



Report to:  
**The Southern Wood Council**

# **THE CONTRIBUTION OF THE FOREST AND WOOD PROCESSING SECTOR TO OTAGO AND SOUTHLAND**

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# The Contribution of the Forest and Wood Processing Sector to Otago and Southland

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# 1 Executive summary

This report was completed for the Southern Wood Council (SWC) with assistance from its members who represent the majority of forest owners and wood processors in the Otago and Southland regions. While the information, statements, and opinions contained in this report are the result of independent research and analysis, BERL would like to recognise the contributions made by SWC members, particularly in assessing the issues relevant to the future performance of the sector.

New Zealand's forestry industry was highly regulated from the 1920s through to the 1980s and in particular, plantation forests could only be established on poorer land unsuitable for agriculture. Industry deregulation over the 1980s saw significant changes in the ownership of the forests including foreign investment in the forest blocks and in down-stream processing.

More recent times have seen the volume of wood harvested increase significantly in the Southern region. The volume of wood removed from the region has doubled from 780,000m<sup>3</sup> in 1990 to 1,560,000m<sup>3</sup> in 2003. This increase in wood supply has been matched by new investments in processing capacity with the volume of wood being processed increasing to 1,160,000m<sup>3</sup> per annum in 2003 or by about 800,000m<sup>3</sup> since 1990. Log exports have remained at about 400,000m<sup>3</sup> per annum but have reduced in significance from about 50% to 25% of the region's total wood removals.

These changes have seen the sector's *direct* economic contribution to the Southern region increase significantly. The sector employs about 2,427 Full-Time Equivalent (FTE) workers, representing an increase of 665 FTEs since 1994. These 2,427 FTEs account for about 2.1% of total employment in the Southern region. In this respect, the sector has been a key growth driver in the region with FTEs in the sector growing on average by 3.6%pa compared to the regional average of just 1.1%pa.

The sector also directly generated about \$264 million per annum in real Gross Domestic Product (GDP) for 2003, representing about 2.1% of the region's total GDP. Real GDP growth in the sector has averaged 4.9%pa since 1994, compared to the region's real GDP growth average of just 1.8%pa. The sector's increase in real GDP has been achieved through more employment and increases in labour productivity, which has increased on average by 1.3%pa since 1994. This growth in labour productivity compares well to the average of 0.7%pa for the Southern region as a whole.

Overall, the sector has achieved high growth rates in FTE employment, real GDP and labour productivity over the past decade. The sector also accounts for between \$180 and \$200 million in exports for the region. These trends confirm that the forest and wood processing sector is one of the key growth drivers for the Southern region.

The sector also generates *indirect* activity in supplier industries via its purchases of production inputs and *induced* activity in consumption industries via wages and profits generated by the sector and supplier industries being spent within the region. The *total* (direct, indirect and induced) contribution of the sector in 2003 is measured as 5,473 FTEs and \$478 million in real GDP.

This total contribution accounts for 4.8% of the Southern region's total employment and 6.7% of the Southern region's total real GDP. The sector's total economic impact upon the region is therefore highly significant, particularly as it represents one of the main driver industries of the local economy, following on the heels of agriculture and food and beverage manufacturing.

The level of employment associated with the forest and wood processing sector is also notable because it spans across the whole region to include small as well as large settlements and communities. These jobs often offer year-round employment, which encourages people to stay in small settlements. The people employed are on average younger, being in the age groups that raise families in the settlements.

The forest and wood sector is a core driver industry that employs significant numbers of people in at least nine of the small rural centres, in all four of the towns, as well as in the regional centres and the cities of Dunedin and Invercargill. The nature and location of the sector's economic activity gives the region a robust rural base and strong social and economic flows through the region's settlement hierarchy.

The sector strengthens communities in the Southern region by its spread of quality employment of younger, active people raising families and assisting them to retain active sports clubs, schools, other social services and retail outlets. The executives working in the sector's businesses also contribute to running community and social organisations.

Community involvement by the sector also includes a wide range of support like recreational access to forest blocks, firewood for fundraising, supporting education and building community assets.



The forestry sector, locally and nationally, is based on sustainable plantation forests. By making strenuous efforts it continues to improve environmental performance at the forest and mill level. Many of the enterprises have international Forest Stewardship Council certification, which enables them to market into the premium international markets, while assisting them with environmental surveillance and enhancement.

A fundamental environmental benefit of plantation forestry is that it achieves a high level of carbon sequestration. The forest sector therefore reduces the net amount of greenhouse gas emission of New Zealand as a whole.

