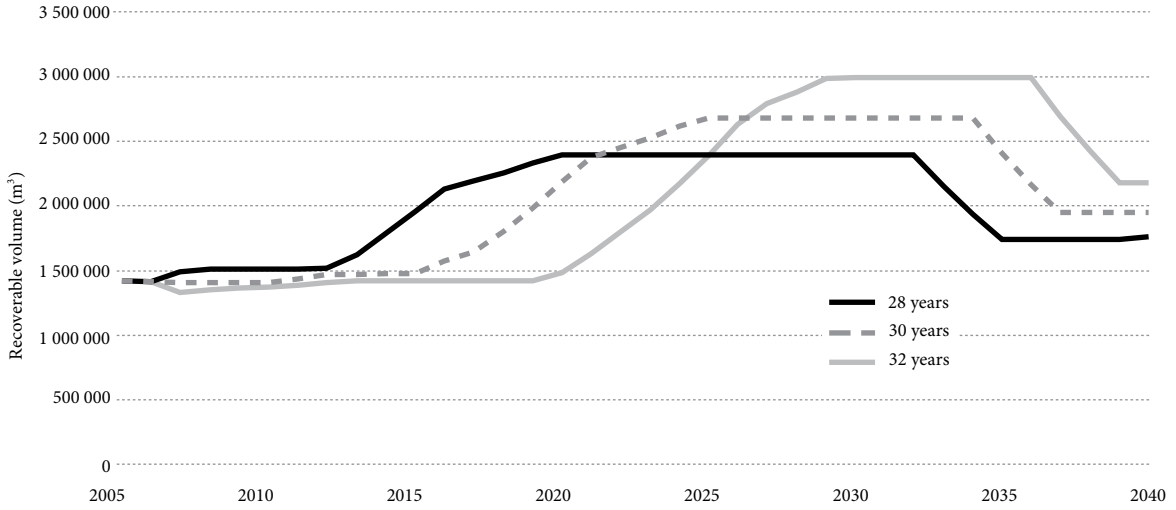
FIGURE 4.35: OTAGO AND SOUTHLAND COMBINED WOOD AVAILABILITY UNDER SCENARIO 4 – BY LOG PRODUCT



› SCENARIO 5

Different wood availability profiles are generated if the target rotation age is modified. Figure 4.36 indicates a band of possible wood availability profiles. A common feature is the limited potential for increase through to 2012. After this there is the opportunity for a substantial increase as the large area planted by small-scale owners in the 1990s matures and is available for harvest.

»» FIGURE 4.36: OTAGO AND SOUTHLAND COMBINED WOOD AVAILABILITY UNDER SCENARIO 5 – DIFFERENT TARGET ROTATION AGES



CONCLUDING COMMENTS

Wood availability from the Otago and Southland wood supply region's planted forest resource will be relatively static for the next decade. After 2015, increases in wood availability are expected to result in increased log supply with the potential for significant volume increases leading up to 2020.

Most of the potential increase in wood availability from 2016 on will come from the region's small-scale forest growers who established forests during the 1990s. The actual timing of the harvest from these forests will depend on market conditions and the decisions by many small-scale owners.

After 2015, the combined Otago and Southland regional harvest has the potential to increase from the current level of about 1.5 million cubic metres to about 2.6 to 2.8 million cubic metres from around 2020.

Market conditions and logistical constraints (availability of logging crews, transport capacity and wood processing capacity) will limit how quickly the additional wood availability from small-scale owners' forests can be harvested towards 2020.

Some owners will be motivated to harvest early while others may decide to grow their forests on longer. Therefore the harvesting of the post-1990 forest plantings is likely to be spread out over a long period. If log prices increased during this post-2015 period of more plentiful wood availability, harvesting rates could quickly rise to meet demand. Likewise, low log prices would lead to delayed harvesting.

Depending on the rate of harvesting from the region's post-1990 forests, the availability of radiata pine is expected to decrease in the early to mid 2030s. This will be compensated for by the maturing of the region's Douglas-fir resource.

THE WOOD PROCESSING INDUSTRY 5

Commercial sawmilling has been a feature of the southern economy for the past 160 years. A water-powered mill was established on the Leith Stream in 1849 to supply the demands of the early Dunedin settlers. Larger-scale operations were developed in the 1860s to meet the demands of the Otago goldfields. In 1876 the industry took a major step forward with the establishment of New Zealand's first mechanised paper making facilities (at Dunedin and Mataura).

The early timber industry was based on the region's natural timber resources. It was not until 1933 that the first production thinnings from the region's planted forests were processed; and it was a further 15 years before the Forest Service constructed the Conical Hill sawmill (at Tapanui), as a demonstration unit for processing plantation timber. The picture today is markedly different, with 99 percent of the regional harvest now being sourced from plantation forests, and the remainder derived from sustainably managed natural forests.

Increasing harvest volumes during the 1990s provided a basis for additional sawmilling and processing capacity. The past 15 years has seen well over $250 million invested in new or additional capacity. This investment has diversified the production base of the region, with the development of remanufacturing facilities, a veneer operation and a medium density fibreboard (MDF) factory. With this recent investment, about 75 to 80 percent of the annual harvest is processed in some form.

TABLE 5.1: SAWN TIMBER PRODUCTION FROM INDIGENOUS AND PLANTED FORESTS IN OTAGO/SOUTHLAND

YEAR ENDED 31 MARCH	INDIGENOUS TIMBER PRODUCTION (M^3)	PLANTATION TIMBER PRODUCTION (M^3)	TOTAL TIMBER PRODUCTION (M^3)
1996	10 247	229 809	240 056
1997	17 204	224 044	241 248
1998	7 435	261 167	268 602
1999	13 496	275 851	289 347
2000	8 201	350 616	358 817
2001	11 816	364 508	376 324
2002	13 970	387 802	401 772
2003	10 198	446 598	456 796
2004	10 044	408 804	418 848
2005	7 877	425 162	433 039
2006	6 925	408 967	415 892
2007 (Provisional)	5 695	419 969	425 664

Source
Ministry of Agriculture and Forestry.

› SAWN TIMBER PRODUCTION

Between 1996 and 2003 the annual production of sawn timber increased 90 percent, from 240 000 cubic metres to 456 800 cubic metres (March year figures – Table 5.1). This growth was due primarily to additional investment in existing facilities, rather than new plants. Production has fallen back in the past four years, due to a combination of the high dollar, weakness in key markets and additional manufacturing and transport costs. This has led several mills to undergo restructuring, and a reduction in activity. In spite of the current downturn, production levels are still about 77 percent higher than recorded in 1996.

› SAWN TIMBER EXPORTS

The past decade has seen a progressive increase in sawn timber export volumes. Exports have climbed from 51 700 cubic metres in the December 1996 year to 197 100 cubic metres for the December 2006 year, an increase of 280 percent. Since 2001, the majority of these exports have been shipped through Bluff. These trends are shown in Table 5.2.

While export volumes have climbed, the returns from exporting have been more variable. Returns peaked at $82.9 million in the December 2002 year. This was associated with a favourable exchange rate, positive demand in the North American construction industry and low freight rates. The returns per cubic metre fell sharply in the following year, with the rising dollar and more difficult trading conditions. Market conditions have remained tight over the past four years, and this is reflected in returns. The average returns per cubic metre (in 2006) are comparable with those received in 1996. However, New Zealand has experienced inflation of about 25 percent over this period, so the real returns are proportionately less.

› LOG EXPORTS

Log exports have seen a marked decline over the past decade. In the mid 1990s about 45 to 50 percent of the regional harvest was exported as unprocessed logs. The figure over recent years has been in the 17 to 25 percent range.

»» TABLE 5.2: SAWN TIMBER EXPORTS FROM OTAGO AND SOUTHLAND PORTS

YEAR ENDED 31 DECEMBER	DUNEDIN (M^3)	BLUFF (M^3)	TOTAL (M^3)	TOTAL VALUE (NZ$000)
1996	31 200	20 547	51 747	18 057
1997	24 924	38 653	63 577	22 919
1998	33 966	46 076	80 042	32 409
1999	54 548	69 319	123 867	51 879
2000	73 410	71 960	145 370	67 444
2001	59 349	91 127	150 476	71 079
2002	49 426	120 368	169 794	82 880
2003	61 890	108 332	170 222	66 288
2004	67 358	119 052	186 410	76 862
2005	67 218	111 574	178 792	58 366
2006	86 188	110 872	197 060	68 115

Source
Ministry of Agriculture and Forestry.

Note
Sawn timber values are NZ$ free on board (fob).

»» TABLE 5.3: LOG EXPORTS FROM OTAGO AND SOUTHLAND PORTS

YEAR ENDED 31 DECEMBER	DUNEDIN (M^3 (R))	BLUFF (M^3 (R))	TOTAL (M^3 (R))	TOTAL VALUE (NZ$000)
1996	289 351	213 812	503 163	52 448
1997	271 583	149 468	421 051	39 227
1998	252 875	64 408	317 283	28 754
1999	321 200	112 020	433 220	37 942
2000	294 585	143 046	437 631	48 408
2001	321 887	152 473	474 360	44 727
2002	307 123	69 496	376 619	36 842
2003	281 915	58 074	339 989	25 438
2004	234 912	32 689	267 601	18 830
2005	276 366	16 477	292 843	22 128
2006	273 099	74 183	347 282	29 742

Source
Ministry of Agriculture and Forestry.

Note
(r) = roundwood.

The decline reflects the increase in processing activity and the relatively tight supply conditions in the region. The commissioning of the Rayonier (now Dongwha) MDF plant in 1997 absorbed a significant proportion of the lower-quality pulp logs in the region. A number of mills have also adopted sawing and scanning technology which has allowed smaller diameter and lower quality logs to be utilised.

Another critical factor affecting the log trade is the cost of freight. The cost of freighting logs to New Zealand's major export markets (China and South Korea) has more than tripled over the past five years, from US$20 per cubic metre to about US$70 per cubic metre.

The drivers for this increase in rates are strong Asian growth (particularly China and India); congestion in key ports (including Newcastle, Australia); higher operating costs (bunker fuel, personnel and insurance); and a three to four-year time lag between ordering new vessels and their delivery. These factors have particularly affected the charter rates for handysize and handymax vessels.

THE STRUCTURE OF THE OTAGO/SOUTHLAND FORESTRY SECTOR

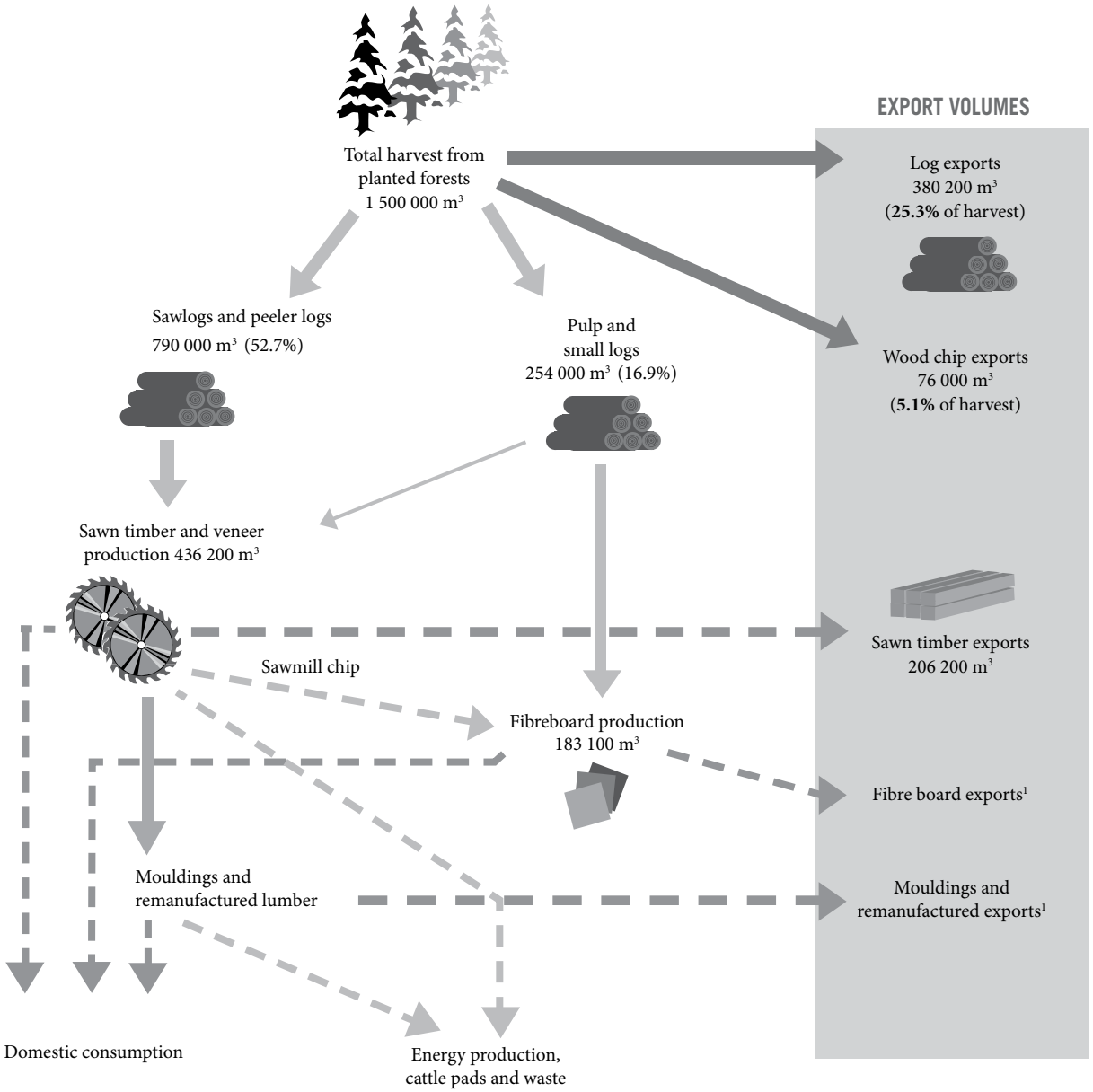
Figure 5.1 provides a snapshot of how the Otago/Southland forest industry is currently structured. The diagram tracks the March 2007 year harvest from the forest to the market.

Of the estimated 1.5 million cubic metres harvested in 2006/07, 69.6 percent was processed within the region, as sawn timber, veneers, mouldings, posts or MDF. As described previously, a significant proportion of this value-adding processing is exported to the United States, Australia, China and other Pacific Rim countries.

The wood residues from the industry (bark, sawdust, wood chips, and short length) are used in a variety of activities. An estimated 150 000 cubic metres of chips are consumed in the manufacture of MDF, while a significant number of processing operations use residues as an energy source. Residues are also used by the dairy industry (for feed pads), and by the public for firewood and garden landscaping.

The Niagara Sawmilling operation.

FIGURE 5.1: LOG FLOW IN THE OTAGO/SOUTHLAND FOREST INDUSTRY FOR THE YEAR ENDED 31 MARCH 2007



Note

1. Export figures not publicly available.
2. The estimated harvest is derived from export and processing data in Otago and Southland. Inter-regional log movements are not included.

THE OTAGO/SOUTHLAND SAWMILLING AND TIMBER PROCESSING INDUSTRY

The Otago/Southland region supports 28 sawmilling operations with an annual production of more than 500 cubic metres of rough sawn timber. All but two of these operations are focused on plantation timber species. The two remaining mills are specialist indigenous sawmillers (and are discussed in chapter 6).

The investment in new processing over the past 15 years has created a robust local industry, with a number of medium to larger-scale operations, as shown in Table 5.4. This depth of sawmilling activity ensures strong competition for logs.

The region also supports a modern MDF plant, a mouldings facility, a veneer operation and two stand-alone chip plants. The majority of these plants have been established within the past 15 years, and are important for ensuring that the region's timber resources are efficiently utilised.

The remainder of this chapter comprises short summaries of the major sawmilling and processing operations within the region.

CRAIGPINE TIMBER COMPANY LIMITED

Craigpine is a plantation management and timber processing company, based in Southland. The company was formed in 1923 and is privately owned by the Black Family.

The sawmilling arm of the operation is located at Winton and employs 160 staff, on a two-shift basis. In the late 1990s Craigpine embarked on a major expansion phase, with processing capacity increasing from 102 000 tonnes of logs per annum to the current capacity of 208 000 tonnes. Sawn timber production averages 600 cubic metres per day or about 120 000 cubic metres annually.

The company operates seven kilns, which enables 100 percent of production to be dried on site.

Radiata pine is the principal species handled by the mill. Logs are sourced from Craigpine's own forests (see chapter three), the corporate sector and private growers. The catchment for the mill is Southland and South Otago. The mill utilises both pruned and unpruned logs, normally with a small end diameter (SED) of more than 30 centimetres. While the focus is on larger logs, the mill has invested in equipment to handle smaller diameter logs (SED over 15 centimetres). This allows greater utilisation of logs which would previously have been chipped or exported.

Craigpine is an export-focused company, with about 85 percent of production going off-shore, particularly to East Asia. The company has focused their marketing efforts on building the image of radiata pine as a "show timber", suitable for furniture, remanufacturing and handicrafts. In its marketing, the company emphasises the distinctive features of radiata pine grown in the south – the lighter colouring and longer internodes.

As discussed in chapter three, Craigpine was one of the first forestry companies in New Zealand to be accredited with FSC environmental certification (in 1997). The certification covers both the plantation estate and the milling operation. This has enabled the company to meet increasing customer demand for timber with a full chain of environmental custody.

NIAGARA SAWMILLING COMPANY LIMITED

Niagara Sawmilling is a privately owned sawmilling and remanufacturing operation at Kennington, north-east of Invercargill. The company was established in 1935 and has been owned by the Richardson family since 1954.

The mill is an integrated operation. The site has seven

TABLE 5.4: SAWN TIMBER PRODUCTION FROM PLANTED PRODUCTION FORESTS IN OTAGO AND SOUTHLAND – YEAR ENDED MARCH 2007

SAWMILL	LOCATION
A. PRODUCTION LEVEL: GREATER THAN 100 000 M^3 SAWN TIMBER PER ANNUM	
Craigpine Timber Company Limited	Winton
B. PRODUCTION LEVEL: 20 000 M^3–99 999 M^3 SAWN TIMBER PER ANNUM	
Blue Mountain Lumber Limited	Tapanui
Bright Wood New Zealand Limited	Otautau
Gorton Timber Company Limited	Milton
Millstream Lumber (Southern Cross Forest Products Limited)	Milton
Niagara Sawmilling Company Limited	Kennington
Rosebank Sawmill	Balclutha
C. PRODUCTION LEVEL: 5 000 M^3–19 999 M^3 SAWN TIMBER PER ANNUM	
Findlater Sawmilling Ltd	Tussock Creek
Harvey Wood Limited (Southern Cross Forest Products Limited)	Milton
Hollows Timber Company Ltd	Balclutha
Naseby Sawmill	Naseby
Ngahere Sawmilling Company Ltd	Mataura
Otago Lumber Company Ltd	Mosgiel
Pankhurst Sawmilling Company Ltd	Riverton
Stuart Timber Company Ltd	Tapanui
D. PRODUCTION LEVEL: 500 M^3–4 999 M^3 SAWN TIMBER PER ANNUM	
Beven West Sawmilling	Waianiwa
Bruce Sawmilling Company Limited	Milton
Central Otago Lumber Ltd	Luggate
Clutha Mobile Milling	Balclutha
Herbert Sawmilling Ltd	Waianakarua (Oamaru)
Lumsden Sawmill	Lumsden
North Otago Sawmilling	Oamaru
Rural Sawmill Ltd	Nightcaps
Southern Lumber Company	Waikiwi

Source
Ministry of Agriculture and Forestry.

Note
This table includes only those mills that have given approval for their details to be listed.

kilns, which allow 100 percent of production to be dried on site. In addition to this, the plant has a remanufacturing facility (which produces finger-jointed, laminated and primed products), and a CCA treatment plant. The mill underwent a major upgrade in 2002/03, which included the introduction of sawing technology to process smaller diameter logs (SED 15 centimetres).

Niagara Sawmilling employs 120 staff, on a double-shift basis. The plant is processing about 160 000 cubic metres of logs per annum, and is producing in the order of 90 000 cubic metres of sawn timber.

The mill sources the majority of its timber from Rayonier New Zealand (75 percent). The remainder is drawn from small growers, other corporates and Niagara's own forest resource. Log input is 100 percent radiata pine.

The company has a strong export focus, with about 85 percent of production going across the wharf. The principal markets are the United States, Australia, Vietnam, China, Indonesia and Malaysia. Niagara Sawmilling has a strong commitment to sustainable production, and has achieved Forest Stewardship Council chain of custody certification for their milling and processing operation.

› BLUE MOUNTAIN LUMBER LIMITED

Blue Mountain Lumber is a wholly owned subsidiary of Ernslaw One Limited who purchased the Tapanui sawmill from the Crown in 1990. Over the following decade the facility was extensively upgraded with an estimated $10 million being invested, particularly in remanufacturing facilities. In association with Meridian Energy, a co-generation facility was developed to utilise the wood residues produced by the operation.

At its peak, in 2002, Blue Mountain Lumber employed a workforce of 210, operated 10 kilns and had an annual log consumption of 220 000 cubic metres. At this stage, the company was focused on the export market, with 85 to 90 percent of production normally going offshore, principally to the United States and South Korea. Deteriorating market conditions in 2003 (coupled with a rising dollar and increasing shipping and insurance costs) forced the company to undertake restructuring. This has been a lengthy process, and has involved both physical restructuring, and market repositioning, over a period of four years.

The Blue Mountain operation is now focused on the domestic market, with only 10 percent of production heading off-shore (principally to Australia). The workforce has stabilised at 90 to 95 staff. While the throughput at the mill has fallen in recent years, it continues to be one of the largest timber processing facilities in Otago and Southland, and is the largest single employer in West Otago. On an annual basis, the mill is purchasing 80 000 cubic metres of logs and producing 45 000 cubic metres of sawn timber and remanufactured product. The majority of the log input is sourced from Blue Mountain's parent company, Ernslaw One.

Blue Mountain Lumber has traditionally been a large processor of Douglas-fir. With the restructuring of the operation, the company made the decision to focus on this species. Log input is now 100 percent Douglas-fir. To build market interest in the species, the company has established the "Blue Mountain Oregon" brand, which is promoted as a premium framing timber. The market response to this branding initiative has been positive.

› BRIGHT WOOD NZ LIMITED

Bright Wood New Zealand (BWNZ) is owned by members of the Stovall family, owners of the Bright Wood Corporation of the United States. The Bright Wood Corporation is one of the United States' largest timber remanufacturers, with a product range extending from

louvred doors and mouldings through to stair components. The New Zealand arm of the company was formed in 1992. BWNZ was established to buy sawn timber for export to Bright Wood's processing facilities in Oregon.