In conclusion, the forest and wood processing sector makes significant contributions to the region across a range of areas such as economic growth, local community and regional employment, community funding and infrastructure, and the environment. Looking ahead, the sector is expected to continue generating wealth and employment and to continue making a strong contribution to the sustainability of the region.



## 2 Historical context of the sector

The forest and wood processing sector has increased its contribution to the Southern region and the country since it underwent major re-structuring and expansion over the last two decades. To acquaint the reader with the present situation it is useful to outline the historical context for the sector in New Zealand and recent developments in the Southern region.

### 2.1 Evolution of the forest sector

New Zealand's commercial forestry and timber processing industry has a history dating back to the early years of European settlement. The industry has evolved in this period from an extractive activity based on indigenous forests to one that employs sustainable harvesting practices and utilises exotic, plantation-grown trees to produce wood, paper and a range of products.

The evolution of the plantation-based sector has seen three main phases:

- critical mass plantations established 1920s to 1940s
- regulation, industry growth and Government control 1940s to 1984
- deregulation, diversification, and sustainability 1984 onwards

#### 2.1.1 *Large plantations and small sawmills 1920s to 1940s*

The development of a substantial exotic resource (now over 1.8 million hectares) was driven until the late 1980s by the New Zealand Forest Service (NZFS), a Crown agency. The NZFS recognised the need for fast growing exotic species to relieve the pressure on New Zealand's natural forests. The first significant plantings in the Southern region occurred in 1898 (at Conical Hill and Naseby Forests). However, large-scale plantings did not commence until the 1920s.

In the 1920s and 1930s, the NZFS and a major private company NZ Forest Products Ltd planted the critical mass of plantations around the country on land unsuitable for pastoral agriculture. The core plantations were established in the central North Island. The plantations totalled 321,000 hectares by 1937, sufficient as a base for establishing a major processing industry in the late 1940s and 1950s.

The processing arm of the timber industry has been characterised historically by small to medium sized operations. Most towns and rural centres would have their

own mill. Even today, there are well over 300 mills producing rough sawn timber, 80% of which are producing less than 10,000m<sup>3</sup> per annum. Except for a few examples, such as Conical Hill (now Blue Mountain Lumber) in the Southern Region and Waipa in the North Island, they were established with private capital rather than government resources.

### **2.1.2 Regulation, industry growth and government control 1940s to 1984**

Regulation of many aspects of establishment and operation of the plantation-based forestry sector over the period from the 1940s to 1984-1987 caused distortions to the shape of the sector. This regulation and government control included:

- restriction of planting to land unsuitable for pastoral agriculture under the Town and Country Planning Act;
- price controls on sawn timber from 1940s to 1980s, based on historical cost-of-production formulae, reduced the need for competitive increases in sawmill productivity;
- stumpage prices for logs from the NZFS forests were negotiated for sales to these regulated sawmills, but in the context that long-term contracts at low prices had been signed with major processors Tasman Pulp and Paper Ltd (in 1951), and later Panpac; and
- government management of log supply to the sawmills.

By 1984, the plantation forest area had increased to 1.04 million hectares, an increase of 600,000 hectares in 20 years, indicating a substantial increase in plantation forest roundwood removals in the future.

### **2.1.3 Deregulation, diversification, sustainability 1984 to 1992**

During the restructuring of the New Zealand economy from 1984 to 1992, much of the industry's regulation and government participation and control was removed. The main steps taken were the:<sup>1</sup>

- elimination of price controls on sawn timber, on 8 November 1984;

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<sup>1</sup> For some of the early effects of this deregulation see *Valuation Prices for Wood in New Zealand Exotic Forests, A Study Commissioned by Treasury*, BERL, September 1988.

- removal of controls on the export of logs by NZFS from 1 April 1987;
- corporatisation of NZFS on 1 April 1987 by transferring its estate (of approximately 598,000 hectares – net stocked area) to the New Zealand Forestry Corporation, a state-owned enterprise;
- repeal of the Town and Country Planning Act 1977 in the Resource Management Act 1991; and
- creation of Crown Forest Licences and sale of cutting rights to Crown forests.