In 1996, BWNZ entered into a custom cutting agreement with the Waikana Timber Company, of Otautau. Two years later BWNZ purchased the mill outright, and started a progressive upgrade of the operation. BWNZ invested heavily in new equipment, including three drying kilns. The processing capacity of the plant was increased from 10 000 cubic metres of logs in 1996 to about 130 000 cubic metres in 2003. The company moved to direct ownership as it provided Bright Wood with a more reliable supply chain and it gave the company control over the standard of production and drying.

BWNZ draws its timber supplies primarily from the corporate sector (Rayonier New Zealand and Wenita Forest Products). Smaller growers have made up only 10 percent of log supply in recent years.

The mill went through a major restructuring in early 2007 due to deteriorating market conditions in the United States and the high New Zealand dollar. The company moved from a two-shift operation, employing 100 staff, to a single shift with 60 full-time and two part-time staff. BWNZ has also shifted its production focus away from the United States, to the Asian market. In 2006, 70 percent of production was destined for Bright Wood's processing facilities in the United States. This figure is down to 30 percent. BWNZ is tapping into the rapidly expanding Chinese market, including the furniture sector. The company is also selling increasing volumes on the domestic market.

This period of restructuring has reduced processing activity at the Otautau mill, but BWNZ remains one of the larger saw milling operations in the region. On an annual basis, the company is processing 70 000 cubic metres of logs, and is producing 35 000 cubic metres of sawn timber.

› ROSEBANK SAWMILL (WENITA FOREST PRODUCTS LIMITED)

Rosebank Sawmill is a wholly-owned subsidiary of Wenita Forest Products Limited. The mill is located on the southern outskirts of Balclutha, and was purchased in 1994. The mill is a medium-sized processing facility, handling about 55 000 cubic metres of pruned (P1) logs per annum. Ninety-five percent of log supply is sourced from the Wenita estate.

The mill utilises radiata pine and produces green and kiln-dried sawn timber for the domestic and international markets. The plant employs 48 staff and produces about 32 000 cubic metres of sawn timber per annum. The plant operates two Windsor kilns. The majority of the sawn timber production is sold domestically (including a significant proportion for remanufacturing by other processors). Export markets include Asia, Australia and the United States.

› GORTON TIMBER COMPANY LIMITED

The Gorton Timber Company is a family-owned sawmilling operation, based at Milton in South Otago. The business produces sawn timber for the domestic market and further processing. The Gorton family have progressively expanded the operation in recent years. Sawn timber production increased three-fold over the period 2000 to 2007, and now stands at 20 000 cubic metres per annum. A further upgrade was scheduled for the 2007/08 Christmas period which will enable production to increase to 40 000 cubic metres per annum.

Log demand has grown correspondingly. The company sources the majority of its logs from City Forests and

other corporate growers. Production is predominantly radiata pine and the mill processes a high percentage of pruned logs.

The mill operates on a single-shift basis and employs 16 full-time staff in the log handling and sawmilling arms of the business.

In 2002, the mill attained Forest Stewardship Council chain of custody certification. The Gorton family made the decision to go down this path as they consider consumers are placing increasing emphasis on the source of their timber products and how they are manufactured. Attaining chain of custody certification has assisted the company in securing cutting contracts with larger processors and exporters.

Gorton Timber is contracted to supply sawn timber to City Forests' dry-mill operation at Milburn. This production is kiln-dried and dressed by City Forests for domestic and export markets.

› SOUTHERN CROSS FOREST PRODUCTS LIMITED

Southern Cross Forest Products (SCFP) is one of New Zealand's largest manufacturers, and marketers, of clearwood timber products. The company has four manufacturing subsidiaries in New Zealand (three of which are in Otago):

- New Zealand Wood Moulding (Mosgiel);
- Harvey Wood Lumber (Milton);
- Millstream Lumber (Milton);
- Thames Timber (Thames).

NEW ZEALAND WOOD MOULDING

The New Zealand Wood Moulding facility is located at Mosgiel, south of Dunedin. The plant produces solid-timber mouldings and boards, finger-jointed mouldings and boards as well as kiln-dried, graded lumber. The company exports 90 percent of its finished mouldings and 100 percent of its kiln-dried lumber. The main markets for the company include the United States, Australia, New Zealand and Asia.

The operation currently employs 103 staff and produces about 45 full size containers of finished mouldings and board products per month, as well as about 1500 cubic metres of lumber per month. The mouldings facility sources sawn timber from the two SCFP mills in Otago, and has contracted supply from the Wenita mill at Rosebank (Balclutha). The facility also utilises some North Island supply.

The plant uses the latest moulding and scanning technology to meet the customer demands of North America. Production is based 100 percent on radiata pine. All dry wood wastes are recycled as boiler fuel. All of the SCFP facilities have FSC chain of custody certification. The company has stringent environmental policies and has a preference for purchasing logs from FSC-certified forests.

HARVEY WOOD LUMBER

Harvey Wood was established in 2001 and operates a green mill facility. The plant custom-cuts 100 percent of its production for SCFP processing operations (including the NZ Wood Moulding facility and Millstream).

The mill processes about 30 000 cubic metres of logs annually, and is producing in the vicinity of 16 500 cubic metres of sawn timber. Ninety percent of log supply is sourced from the corporate sector, with the residual coming from private growers.

Harvey Wood employs 17 staff in the green mill.

MILLSTREAM LUMBER

The Millstream Lumber plant at Milton was established in 1987, and was purchased by SCFP in 1999. The plant is a

fully integrated operation, with a green mill, dry processing facility, and speciality pallet and fencing components. The mill currently employs 51 staff, spread across the sawmilling operation, pallet mill and dry processing arms of the business. The mill operates on a single-shift basis.

The mill processes 63 000 cubic metres of logs annually, producing about 34 000 cubic metres of sawn timber. About three-quarters of the log input is made up of pruned radiata pine. The main markets for the mill include the NZ Wood Moulding Company, the domestic market and Asian furniture customers. About 80 percent of the log supply comes from the larger-forest owners (and managers), with the balance coming from woodlots.

› CITY FORESTS LIMITED

City Forests Limited (CFL) is a trading enterprise of the Dunedin City Council. The company is both a plantation manager (as described in chapter 3) and a timber processor. While the company has a long history in forestry management (dating back to the early 1900s), it has only recently moved into timber processing, with the commissioning of its Milton facility in February 2006.

The company intends to progressively develop the Milton site, as market conditions and timber supply allows. The plant currently operates as a dry-mill processing facility, and employs 20 staff. The through-put is mainly pruned radiata pine, sourced from the City Forests estate. The initial green-sawing is contracted to mills in the immediate area (principally the Gorton Timber Company). On an annual basis, the plant and its contracted mills process about 24 000 cubic metres of logs.

The plant kiln-dries and dresses sawn timber for both the domestic and export market. The focus for the plant is on producing appearance-grade lumber, for furniture, joinery and mouldings. The principal export markets for the company are the United States and Asia.

The Milton facility, along with the wider CFL operation, holds Forest Stewardship Council certification. CFL was one of the first companies in New Zealand to adopt environmental certification.

»» VENEER AND PANEL PRODUCTS

› DONGWHA PATINNA NEW ZEALAND LIMITED

Dongwha Patinna is a New Zealand registered company owned by Dongwha Holdings of South Korea. The parent company is a manufacturer of wood products including MDF, particleboard, chemicals, laminates and flooring products. Dongwha Patinna was established in 2005 following the purchase of the Mataura MDF operation from Rayonier New Zealand.

In September 2007, the Laminex Group (a division of Fletcher Building Products) agreed to purchase a 20 percent stake in Dongwha Patinna NZ Limited.

The plant was commissioned in October 1997. The operation initially had a production capacity of 140 000 cubic metres of finished boards. This has been raised over the past decade to 170 000 cubic metres (or 480 cubic metres of finished boards per day). Fibre consumption is about 370 000 cubic metres, made up 220 000 cubic metres of pulp logs (60 percent) and 150 000 cubic metres of wood chips (40 percent).

The production from the Mataura plant is marketed under the Patinna brand around the Pacific Rim and the Lakepine brand within New Zealand. About 80 percent of production goes off-shore, principally to China, Japan and the United States.

The plant directly employs 110 staff and operates on a 24-hour, 7-days a week basis.

The operation gained ISO 14001 (Environmental Quality System Standard) accreditation in February 2001, and in March 2002 the company achieved FSC accreditation for up to 100 percent of its log supplies. As part of this commitment to environmental improvement, the plant has a dedicated environmental team that monitors the plant's activities against permitted levels and communicates these results to neighbours and local authorities.

› SOUTHLAND VENEERS LIMITED

Southland Veneers (SVL) was established in 1998 as a joint venture between local interests and EAC Timber, an international distributor of hardwoods based in Denmark. The plant is located at Kennington, north of Invercargill, and produces rotary veneers from radiata pine. The plant was developed with the export market in mind. In November 1999 the company achieved FSC chain of custody certification for the operation. Following a restructuring in 2000, the management acquired the majority shareholding (51 percent), and EAC reduced their stake to 49 percent.

When the plant was commissioned, the operation was focused on the manufacture of core veneers for industrial-grade plywood. The Philippines was the initial market for this production. SVL has progressively developed additional Asian markets, including Malaysia, Korea and Japan. High-grade veneers, for specialist applications (including decorative grade plywood) have been added to the product range. The key market for this production is the United States. Building market recognition, and locating niche markets for New Zealand produced veneers, has required a long-term marketing effort.

The company has faced a number of challenges in maintaining these export markets. In some Asian markets, including the Philippines, SVL has faced tariff differentials compared to its key competitors, and SVL's customers have faced strong competition from the emerging Chinese plywood industry. In addition to this, the pricing of products are in United States dollars. With the high New Zealand dollar, this has squeezed margins. The weakening of the United States construction market has aggravated this situation.

On an annual basis, the Kennington plant is producing 30 000 cubic metres of veneer. This production requires a roundwood input of about 60 000 cubic metres. All veneer is kiln-dried on site, in a purpose-built veneer dryer. The plant employs 40 staff. The manufacturing process is broken into sections, and these operate on either a two or three-shift basis.

Seventy percent of logs are sourced from the corporate sector, with the residual being purchased from small growers (through log buyers). As the principal product line for the plant is core veneers, the plant utilises a high proportion of unpruned radiata logs. The percentage of pruned versus unpruned log input is about 15 percent and 85 percent, respectively.

In addition to the veneer operation, the facility has two timber drying kilns. These kilns are used for drying residue products, part of which is used for packaging the export veneer.

»» OTHER PROCESSING

› SOUTH WOOD EXPORT LIMITED (WOOD CHIPPING OPERATIONS)

South Wood Export Limited (SWEL) operates a stand-alone chipping facility at Awarua (10 km south of Invercargill). SWEL also has a 50 percent stake in South Wood Ltd, a company that has a chipping plant at Mosgiel (in association with City Forests Ltd).

SWEL has been chipping logs at the Awarua facility since 1981, for export to Japanese pulp and paper manufacturers. The mill has a processing capacity of 300 000 tonnes of logs per annum. All woodchip is stockpiled and exported through the port of Bluff. In 2004, SWEL attained Forest Stewardship Council chain of custody certification for its mill and port operations.

The company initially processed indigenous hardwoods at the Awarua facility (primarily silver beech). As discussed in chapter 3, SWEL recognised the limitations of this supply and established their own estate of short-rotation hardwoods (principally *Eucalyptus nitens*) to sustain the plant over the longer term. The first of these plantings were harvested in 2004 and a sustained harvest of 250 000 cubic metres per annum will be reached between 2011 and 2013 (depending on market conditions). The plant also processes exotic softwoods, and has a debarking facility.

The joint venture operation at Mosgiel (Otago Chip Mill Limited) has the capacity to process 110 000 tonnes of logs per annum. The plant handles softwood logs and the wood chips are exported through Port Chalmers. It also operates a peeler and anti-sapstain facility for high-grade logs destined for overseas customers. The plant is currently not operating at full capacity.

Harvesting in the Lilburn Valley, Western Southland (South Wood Export Ltd).

INDIGENOUS TIMBER
PRODUCTION AND FOREST MANAGEMENT

6

The indigenous timber industry is a small but important component of the Otago/Southland forestry scene. The industry produces high-value sawn timber for flooring, furniture, panelling and veneers.

The shape of the industry has altered markedly in the past 25 years, with harvesting moving to a sustainable management basis. This has seen the introduction of harvesting regimes that remove less than the incremental growth in standing volume, and enhance the environmental values of the forest estate (for example, small coupe, individual tree and canopy retention harvesting models). This shift in management regime was introduced through a 1993 amendment to the Forests Act 1949. The Part IIIA amendment requires private forest owners to have an approved sustainable forest management (SFM) plan or permit before timber can be harvested. Coupled with these management changes has been the Government's decision to cease harvesting from Crown lands, and to permanently preserve these areas in the conservation estate.

The Department of Conservation administers more than two million hectares of land in Otago/Southland, a large proportion of which is in natural forests (predominantly beech). This estate is managed for nature conservation and recreational purposes.

PRIVATE INDIGENOUS FORESTS

MAF estimates that the Otago/Southland region has 126 960 hectares of natural forest in private ownership. This total includes lands reserved for Maori under the 1906 South Island Landless Natives Act (SILNA) but excludes areas subject to protective covenants. The Otago/Southland figure is about 10 percent of all privately owned natural forests. (A mapping project by MAF in 2006 calculated that the private forest estate totals approximately 1.27 million hectares – provisional figures).

MAF's Indigenous Forestry Unit (IFU) estimates that a third of the private estate has potential for sustainable forest management. Currently 14 200 hectares (or 11 percent of the Otago/Southland estate) is operating under approved SFM management plans or permits.

The Otago/Southland estate comprises largely beech forests. The beech species are considered to offer the best prospects for sustainable management of any of the indigenous timber species in New Zealand. This is based on the capability of beech to regenerate, its relatively fast growth rates, and its suitability for high-quality end uses such as furniture. Silver beech *(Nothofagus menziesii)* dominates the southern resource, and is considered to be the easiest of the New Zealand beech species with which to work.

HARVEST VOLUMES

Indigenous timber production has seen a marked decline over the past decade. In the June 2006 year, the national harvest was in the vicinity of 20 000 cubic metres (log volume) at mill. While the harvest has trended down, the available cut (through approved plans and permits) has increased. Nationally, there is close to 80 000 cubic metres of standing timber available for harvest, on an annual basis (under approved plans – 2006 figures). The decline in harvest volumes is due to a combination of factors. These include the transition from rimu to the less well known beech species, growing volumes of imported speciality timbers (and furniture), and the high dollar (making exports less viable and increasing the competitiveness of imports).

Over 60 percent of the current production comprises beech, particularly silver beech. The remaining volume is made up of rimu and other podocarps, some kauri and broadleaved hardwood species, principally tawa (*The Indigenous Forest Industry in New Zealand,* Indigenous

TABLE 6.1: LOG AND SAWN TIMBER PRICES 2006

SPECIES AND TYPE OF PRODUCT	INDICATIVE PRICES
Rimu logs	$600/m^3 at mill
Beech logs	$200/m^3 at mill
Tawa logs	$250/m^3 at mill
Heart dressing rimu (rough sawn, kiln dried)	$2800/m^3
Dressing grade silver beech and tawa	$1900/m^3

Source
The Indigenous Forest Industry in New Zealand, Indigenous Forestry Unit, MAF. Published in *Indigena,* August 2007.

Forestry Unit, MAF. Published in *Indigena,* August 2007: 15–18).

SAWMILLING ACTIVITY AND PRICING

In the year ending March 2007, eight mills in Otago and Southland produced sawn timber from natural forests. The region produces about 67 percent of New Zealand's total production of indigenous sawn timber. The two major operators are Lindsay & Dixon Limited and Alan Johnston Sawmilling Limited.

The remaining mills produce limited quantities of sawn timber (less than 250 cubic metres) and include a number of portable plants.

The returns for native logs and sawn timber have moved relatively little in recent years. Returns have been depressed due to the competitive pressures outlined earlier in this section. Indicative prices for the major timber species are provided in Table 6.1. The figures were prepared by the IFU in 2006.

LINDSAY & DIXON LIMITED

Lindsay & Dixon is an integrated forest management and timber processing company, based at Tuatapere in western Southland. The company is New Zealand's largest processor and marketer of indigenous timbers. The principal species handled by the company is silver beech. The company also processes small quantities of mountain beech, rata, rimu and totara. The company dates back to 1931 and has been through a number of ownership changes. The current owners (Bernie Lagan and Don MacLachlan) purchased the operation in 2000.

Lindsay & Dixon source the bulk of their indigenous log supply from the 11 600 hectare Longwood and Rowallan forests in western Southland. These forests are managed by Lindsay & Dixon under a 100-year contract with the Waitutu Incorporation. The forests are managed under an approved SFM plan with forest operations audited by the IFU. The permitted annual harvest (set out in a Sustainable Forest Management Plan, approval number 4-13-019 under the Forests Act) is 23 628 cubic metres (across all species). This represents an extraction rate of just 1.8 percent per annum of the standing volume of timber in the estate. Eighty-six percent of the permitted harvest comprises silver beech.

In 2004 the Longwood and Rowallan forests received FSC certification. This was the culmination of three years of work in developing management practices that will sustain, and progressively improve, the quality of the forest resource.

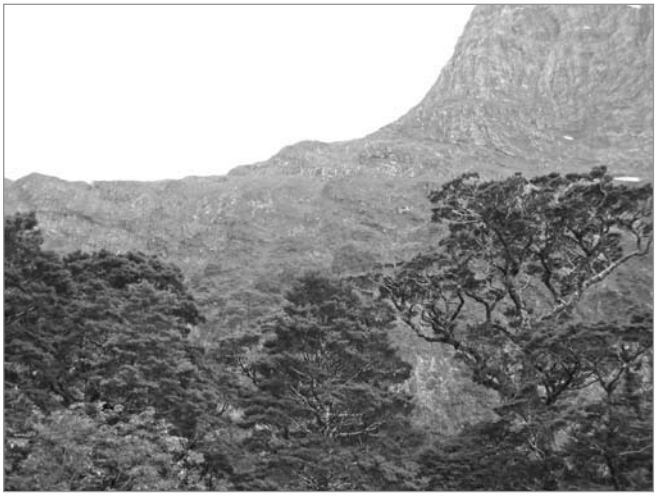
Lindsay & Dixon is not currently cutting its full entitlement from the Longwood and Rowallan forests. This reflects a number of industry-wide issues. The sector is facing strong competition from imported timbers (and furniture), while the high dollar is affecting export opportunities. It is also taking time to raise public awareness of beech as a high value species, and as a suitable alternative to rimu.

The processing arm of the business includes a sawmilling operation, kiln-drying facility and a remanufacturing plant. These activities are located on a ten hectare site at Tuatapere. While the mill is set up primarily for indigenous timber production, the company also processes up to 10 000 cubic metres of radiata pine and eucalypt species annually. This production is for both local and export markets.

The company has made steady progress in improving the conversion rates for silver beech, and the other timber species going through the mill. The company has focused particularly on lower grade logs that would previously have gone for firewood. Short pieces are now retained and laminated in the remanufacturing operation, or used for customised runs. As part of this effort to improve resource utilisation, and reduce waste, the company was assessed for FSC chain of custody certification in 2002.

Lindsay & Dixon's manufacturing division comprises seven kiln-drying units and the latest technology for dressing and moulding. The company operates a fully computerised saw for precision componentry work; and a 40-bay laminating press and ancillary plant for the production of brush blanks, broom handles, rods, flooring and panelling.

The company has invested heavily in marketing its production, and building up brand recognition. It has developed the "Southland Maple" and "Cherry Beech" brands to market its silver beech production to domestic and overseas customers. This branding initiative has been used to promote silver beech as a versatile timber for flooring, furniture, joinery and panelling.



INFRASTRUCTURE 7

PORTS

PORT OTAGO LIMITED

Port Otago operates cargo handling and storage facilities at Port Chalmers, Ravensbourne and Dunedin. The port is one of New Zealand's oldest, with the first wharves built in 1844. New Zealand's first export shipment of frozen meat left Port Chalmers for London on 15 February 1882. The port is both a regional hub and one of New Zealand's principal export facilities for primary products including dairy production, meat products, logs, sawn timber and fish. In the June 2007 year, the port handled 2.9 million tonnes of cargo. The port has been successful in expanding its export business through new investment in infrastructure, the provision of additional services and the adoption of more flexible working practices (including 24 hour servicing). This has enabled the company to maintain existing shipping connections and to attract new liner services.

The port is classed as a full-service facility, catering for bulk cargo, container and tanker operations. The port company has invested heavily in dry and cold storage facilities, and has developed support services around vessel maintenance, container repairs and warehousing services. The company has been investing progressively in the container operation to improve efficiency and lay the basis for further increases in cargo volumes. This investment has included new container cranes and straddle carriers. The next stage in this development has been the recently announced plans to deepen the main channel to Port Chalmers, to cater for larger-capacity vessels, and consolidate the position of the port as a key export hub. The main channel can currently accommodate vessels with a 12.5 metre draft. This depth is sufficient to handle the largest container vessels currently operating on the New Zealand coast (4100 twenty-foot-equivalent, TEU vessels), but it is insufficient for the next generation of vessels which will require a draft of 14.5 metres (6000 TEU vessels).

The port has a dedicated forestry berth, with an adjacent area for the marshalling and loading of logs, wood chips and other forestry products. The berth has a maximum draft of 11.6 metres and is 412 metres in length.

In the June 2007 year, Port Otago handled wood and wood products valued at $101 million FOB (Statistics New Zealand – NZHSC 44). About 70 percent of these exports were in processed timber products (sawn timber, mouldings and MDF), and the remainder in logs and wood chips. The principal export markets were South Korea, China, Australia, Japan and Vietnam.

SOUTH PORT NEW ZEALAND LIMITED

South Port is New Zealand's southern-most commercial port, with cargo handling facilities at Bluff and Tiwai Point. The port started operations in 1877 and became a publicly listed company in 1994. The Southland Regional Council (Environment Southland) is the principal shareholder (with a 66 percent holding).

Bluff is a natural harbour, facing onto Foveaux Strait and the Southern Ocean. The port operates on a 24-hour basis and can handle vessels with a maximum draft of 9.7 metres at ordinary high tide (10 metres under spring tide conditions). The tidal range at the port is three metres.

In the June 2007 year, the port handled 2.16 million tonnes of cargo, of which 1.15 million tonnes related to the New Zealand Aluminium Smelter's operation at Tiwai Point (raw materials and finished product). The Island Harbour facility, at Bluff, covers 56 hectares and has significant cold and dry storage capacity, dedicated container storage, log handling facilities, and space for wood chip storage. The port has been developing its container capacity over the past decade, and now operates a Liebherr mobile crane.

The port is centrally located for handling Southland's forestry exports. Six major processing operations (including the Dongwha Patinna MDF facility) are located within 70 kilometres of the port. Forestry products made up 16 percent by volume of all cargo handled by the port in the June 2007 year. The port handles exports of MDF, sawn timber, veneer, logs and wood chip. The value of wood and wood product exports for the June 2007 year totalled $77.2 million FOB (Statistics New Zealand – NZHSC 44). The principal destinations for these exports were the United States, Japan, South Korea, Taiwan, Vietnam and China.