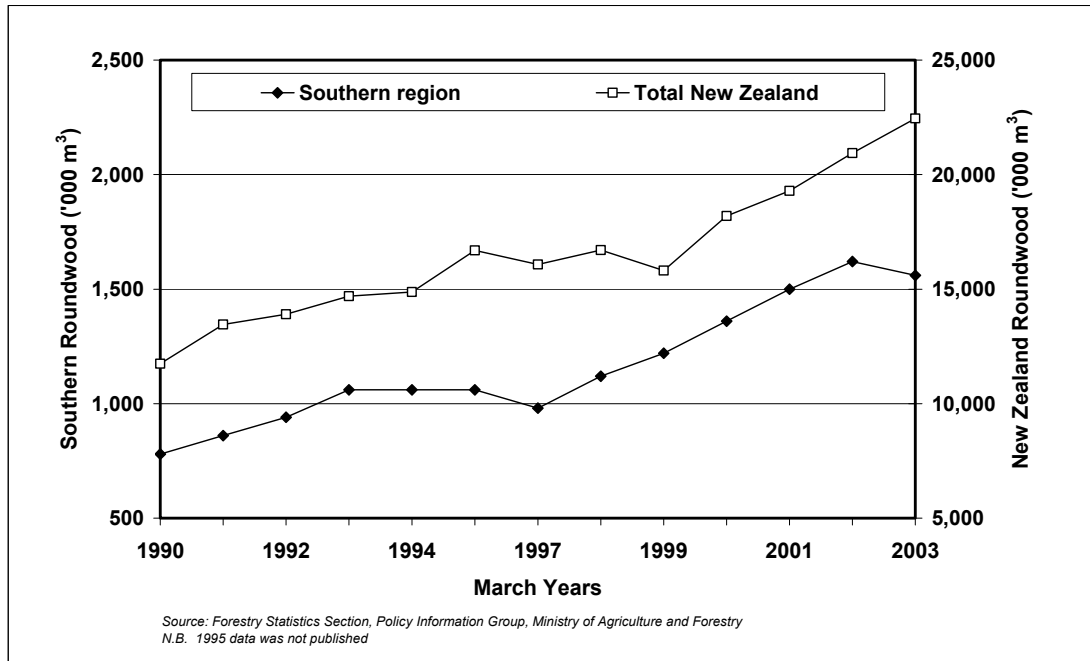
Since 1990, the cutting rights to the Crown's forestry estate have been sold to private sector interests in New Zealand and overseas. In the Southern region the Crown's estate has been divided amongst a number of companies, principally with overseas interests. They include Blakely Pacific, City Forests, Ernslaw One, Rayonier New Zealand and Wenita Forest Products. In several cases the assets have been purchased via the Ngai Tahu Incorporation.

## **2.2 Wood production in the Southern region**

The roundwood removals from the forests in the Southern region are estimated by MAF to have increased from 780,000m<sup>3</sup> in 1990 to 1.62 million m<sup>3</sup> in 2002 before reducing to 1.56 million m<sup>3</sup> in 2003. This strong increase closely shadowed the total New Zealand increase in estimated roundwood removals, where the national harvest is estimated to have increased from 11.74 million m<sup>3</sup> in 1990 to 22.45 million m<sup>3</sup> in 2003 as seen in Figure 2.1.

Growth in volume of harvest in the Southern region has been similar to the national situation. This is reflected in the Southern region's share of the national total, which remained reasonably constant at 6-7% in 1990 to 1992 and at 7-8% in 2000 to 2002.

**Figure 2.1 Estimated wood harvest in Southern Region and NZ**



This implies a small increase in the share but, given the Southern region's estimated drop in 2003, this increase may not be sustained through the coming years.