ROAD TRANSPORT

Road transport is the principal means of freight movement for short and medium-haul journeys in Otago and Southland. The region has an extensive roading network, covering 15 665 kilometres of local roads and 2079 kilometres of state highways. The major forestry companies link into this network with their own roading systems.

The corporate sector works with local roading authorities to identify the pressure points on the transport system and to forecast future usage. This consultation is aimed at avoiding potential bottlenecks and ensuring that roading upgrades are completed before harvesting operations.

Access to the roading network can be an issue for smaller plantation owners and for the farm forestry sector. Some plantations are located on roads that are not designed for heavy-vehicle use over an extended period (particularly during winter). This can reduce the harvest window (for example, to the summer and autumn period), or restrict the number of heavy vehicle movements that are permitted each month. Advanced consultation with the affected council (two to three years in advance of harvesting) can alleviate some of these difficulties, as it allows the council time to budget for roading upgrades, or to work through the particular harvest issues.

Another issue for private investors is the need to develop suitable (on-site) access, to connect harvest sites with the roading network. The existing farm tracks are not normally of a sufficient standard for harvest equipment and heavy logging vehicles. This roading investment needs to be planned appropriately.

The way councils rate the forestry sector, for road maintenance and upgrades, has been a point of contention in a number of districts. Industry concerns have focused on those situations where councils have used differential rating models to allocate costs. When this issue has arisen, the industry has worked with local authorities to provide them with accurate data on road usage; and to explore opportunities for reducing design and construction costs. The industry also faces periodic calls for additional financial contributions before harvest.

RAIL TRANSPORT

The combined Otago/Southland region is serviced by the main trunk line, which connects Oamaru, Dunedin and Invercargill. The region also has two operating branch lines. The first connects Invercargill with Nightcaps. This line transports both coal and some refrigerated meat products. The second line connects Dunedin with Middlemarch and is principally a tourist route.

The Middlemarch line was recently examined as an alternative route for transporting logs from Mt Allan (Wenita Forest Products) to Port Otago and local mills. Wenita undertook this assessment in association with local roading authorities. With the short distances involved, and the range of customers for the logs, this proposal did not prove to be financially viable.

The rail system handles only a small proportion of the region's log harvest as the carriage distances are normally less than 100 to 150 kilometres. Another factor in this equation is the need to transfer logs onto trucks for part of the journey (from the forest to the siding or to the mill). This additional handling adds to operating costs.

A number of processing companies utilise the rail network for the distribution of sawn timber or processed timber products (usually in a containerised or pallet form). The rail network is an efficient means of transporting large quantities of containers domestically or to port facilities.

Looking further out, the Otago/Southland rail network has the advantage that it lies in close proximity to a number of the region's major forests. This is likely to encourage growers to periodically review their use of rail, particularly with rising energy costs and the environmental advantages of rail freight over road.

ENERGY

The combined Otago/Southland region supplies a substantial proportion of New Zealand's electricity demand, through renewable hydro-generation. The Clyde and Roxburgh dams on the Clutha River have an installed capacity of over 750 megawatts (MW), while the Benmore, Aviemore and Waitaki dams, on the Waitaki River have a capacity approaching 850 MW. The largest hydro-generation facility in the south is Manapouri, with an installed capacity of 710 MW.

Hydro-generation will be supplemented in coming years with the development of wind farms. The White Hill project (developed by Meridian Energy) is already operating and there are several larger scheme, under active consideration.

The region also has substantial quantities of commercial coal, which is mined mainly at Ohai in Southland and Kaitangata in South Otago.

This combination of renewable and fossil fuels provides the region with a reliable energy supply.

WOOD RESIDUES

Wood residues currently generate about 4.7 percent of New Zealand's total primary energy supply. Combustion (burning) is the most common method used in New Zealand to generate energy from wood, with an estimated 340 gigawatt hours (GWh) of electricity and 8700 GWh of heat produced from wood residues each year.

Wood residues provide 50 to 55 percent of the New Zealand forest industry's energy consumption. Electricity provides about 25 percent, and the balance comes from gas, coal and oil.

In addition to burning mill residues, the industry is investigating the economics of utilising harvest-site residues for energy production. Trials are underway in the central North Island. These trials are focusing particularly on the supply-chain costs, and how they can be minimised.

OPPORTUNITIES AND CONSTRAINTS

8

The forestry sector is one of the drivers of the Otago and Southland economy. The sector is a significant employer, exporter, and consumer of services. These points were emphasised in a 2005 study by Business and Economic Research Limited (BERL). The study was commissioned by the Southern Wood Council (SWC) to assess the contribution the forestry sector makes to the Otago and Southland economy.

The BERL study estimated that the direct contribution of the sector to regional GDP stood at 3.7 percent in 2003. When indirect and induced expenditure is added (including purchases of goods and services by the sector, and additional expenditure generated by forestry sector wages), the total contribution of the sector climbed to 6.7 percent of regional GDP. The BERL study also found that the forestry sector achieved 4.9 percent per annum growth in real GDP over the preceding decade, compared to just 1.8 percent for the region as a whole. This growth was assisted by a steady improvement in labour productivity.

The growth opportunities over the medium term (to 2016) are likely to focus on productivity improvements; the utilisation of lower-grade logs and potentially biofuels. The wood availability forecasts indicate that there is limited opportunity to increase the total harvest of either radiata pine or Douglas-fir during this period. Production increases will be seen in the harvest of *Eucalyptus nitens,* as this resource matures.

The policy initiatives around afforestation and emissions trading have the potential to rekindle interest in forestry plantings. These new plantings are likely to occur on more elevated sites due to the escalating cost of land.

Looking longer-term (post-2016–2020), there will be opportunities to substantially increase harvesting and processing volumes as the private resource (planted in the 1990s) comes on stream. The scattered nature of this resource (in terms of area and ownership) will require careful management if the region is to maximise the benefits of this increased harvest.

These opportunities for future development can not be taken for granted. The timber industry is extremely competitive, and the sector is driven as much by international trends as by local conditions. The sector also faces a range of domestic challenges (or constraints), ranging from skill shortages through to regulatory controls.

This chapter will review some of the key challenges facing the industry, as well as emerging opportunities for the sector.

CHALLENGES AND CONSTRAINTS

INDUSTRY-WIDE ISSUES

Nationally, the plantation and timber processing sectors face a range of challenges that affect the operational performance and the competitiveness of the sector. These constraints include:

- the fluctuation in the New Zealand dollar against the currencies of our key markets and competitors;
- road and sea transport costs;
- New Zealand's distance from its markets;
- skill shortages;
- compliance costs;
- planning requirements under the Resource Management Act (RMA);
- the fragmentation of the industry;
- increased competition from low-cost producers around the Pacific Rim;
- non-tariff barriers;
- market pressure from wood substitutes.

INCREASING SEA FREIGHT COSTS

The cost of freighting logs to New Zealand's major export markets (for example, China and South Korea) has tripled

over the past five years. In 2001/02, logs could be freighted for US$20 per cubic metre. Brokers are now quoting figures in excess of US$60 to $70 per cubic metre.

Sustaining the log trade, in a period of escalating freight rates, is a difficult proposition for growers and exporters. To successfully operate in this environment, exporters need to look closely at their supply-chains and identify opportunities for reducing (or sharing) financial costs. The options suggested by industry commentators include:

- forestry companies looking at formally partnering with bulk importers, and taking more control of the charter arrangements;
- the use of shared charters, to ensure the vessel is loaded on both legs of the voyage;
- larger-capacity vessels being utilised, where feasible, to reduce the per-tonne cost of freight. This may require the use of feeder services to hub ports (which would require industry pooling of log volumes);
- increasing the use of container services (and specially designed log containers) for small or specialised orders.

The rise in bulk freight rates may act as a spur to encourage additional processing of logs. Exporting sawn timber (rather than logs) reduces the relative cost of freight and provides exporters with additional transport options, particularly the use of scheduled container services.

› ATTRACTING AND RETAINING SKILLED LABOUR

A persistent issue for the industry (both regionally and nationally) is the ability to attract, and retain, suitable staff. Growers and processors are reporting ongoing difficulties in attracting staff, despite the current downturn in the sector. This is due to a combination of tight labour conditions in Otago and Southland (with low unemployment and strong competition for labour), the limited exposure of the industry to school and university leavers, and a general move away from physically demanding types of employment.

The major growers and processors in Otago and Southland recognise the need to promote the industry to school leavers, and to workers in other sectors. A number of initiatives have been co-ordinated through the SWC. These include hosting schools at forestry open days, developing career promotion material, attending the career promotion functions and developing promotional DVDs to better inform the public about the industry and its career opportunities.

The industry is also placing additional emphasis on recognising skill attainment, and developing initiatives to enable accelerated learning. This reflects recognition within the sector that productivity gains can only be achieved with a skilled and motivated workforce.

The industry works closely with Telford Rural Polytechnic, which provides formal training in silviculture and harvesting. Regular discussions are also held with the Forest Industries Training Education Council (FITEC) around their on-the-job training programmes.

› LOCAL AUTHORITY (RMA) PLANNING ISSUES

The forestry sector faces a number of challenges in the planning area, which will need to be worked through with territorial and regional authorities, over coming years. These include:

- the availability of additional sites for green field processing facilities;
- the ability to establish mid and higher-altitude plantings (particularly in areas with amenity and landscape considerations);
- the management of wilding tree spread on higher-altitude sites;
- the hydrological impacts of forests on water availability;
- the increasing incidence of boundary issues with rural

lifestyle owners (for example, lifestyle owners calling for restrictions on commercial processing and plantation operations around operating times, movements and noise emissions);
- water discharge issues from processing facilities;
- fumigation requirements for export forest products.

The limited availability of industrial land (for new processing) is considered to be a key constraint facing the industry. A shortage of sites has led a number of companies to apply for development consents on rural sites. As industrial activities are generally non-complying in rural zones, the applications have frequently faced an uphill battle. The consent, and appeal process, can take an extended period and there is no certainty that the projects would proceed. The cost and uncertainty associated with these applications has encouraged a number of companies to expand existing plants instead of building new facilities.

Progressing this issue will require dialogue with both councils and the affected communities. The experience to date has shown that communities hold strong views on land re-designation, particularly where there are issues around amenity values, productive soils and landscape issues. This was seen in the unsuccessful attempt by the Dunedin City Council to establish a forestry enterprise park at Allanton, south of Mosgiel.

The upcoming (ten-year) review of district plans will provide an opportunity for growers and timber processors to put forward their views on future policies. Evidence can be submitted through the submission, and hearing process, on the issues outlined above. The review process has started in Otago/Southland, with the Clutha District Council undertaking preliminary consultation with stakeholder groups.

The forestry sector comes to the review process with a strong record of environmental progress over the past decade. The major plantation and processing companies have actively met the challenges of the RMA by environmentally certifying their operations, and moving to systems of progressive improvement (such as FSC chain of custody certification). The industry is also taking a pro-active stance in working with councils on planning issues, and in promoting new approaches. The Otago/Southland industry has recently worked with local government on biodiversity management and transportation issues. This ensures the industry is aware of emerging issues and can contribute accordingly.

› INFRASTRUCTURE DEVELOPMENT

The industry, in association with the region's roading authorities, will need to start planning for the projected increase in wood flows from 2016 to 2020. This increase will generate additional heavy vehicle movements on both primary and secondary routes. A detailed assessment of projected routes will need to be undertaken, and upgrades planned accordingly (to alleviate both the heavy loads and increased congestion).

The increase in wood availability will come primarily from small-scale forest growers. The dispersed, and fragmented, nature of this forest resource will have an impact on transport infrastructure.

› COMPETITION IN WOOD PRODUCTS

Future investment in afforestation and timber processing will depend upon the international competitiveness of the domestic industry. Investors will only commit funds to a venture if the production can compete on the international market (be they logs or laminated boards). This is seen particularly where a company is producing standard timber products that can be sourced from around the Pacific Rim. Unless there is a point of differentiation, investors will generally seek locations with the most favourable economic and planning conditions.

It is also important to recognise that international competitiveness is constantly improving. This means timber processors need to progressively improve efficiency, through the use of innovative technology, positioning for market value, improved productivity, and reduced costs.

OPPORTUNITIES

With a flat supply curve over the next decade, the focus for the industry is likely to be on improving the utilisation of the existing resource; identifying efficiencies in the manufacturing and supply chains; and developing new (and differentiated) product lines. While solid wood processing will remain the basis of the industry, developments in engineered wood products and bio-materials are likely to create new market segments.

At the plantation level, growers are likely to explore the opportunities for developing additional income streams from their land and timber resources. These opportunities include bioenergy, carbon sequestration and the development of secondary crops.

PRODUCTIVITY GAINS

Internationally, the forestry sector is achieving significant productivity gains through the application of improved technologies, work place practices and supply-chain arrangements. These initiatives are improving the operational efficiency of the industry and decreasing the per-tonne cost of harvesting and processing. In an increasing competitive trading environment, these incremental gains in productivity are critical.

The Otago/Southland industry has achieved significant productivity gains in recent years, and has a culture of adaptation and improvement. A key advantage for the local industry has been its willingness to work collectively to achieve efficiency gains. In 2004, eight companies underwent energy efficiency audits. Working collectively, the companies were able to more effectively access assistance for this initiative from the Energy Efficiency and Conservation Authority (EECA).

The areas where the local industry could achieve long-term gains in productivity include:

- further mechanisation of harvesting and skid site activities;
- collective action to improve vehicle scheduling;
- the adoption of software to improve vehicle and load tracking (including electronic reconciliation);
- increased use of timber scanning technology to improve recovery rates; and
- further automation of the milling process (that is, labour replacement).

INNOVATIVE COMPANIES AND PEOPLE

The experience of the past 20 years has shown primary sector exporters that simply increasing production does not yield higher economic returns. To maximise returns, companies need to differentiate their product lines, seek new solutions to problems and align their production to the needs of the market place. Achieving this situation requires a culture of innovation and technical adaptation. Within a company this means providing support for new ideas and products; and at a broader scale it means greater collaboration (and information exchange) between companies.

This message has been taken on board by the major players in the Otago/Southland industry. The case of Dongwha Patinna illustrates this point. The company has a programme of continuous product development, which draws on ideas from across their workforce. Three or four ideas are being tested at any one time. Since the plant was commissioned, eight new specialist products have been added. These include high-density, stress-free, ultra-light and super-light product lines.

Other examples of industry initiatives include:

- efforts to differentiate radiata pine grown in Otago/Southland, by focusing on its distinctive characteristics (for example, lighter colouring and longer inter-nodal lengths);
- early adoption of environmental certification standards to provide consumers with certainty over the source of their timber, and to create a point of differentiation in the market place;
- developments in kiln design by Invercargill-based engineering company John Fogarty Limited;
- work undertaken by Lindsay & Dixon into the drying and colouring of the major beech species.

› BIOENERGY/BIOFUELS POTENTIAL

Energy production from harvest residues has been identified as a potential opportunity for the forest industry. Trials are underway on the logistics of transporting residues from harvest sites to energy plants. This work is focusing on the volume of residues required to break even, the geographical limits of collection areas and the forms of collection.

Larger processors already use wood residues from the milling process to fuel boilers (or co-generation plants). The wood fibre collected from harvest sites could be used to supplement existing feed stocks, or could be used to fuel stand alone energy plants.

Looking further down the track, work is underway on the opportunities for utilising wood fibre as a basis for a biofuels industry. The potential products would be ethanol, methanol and specialised chemicals and oils.

Under the Forest Industry Development Agenda (FIDA), the government has made $2.8 million available to fund bioenergy programmes across New Zealand.

› SECONDARY CROPS

New Zealand's commercial forests have been managed primarily for log production. Limited attention has been paid to the potential for developing secondary crops, which could supplement revenue during the rotation cycle.

New Zealand's Crown Research Institutes have undertaken work on a selection of crops that could be managed in conjunction with timber production. They include: mycorrhizal mushrooms, Ginseng and a number of berry and nut species. The financial advantages in developing secondary crops are three-fold:

- after an initial establishment period they provide landowners with an annual income, which can defray forest management costs;
- an additional crop improves operating cash flow;
- a secondary source of income reduces the financial uncertainty associated with long-term forestry investment.

The factor which could turn this work from a "boutique" initiative into a driver of new planting is the willingness of the corporate sector to come on board. Attracting corporate investment would provide the scale of production necessary to establish permanent domestic and export market-chains.

› COLLECTIVE ACTION ON INDUSTRY CONCERNS

The Otago/Southland industry has worked collectively on a range of issues confronting the sector (from differential rating through to drug and alcohol standards in the workplace). This ability to bring together industry leaders, and formulate a pan-industry position on emerging issues, is a major strength, and opportunity.

An important factor in encouraging the industry to work more closely was the formation of the SWC in 2001. This industry body brought together the major growers and

timber processors in Otago and Southland, along with local authority development agencies and the two port companies. The objectives of the body have been to:

- promote the sustainable development of the forest products industry;
- encourage communication within the sector;
- co-ordinate collective action;
- raise the profile of the industry with local authorities and the public.

Since the formation of the SWC, a number of initiatives have been undertaken to lift the profile of the forest industry. These include:

- research on the economic contribution of the industry to the regional economy;
- media promotion of the industry and its role within the community;
- the development of promotional material on the industry (for career days and field trips for students);
- the development of a DVD on the career opportunities in forestry;
- presentations to local authority representatives and careers advisers.

The SWC also provides a collective voice to local and central government on current and emerging issues. This has benefits for both the industry and the organisations they consult with. In the case of local authorities, the SWC provides a central point of contact for councils when developing new initiatives, or when current plans come up for review.

› POSITIVE ATTRIBUTES OF THE REGION

Looking to the future, the combined Otago/Southland region has a number of advantages in attracting new investment into plantation development and additional processing activity.

These positive attributes include:

- a diversified processing industry, which encourages strong competition for timber;
- a well-managed forest resource, with experienced staff and contractors;
- a radiata pine resource which is seen as having favourable characteristics for visual end uses (for example, mouldings and furniture components);
- a high proportion of the radiata resource is pruned (72.8 percent);
- a planning environment that is generally supportive of new planting;
- the availability of mid-altitude (hill country) land for plantation development;
- the proximity of the major growing areas to the highway network and key processing facilities;
- a strong farm forestry (small block owning) sector that will provide the majority of the additional resource coming on-stream from 2016;
- a maturing Douglas-fir resource that will provide development opportunities from the late 2020s;
- proactive development agencies, and port companies, that are supportive of the industry and are keen to work through supply-chain issues;
- active industry associations that support technology and information transfer;
- an image as New Zealand's most diversified forestry region, in terms of commercial timber species.

CONCLUDING COMMENTS

Otago and Southland's forest growing and timber processing industries face both opportunities and challenges over the next 20 years.

In the near to medium term, the forecasts indicate a flat supply of timber. While this is likely to limit new processing activity, it creates a strong driver for improving the utilisation of the current resource and to identify new (and higher value) product lines. This period of stability provides an opportunity to put in place the infrastructure required for the projected upturn in harvest volumes from 2016.

One of the region's greatest assets is the skill base within the industry, and the willingness of managers to undertake collective action. A co-operative approach will be critical for tackling the constraints facing the sector, around skills and training, transport planning and operational efficiencies.

Photo by John Doogan.

REGIONAL CONTACTS

AND ADDITIONAL SOURCES OF INFORMATION

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COMPANY/ORGANISATION	ADDRESS		PRINCIPAL CONTACT	PHONE	WEBSITE
Blakely Pacific Limited	PO Box 13 980	Christchurch	Phil Taylor	+64 3 365 2846	www.blakely-pacific.co.nz
Blue Mountain Lumber Company Ltd	Private Bag 50021	Gore	Matthew Hitchings	+64 3 204 8444	-----
Bright Wood NZ Ltd	PO Box 93	Otautau	John Crane	+64 3 225 8545	www.brightwood.com
Calder Stewart Forestry	PO Box 74	Milton	Jeremy Hayes	+64 3 417 7245	-----
City Forests Limited	PO Box 210	Dunedin	Grant Dodson	+64 3 467 7722	www.cityforests.co.nz
Clutha District Council	PO Box 25	Balclutha	Murray Brass	+64 3 418 1350	www.cluthadc.govt.nz
Craigpine Timber Ltd	PO Box 55	Winton	John Cowan	+64 3 236 7533	www.craigpine.co.nz
Dongwha Patinna (NZ) Ltd	PO Box 189	Gore	Shaun Cawood	+64 3 209 3100	www.patinna.com
Dunedin City Council	PO Box 5045	Dunedin	Graham Strong	+64 3 474 3507	www.cityofdunedin.com
Environment Southland	Private Bag 90116	Invercargill	Warren Tuckey	+64 3 211 5115	www.es.govt.nz
Ernslaw One Limited	PO Box 36	Tapanui	Phil de la Mare	+64 3 204 8061	-----
Fulton Hogan Ltd	Private Bag 1962	Dunedin	Eion Mills	+64 3 417 4269	-----
Lindsay & Dixon Limited	Private Bag	Tuatapere	Bernie Lagan	+64 3 226 6059	www.lindix.co.nz
Ministry of Agriculture and Forestry	PO Box 5648	Dunedin	Parnell Trost	+64 3 951 4705	www.maf.govt.nz
Niagara Sawmilling Company Ltd	PO Box 542	Invercargill	Bill Harper	+64 3 230 4831	www.niagara-timber.co.nz
New Zealand Farm Forestry Association Branches					
North Otago FFA	Tapui Road, Tapui	Omarama	Scott Johnston	+64 3 432 4255	-----
Mid Otago FFA	70 Evans Street	Dunedin	Chaz Forsyth	+64 3 473 8317	-----
South Otago FFA	Konini, 1 RD	Lawrence 9163	Graham Hunter	+64 3 485 9567	-----
Southland FFA	Campion Road	Gore	John Purey-Cust	+64 3 208 5200	-----
Otago Regional Council	Private Bag 1954	Dunedin	Selva Selvarajah	+64 3 474 0827	www.orc.govt.nz
PF Olsen Ltd	PO Box 975	Dunedin	David Thode	+64 3 453 6819	www.pfolsen.co.nz
Port Otago Limited	PO Box 8	Port Chalmers	Peter Brown	+64 3 472 7890	www.portotago.co.nz
Rayonier New Zealand (Matariki Forest Estate)	PO Box 1742	Invercargill	Steve Chandler	+64 3 214 2572	www.rayonier.com
South Port New Zealand Limited	PO Box 1	Bluff	Nigel Gear	+64 3 212 8685	www.southport.co.nz
Southern Cross Forest Products Ltd	PO Box 148	Mosgiel	Tom Whitefield	+64 3 489 7078	scfp.co.nz
Southern Wood Council	PO Box 904	Dunedin	Brent Apthorp (SWC Secretary)	+64 3 470 1902	www.southernwoodcouncil.co.nz
South Wood Export Ltd	PO Box 7010	Invercargill	Graeme Manley	+64 3 218 2073	-----
Southland District Council (Forestry Manager)	PO Box 903	Invercargill	Roger Washbourn	+64 3 214 9747	www.southlanddc.govt.nz
Southland District Council (Resource Management)	PO Box 903	Invercargill	Trevor Garnett	+64 3 211 2500	www.southlanddc.govt.nz
Southland Veneers Ltd	PO Box 876	Invercargill	Hans Jensen	64 3 230 4820	-----
Venture Southland	PO Box 1306	Invercargill	Robin McNeil	+64 3 211 1400	www.southlandnz.com
Waitaki District Council	Private Bag 50058	Oamaru	Jack Chandra	+64 3 433 0300	www.waitaki.govt.nz
Wenita Forest Products Limited	PO Box 341	Mosgiel	Rodger Hancock	+64 3 489 3234	www.wenita.co.nz