## 2.3 Processing changes in the Southern region

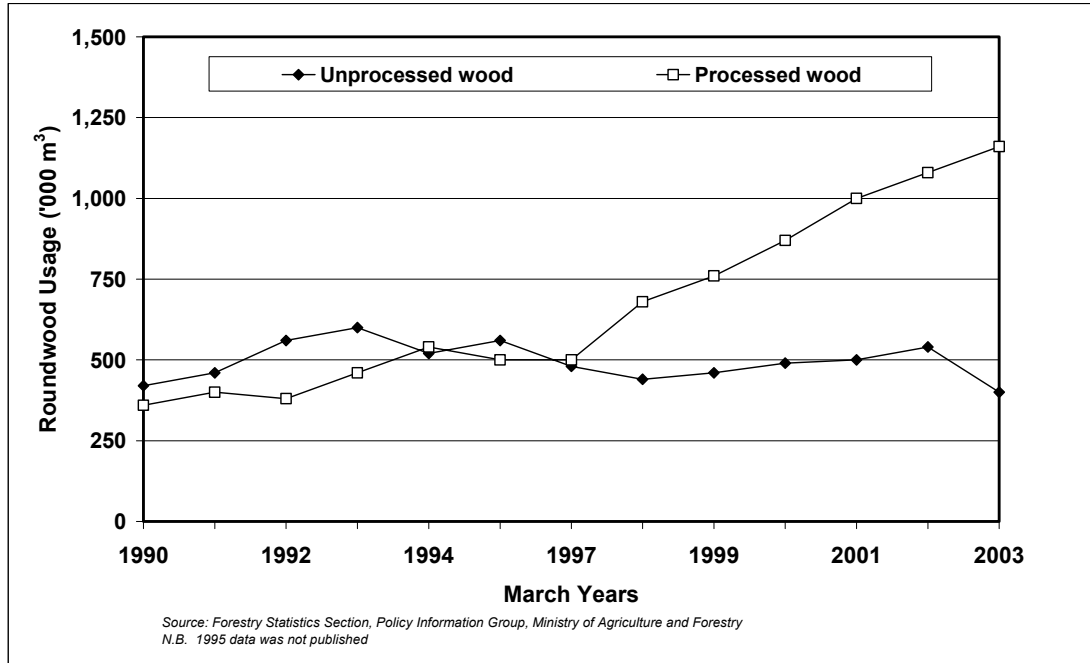
In the Southern region there are now more than three dozen sawmilling operations, including portable mills. Some of these mills have progressively increased their capacity over time through re-investment or using external capital. As mills have expanded, they have moved into further processing and re-manufacturing to extract additional revenue from the timber. In recent decades there has also been strong investment in new areas of timber processing such as medium density fibreboard manufacturing, mouldings and veneers. The Southern region has benefited from this diversification with both locally owned and foreign operations investing in further processing or new areas of production.

### 2.3.1 Processing expansion 1990 to 2003

In the period 1990 to 1997, roundwood processing in the Southern region increased progressively from approximately 350,000m<sup>3</sup> to 450,000m<sup>3</sup>. This was followed by a period of rapid growth from 1997 to 2003 due to strong investment in plant

modernisation and expansion. The volume processed more than doubled over these six years to over 1.1 million m<sup>3</sup> of roundwood in 2003.

**Figure 2.2 Disposal of Southern region roundwood removals**



During the same period, the roundwood removals that remained unprocessed and exported as logs has remained relatively constant within the range of 300,000m<sup>3</sup> to 500,000m<sup>3</sup> per annum.

### 2.3.2 Annual wood flows and product profile

The sector is an integrated production system with the harvest of logs ultimately being used in the production of a wide range of goods for local sale and export. The diagram below provides a broad **visual** description of woodflows in the Southern region over recent years.

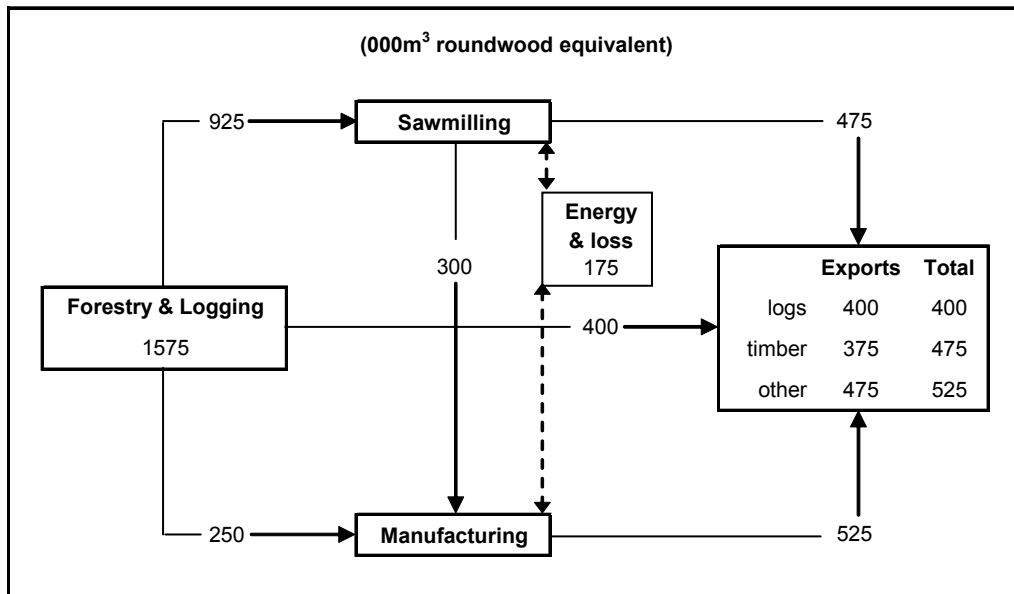
All numbers shown in this diagram are on a roundwood equivalent basis, and thus provide a standardised measure of output volumes for final goods, which in reality can be different in nature and content.<sup>2</sup> The numbers are a very broad approximation

<sup>2</sup> Because of this difference, complete accuracy of figures and their reconciliation is not possible. The numbers give a visual representation of the general magnitude of the flows.

of the average profile over recent years and any single year will tend to differ from this profile depending on the domestic and export environment.