APPENDIX A

OTAGO HARVEST INTENTIONS SURVEY RESULTS, LARGE-SCALE OWNERS

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	EXPECTED HARVEST 2005	HARVEST INTENTIONS FOR SUBSEQUENT 10 YEARS									
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RADIATA PINE											
Pruned (m^3)	168 994	136 488	130 605	119 315	137 908	147 855	160 093	162 843	177 152	174 148	172 675
Unpruned (m^3)	475 183	459 632	439 993	441 303	518 738	518 547	505 897	543 104	556 409	620 431	584 082
Pulp (m^3)	143 572	151 570	149 588	180 117	176 414	139 821	160 616	157 986	144 560	203 266	190 757
Total (m^3)	787 750	747 689	720 186	740 735	833 060	806 222	826 606	863 934	878 121	997 845	947 514
Area radiata (ha)	2 410	2 435	2 379	2 045	2 015	1 786	1 748	1 722	1 742	1 985	1 965
DOUGLAS-FIR											
Unpruned (m^3)	51 044	76 889	59 112	59 337	43 699	42 417	42 498	42 510	42 508	42 509	40 940
Pulp (m^3)	9 060	11 200	8 389	8 164	5 551	5 333	5 252	5 241	5 242	5 241	5 060
Total (m^3)	60 104	88 089	67 501	67 501	49 250	47 750	47 750	47 751	47 750	47 750	46 000
OTHER SPECIES											
Unpruned (m^3)	12 972	14 825	16 154	15 396	11 032	7 200	7 200	7 200	7 200	8 970	13 254
Pulp (m^3)	7 590	9 446	9 648	8 905	4 552	3 600	3 600	3 600	28 600	185 073	47 950
Total (m^3)	20 563	24 271	25 802	24 301	15 584	10 800	10 800	10 800	35 800	194 043	61 204
TOTAL ALL SPECIES (M^3)	868 417	860 049	813 489	832 537	897 894	864 772	885 156	922 485	961 671	1 239 638	1 054 718

APPENDIX B

SOUTHLAND HARVEST INTENTIONS SURVEY RESULTS, LARGE-SCALE OWNERS

	EXPECTED HARVEST 2005	HARVEST INTENTIONS FOR SUBSEQUENT 10 YEARS									
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RADIATA PINE											
Pruned (m^3)	42 936	26 199	26 644	26 474	29 179	32 009	17 113	17 980	17 758	18 710	21 371
Unpruned (m^3)	171 310	178 913	195 788	196 733	195 953	207 121	178 152	212 719	176 514	167 416	174 435
Pulp (m^3)	58 867	96 184	102 604	103 874	103 949	104 029	104 282	120 711	106 010	100 811	107 685
Total (m^3)	273 113	301 297	325 037	327 082	329 082	343 159	299 546	351 410	300 282	286 937	303 491
Area radiata (ha)	619	669	694	697	699	744	636	748	642	608	643
DOUGLAS-FIR											
Unpruned (m^3)	9 623	12 687	12 687	12 687	12 687	12 687	12 903	12 903	15 192	13 298	17 268
Pulp (m^3)	118	2 237	2 237	2 237	2 237	2 237	18 947	18 947	19 129	19 007	19 597
Total (m^3)	9 741	14 924	14 924	14 924	14 924	14 924	31 850	31 850	34 321	32 305	36 865
OTHER SPECIES											
Unpruned (m^3)	1 422	0	0	0	0	0	0	0	0	0	0
Pulp (m^3)	54 989	70 000	100 000	150 000	180 000	220 000	250 000	250 000	225 000	70 000	207 000
Total (m^3)	56 410	70 000	100 000	150 000	180 000	220 000	250 000	250 000	225 000	70 000	207 000
TOTAL ALL SPECIES (M^3)	339 264	386 221	439 961	492 006	524 006	578 084	581 396	633 260	559 603	389 242	547 356

Note
Target clearfell age (volume weighted average) for radiata pine: 29 years.
Radiata pine production thinning volumes have been added to radiata pine pulp volumes.

APPENDIX C

WOOD AVAILABILITY FORECASTS – SUPPORTING TABLES

LIST OF TABLES

TABLE C1: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 1, FOR ALL OWNERS

Scenario 1 assumes an unconstrained cut.

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)
2005	925
2006	895
2007	961
2008	398
2009	856
2010	793
2011	785
2012	1 701
2013	1 232
2014	1 345
2015	977
2016	1 305
2017	1 561
2018	772
2019	551
2020	1 092
2021	889
2022	2 341
2023	1 814
2024	3 352
2025	2 448
2026	2 572
2027	1 811
2028	1 846
2029	1 832
2030	1 844
2031	2 103
2032	1 921
2033	1 403
2034	1 057
2035	998
2036	904
2037	980
2038	970
2039	413
2040	860

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C2: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 2

Scenario 2 assumes that large-scale owners cut at stated intentions, and small-scale owners cut at 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	788	137	925
2006	748	147	895
2007	720	250	970
2008	741	151	892
2009	833	128	961
2010	806	131	937
2011	827	126	953
2012	864	178	1 042
2013	878	201	1 079
2014	998	210	1 208
2015	948	204	1 152
2016	836	150	986
2017	836	138	974
2018	836	120	956
2019	836	126	962
2020	836	705	1 541
2021	836	374	1 210
2022	836	1 716	2 552
2023	836	1 142	1 978
2024	836	2 339	3 175
2025	836	1 377	2 213
2026	836	1 502	2 338
2027	856	817	1 673
2028	856	886	1 743
2029	856	677	1 534
2030	875	591	1 466
2031	875	402	1 277
2032	875	617	1 492
2033	875	368	1 243
2034	875	71	946
2035	875	4	879
2036	920	119	1 039
2037	920	148	1 068
2038	920	271	1 191
2039	920	167	1 087
2040	920	144	1 064

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C3: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 3

Scenario 3 assumes a non-declining yield with target rotation of 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	788	137	925
2006	748	147	895
2007	720	247	967
2008	741	226	967
2009	833	134	967
2010	806	161	967
2011	827	168	995
2012	864	189	1 053
2013	878	181	1 059
2014	998	98	1 096
2015	948	155	1 103
2016	836	378	1 214
2017	836	485	1 320
2018	836	509	1 345
2019	836	643	1 479
2020	836	643	1 479
2021	836	643	1 479
2022	836	643	1 479
2023	836	643	1 479
2024	836	643	1 479
2025	836	643	1 479
2026	836	643	1 479
2027	836	643	1 479
2028	836	643	1 479
2029	836	643	1 479
2030	836	643	1 479
2031	836	643	1 479
2032	836	643	1 479
2033	836	643	1 479
2034	836	643	1 479
2035	930	549	1 479
2036	930	549	1 479
2037	930	549	1 479
2038	930	549	1 479
2039	930	549	1 479
2040	930	549	1 479

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C4: OTAGO RADIATA PINE AVAILABILITY UNDER SCENARIO 4, BY LOG GRADE FOR ALL OWNERS

Scenario 4 assumes a split non-declining yield with target rotation of 30 years.

YEAR ENDING DECEMBER	TOTAL (000 M^3 IB)	RECOVERABLE VOLUME BY LOG TYPE		
		PRUNED LOGS (000 M^3 IB)	UNPRUNED LOGS (000 M^3 IB)	CHIP LOGS (000 M^3 IB)
2005	925	189	565	172
2006	895	170	552	174
2007	967	167	603	197
2008	967	150	611	206
2009	967	160	605	202
2010	967	177	594	197
2011	995	194	609	193
2012	1 028	190	633	205
2013	1 028	196	633	199
2014	1 035	176	649	209
2015	1 035	190	643	201
2016	1 139	209	708	221
2017	1 158	230	711	217
2018	1 274	253	787	234
2019	1 402	278	871	252
2020	1 542	306	963	274
2021	1 666	336	1 038	292
2022	1 666	343	1 035	288
2023	1 666	329	1 042	295
2024	1 666	362	1 029	275
2025	1 666	361	1 033	274
2026	1 666	351	1 039	278
2027	1 666	316	1 061	291
2028	1 666	348	1 046	274
2029	1 666	340	1 054	273
2030	1 666	334	1 059	272
2031	1 666	301	1 076	289
2032	1 666	331	1 065	271
2033	1 666	325	1 067	275
2034	1 666	324	1 069	274
2035	1 500	292	961	248
2036	1 350	263	865	224
2037	1 215	238	777	201
2038	1 215	237	777	202
2039	1 215	242	774	201
2040	1 215	228	780	207

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C5: OTAGO RADIATA PINE RECOVERABLE VOLUME AND AVERAGE CLEARFELL AGE FOR EACH TARGET ROTATION AGE UNDER SCENARIO 5, FOR ALL OWNERS

Scenario 5 assumes a split non-declining yield with target rotations of 28, 30 and 32 years.

	28-YEAR ROTATION		30-YEAR ROTATION		32-YEAR ROTATION	
YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	925	31	925	30.5	925	31
2006	895	30	895	29.9	895	30
2007	985	30	967	29.9	929	30
2008	1 064	30	967	29.9	929	30
2009	1 064	29	967	29.7	943	30
2010	1 064	29	967	28.9	943	30
2011	1 064	29	995	30	973	30
2012	1 064	29	1 028	29.5	1 001	30
2013	1 166	29	1 028	30	1 001	30
2014	1 283	29	1 035	30.1	1 001	30
2015	1 404	28	1 035	30.3	1 001	30
2016	1 517	28	1 139	30.7	1 001	31
2017	1 517	28	1 158	30.6	1 001	31
2018	1 517	28	1 274	30.1	1 001	31
2019	1 517	28	1 402	29.9	1 001	31
2020	1 517	28	1 542	29.2	1 016	30
2021	1 517	28	1 666	29.4	1 118	30
2022	1 517	28	1 666	29.3	1 229	30
2023	1 517	29	1 666	29.5	1 352	31
2024	1 517	29	1 666	29.8	1 488	31
2025	1 517	29	1 666	30.3	1 636	31
2026	1 517	29	1 666	30.5	1 800	32
2027	1 517	29	1 666	30.9	1 883	32
2028	1 517	29	1 666	31	1 883	32
2029	1 517	30	1 666	31.6	1 883	33
2030	1 517	30	1 666	31.9	1 883	33
2031	1 517	30	1 666	32	1 883	34
2032	1 517	30	1 666	32.6	1 883	34
2033	1 365	29	1 666	32.6	1 883	34
2034	1 228	29	1 666	32.8	1 883	35
2035	1 106	29	1 500	32.6	1 883	35
2036	1 106	29	1 350	32.6	1 883	35
2037	1 106	29	1 215	32.6	1 695	35
2038	1 106	29	1 215	32.5	1 525	35
2039	1 106	29	1 215	32.3	1 373	35
2040	1 106	29	1 215	32.3	1 373	35

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C6: WOOD AVAILABILITY AND AVERAGE CLEARFELL AGE FOR OTHER SPECIES (DOUGLAS-FIR) IN OTAGO

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	68	50
2006	96	46
2007	78	46
2008	72	46
2009	53	46
2010	53	46
2011	53	46
2012	53	46
2013	53	46
2014	65	46
2015	71	46
2016	68	46
2017	72	46
2018	72	46
2019	61	46
2020	68	46
2021	63	46
2022	71	46
2023	105	46
2024	199	46
2025	276	46
2026	341	46
2027	454	46
2028	545	46
2029	625	46
2030	664	46
2031	644	46
2032	554	46
2033	479	46
2034	438	46
2035	423	46
2036	474	46
2037	605	46
2038	749	46
2039	869	46
2040	869	46

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C7: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 1, FOR ALL OWNERS

Scenario 1 assumes an unconstrained cut.

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)
2005	507
2006	527
2007	176
2008	137
2009	345
2010	489
2011	424
2012	619
2013	797
2014	688
2015	650
2016	503
2017	667
2018	426
2019	484
2020	441
2021	256
2022	1 055
2023	1 499
2024	2 576
2025	1 540
2026	965
2027	867
2028	1 429
2029	972
2030	1 063
2031	888
2032	778
2033	794
2034	905
2035	158
2036	537
2037	599
2038	189
2039	149
2040	373

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C8: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 2

Scenario 2 assumes that large-scale owners cut at stated intentions, and small-scale owners cut at 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	259	248	507
2006	289	238	527
2007	311	159	470
2008	313	137	450
2009	315	115	430
2010	329	154	483
2011	286	91	377
2012	337	223	560
2013	286	85	371
2014	273	189	462
2015	289	141	430
2016	318	53	371
2017	350	41	390
2018	385	40	424
2019	423	70	493
2020	433	219	652
2021	433	102	535
2022	433	905	1 338
2023	433	866	1 299
2024	433	2 033	2 466
2025	433	1 038	1 471
2026	433	575	1 008
2027	433	321	754
2028	433	900	1 333
2029	433	589	1 022
2030	433	454	887
2031	433	344	777
2032	433	96	529
2033	433	199	632
2034	433	347	780
2035	433	4	436
2036	433	240	673
2037	433	249	682
2038	433	171	604
2039	433	149	582
2040	433	124	557

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C9: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 3

Scenario 3 assumes a non-declining yield with target rotation of 30 years.

	RECOVERABLE VOLUME		
YEAR ENDING DECEMBER	LARGE-SCALE OWNERS (000 M^3 IB)	SMALL-SCALE OWNERS (000 M^3 IB)	ALL OWNERS (000 M^3 IB)
2005	259	248	507
2006	289	238	527
2007	311	142	453
2008	313	140	453
2009	315	138	453
2010	329	124	453
2011	286	167	453
2012	337	116	453
2013	286	167	453
2014	273	180	453
2015	289	164	453
2016	318	180	498
2017	339	209	548
2018	339	264	603
2019	339	324	663
2020	373	357	730
2021	406	397	803
2022	406	435	841
2023	406	435	841
2024	406	435	841
2025	406	435	841
2026	406	435	841
2027	406	435	841
2028	406	435	841
2029	406	435	841
2030	409	431	841
2031	450	390	841
2032	453	387	841
2033	453	387	841
2034	453	387	841
2035	453	387	841
2036	453	387	841
2037	453	387	841
2038	453	387	841
2039	453	387	841

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C10: SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 4, BY LOG GRADE FOR ALL OWNERS

Scenario 4 assumes a split non-declining yield with target rotation of 30 years.

YEAR ENDING DECEMBER	TOTAL (000 M^3 IB)	RECOVERABLE VOLUME BY LOG TYPE		
		PRUNED LOGS (000 M^3 IB)	UNPRUNED LOGS (000 M^3 IB)	CHIP LOGS (000 M^3 IB)
2005	507	62	326	119
2006	527	56	336	135
2007	450	50	276	124
2008	450	45	278	127
2009	450	50	278	123
2010	450	46	284	121
2011	450	42	285	125
2012	450	37	289	124
2013	450	36	290	125
2014	450	40	290	121
2015	450	44	291	116
2016	450	48	289	113
2017	495	53	324	118
2018	545	58	350	137
2019	599	64	408	128
2020	659	71	448	142
2021	725	78	490	158
2022	798	85	537	175
2023	878	94	598	186
2024	965	103	659	204
2025	1 028	114	697	217
2026	1 028	125	690	214
2027	1 028	137	681	210
2028	1 028	151	667	211
2029	1 028	151	670	208
2030	1 028	136	685	208
2031	1 028	123	698	208
2032	1 028	110	709	209
2033	1 028	99	718	211
2034	1 028	89	727	212
2035	925	80	654	191
2036	833	72	587	173
2037	749	65	528	156
2038	749	59	534	156
2039	749	53	540	156
2040	749	47	545	156

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C11: SOUTHLAND RADIATA PINE RECOVERABLE VOLUME AND AVERAGE CLEARFELL AGE FOR EACH TARGET ROTATION AGE UNDER SCENARIO 5, FOR ALL OWNERS

Scenario 5 assumes a split non-declining yield with target rotations of 28, 30 and 32 years.

	28-YEAR ROTATION		30-YEAR ROTATION		32-YEAR ROTATION	
YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	507	31	507	31	507	31
2006	527	29	527	29	527	29
2007	470	28	450	28	428	28
2008	470	28	450	28	428	28
2009	470	28	450	28	428	28
2010	470	29	450	29	428	29
2011	470	29	450	29	428	30
2012	470	29	450	29	428	29
2013	470	30	450	29	428	29
2014	517	29	450	30	428	30
2015	569	28	450	31	428	30
2016	626	27	450	31	428	31
2017	688	28	495	30	428	30
2018	757	28	545	30	428	32
2019	833	28	599	30	433	32
2020	892	28	659	30	476	30
2021	892	29	725	30	523	32
2022	892	29	798	30	576	32
2023	892	30	878	31	633	32
2024	892	30	965	31	697	32
2025	892	30	1 028	31	766	31
2026	892	30	1 028	32	843	32
2027	892	30	1 028	32	927	33
2028	892	30	1 028	32	1 020	34
2029	892	31	1 028	33	1 122	35
2030	892	31	1 028	33	1 127	35
2031	892	31	1 028	33	1 127	35
2032	892	30	1 028	33	1 127	35
2033	803	30	1 028	33	1 127	36
2034	723	30	1 028	33	1 127	36
2035	650	30	925	33	1 127	36
2036	650	30	833	33	1 127	36
2037	650	30	749	33	1 014	36
2038	650	29	749	33	913	36
2039	650	28	749	33	822	36
2040	668	28	749	33	822	37

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C12: WOOD AVAILABILITY AND AVERAGE CLEARFELL AGE FOR OTHER SPECIES (DOUGLAS-FIR) IN SOUTHLAND

YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	15	45
2006	19	43
2007	22	47
2008	22	46
2009	22	46
2010	23	46
2011	23	46
2012	23	46
2013	22	46
2014	22	46
2015	21	46
2016	24	46
2017	24	46
2018	28	46
2019	73	46
2020	75	46
2021	75	46
2022	75	46
2023	94	46
2024	112	46
2025	158	46
2026	174	46
2027	247	46
2028	312	46
2029	313	46
2030	269	46
2031	256	46
2032	185	46
2033	197	46
2034	291	46
2035	401	46
2036	550	46
2037	700	46
2038	846	46
2039	937	46
2040	938	46

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C13: COMBINED OTAGO AND SOUTHLAND RADIATA PINE AVAILABILITY UNDER SCENARIO 4, BY LOG GRADE FOR ALL OWNERS

Scenario 4 assumes a split non-declining yield with a target rotation of 30 years.

		RECOVERABLE VOLUME BY LOG TYPE		
YEAR ENDING DECEMBER	TOTAL (000 M^3 IB)	PRUNED LOGS (000 M^3 IB)	UNPRUNED LOGS (000 M^3 IB)	CHIP LOGS (000 M^3 IB)
2005	1 432	251	891	290
2006	1 422	226	887	309
2007	1 418	217	879	322
2008	1 418	195	889	333
2009	1 418	210	883	325
2010	1 418	223	878	317
2011	1 445	236	893	317
2012	1 479	228	922	330
2013	1 479	232	923	324
2014	1 486	216	939	330
2015	1 486	234	934	318
2016	1 589	257	997	334
2017	1 654	283	1 035	335
2018	1 819	311	1 136	371
2019	2 001	342	1 280	380
2020	2 201	376	1 410	416
2021	2 392	414	1 528	450
2022	2 464	428	1 572	464
2023	2 544	423	1 640	481
2024	2 632	465	1 688	479
2025	2 694	474	1 730	491
2026	2 694	476	1 729	492
2027	2 694	453	1 742	501
2028	2 694	499	1 712	485
2029	2 694	491	1 724	480
2030	2 694	471	1 745	480
2031	2 694	424	1 774	497
2032	2 694	441	1 775	480
2033	2 694	425	1 785	486
2034	2 694	414	1 797	486
2035	2 425	372	1 614	440
2036	2 182	335	1 452	397
2037	1 964	304	1 305	357
2038	1 964	295	1 312	358
2039	1 964	294	1 314	357
2040	1 964	276	1 326	364

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.

TABLE C14: COMBINED OTAGO AND SOUTHLAND RADIATA PINE RECOVERABLE VOLUME AND AVERAGE CLEARFELL AGE FOR EACH TARGET ROTATION AGE UNDER SCENARIO 5, FOR ALL OWNERS

Scenario 5 assumes a split non-declining yield with target rotations of 28, 30 and 32 years.

	28-YEAR ROTATION		30-YEAR ROTATION		32-YEAR ROTATION	
YEAR ENDING DECEMBER	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)	RECOVERABLE VOLUME (000 M^3 IB)	AVERAGE AGE (YEARS)
2005	1 432	31	1 432	31	1 432	31
2006	1 422	30	1 422	30	1 422	30
2007	1 499	29	1 418	29	1 341	29
2008	1 522	29	1 418	29	1 359	29
2009	1 522	29	1 418	29	1 378	29
2010	1 522	29	1 418	29	1 381	29
2011	1 522	29	1 445	30	1 401	30
2012	1 530	29	1 479	29	1 420	30
2013	1 636	29	1 479	30	1 430	30
2014	1 800	29	1 486	30	1 430	30
2015	1 972	28	1 486	30	1 430	30
2016	2 142	27	1 589	31	1 430	31
2017	2 205	28	1 654	31	1 430	31
2018	2 274	28	1 819	30	1 430	32
2019	2 350	28	2 001	30	1 435	31
2020	2 409	28	2 201	29	1 493	30
2021	2 409	28	2 392	30	1 643	31
2022	2 409	29	2 464	29	1 807	31
2023	2 409	29	2 544	30	1 987	31
2024	2 409	29	2 632	30	2 186	31
2025	2 409	29	2 694	30	2 405	31
2026	2 409	29	2 694	31	2 645	32
2027	2 409	30	2 694	31	2 810	32
2028	2 409	30	2 694	31	2 903	33
2029	2 409	30	2 694	32	3 005	33
2030	2 409	30	2 694	32	3 010	34
2031	2 409	30	2 694	32	3 010	34
2032	2 409	30	2 694	33	3 010	34
2033	2 168	29	2 694	33	3 010	35
2034	1 951	29	2 694	33	3 010	35
2035	1 756	29	2 425	33	3 010	35
2036	1 756	29	2 182	33	3 010	35
2037	1 756	29	1 964	33	2 709	35
2038	1 756	29	1 964	33	2 438	35
2039	1 756	29	1 964	33	2 194	35
2040	1 774	29	1 964	33	2 194	35

Note
IB denotes inside bark: the recoverable volume of wood excluding bark.