The Southern region's forestry and logging industry harvests about 1,575,000m<sup>3</sup> of logs per annum (although MAF records that this rose to 1,620,000m<sup>3</sup> in 2002). About 400,000m<sup>3</sup>, or 25% of these logs, are exported outside of the region as a final product. This proportion has declined since 1997 when log exports accounted for about 50% of the region's total log harvest.

**Figure 2.3 Broad description of regional woodflow**



Sources: various, reconciliation by BERL

The region's mills process close to 925,000m<sup>3</sup> logs per annum and, with a conversion rate of 0.51 (or 51%), this equates to timber output of about 475,000m<sup>3</sup> per annum. On average, 375,000m<sup>3</sup> or 80% of this timber is exported outside of the region. The region's ports handle about 90% of these exports with the rest distributed by road and rail.

The residual amount of 450,000m<sup>3</sup> from the total 925,000m<sup>3</sup> of roundwood processed in the mills is disposed of in a number of ways including timber waste (sawdust and short-lengths) going towards energy production. This includes fuelling drivers and a cogeneration electricity plant. About 300,000m<sup>3</sup> of the total residual amount goes towards the production of MDF, or is sold as chips (shown here as manufacturing).

Manufacturing in the diagram above covers a range of final products including chips, MDF, mouldings and laminated boards. Note that chip processing facilities are often integrated with the larger sawmills in the region, but we have maintained a separation between these products in the diagram. Producers of these final products process about 250,000m<sup>3</sup> of logs per annum in addition to 300,000m<sup>3</sup> per annum in residuals from sawmilling.

The conversion rate from inputs to final outputs will differ widely depending on the product, but we have assumed that very little loss occurs in the aggregate production process. Specifically, the assumption is that the 550,000m<sup>3</sup> of roundwood equivalent logs produces 525,000m<sup>3</sup> of roundwood equivalent product. About 90% or 475,000m<sup>3</sup> of the total 525,000m<sup>3</sup> are exported outside of the Southern region.

The numbers discussed above are only approximations of what is a highly integrated and evolving production system. In broad terms the woodflows indicate that about:

- 25% of the wood harvest is exported as unprocessed logs;
- 30% of the wood harvest is converted into timber;
- 30-35% of the wood harvested is converted into other products;
- 10-15% of the wood harvested is disposed of as energy or waste; and
- 85% of the wood harvested is ultimately exported outside of the region in the form of final products such as logs, timber, chips and panels.

### 3 Economic contribution of the sector

This section describes the economic contribution of the forest and wood processing sector to the Southern region. The sector's contribution is measured through several indicators noted below.

- **Full-Time Equivalent employment:** provides a standardised measure of the volume of labour used in production. An FTE is equivalent to one full-time worker or two part-time workers.
- **Value Added or GDP:** measures of the additional value of output that the industry contributes to the economy. This can be measured as the value of output less the value of intermediate purchases from other industries used in production. Value Added is largely comprised of the gross operating surplus of companies and compensation of employees (i.e. wages and salaries).
- **Real Value Added or real GDP:** measures Value Added or GDP in constant prices thereby removing the effect of inflation.

These indicators are sourced from the BERL Regional Database, which contains FTE data at the district and regional council level from Statistics New Zealand's annual Business Demographic Statistics database. Statistics New Zealand does not publish regional GDP data, so the BERL Regional Database contains regional measurements based upon national GDP data for the relevant industries.

#### 3.1 Direct economic contribution of the sector

The contribution of the forest and wood processing sector includes the employment and GDP generated by businesses within the sector. This is commonly referred to as the direct economic contribution.

##### 3.1.1 Direct employment

Table 3.1 shows the number of FTEs employed in the forest and wood processing sector in 1994 and 2003<sup>3</sup>. The sector employed 2,427 FTEs across the Southern

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<sup>3</sup> The most recent official data comparable with earlier years is for 2003. Data collected since 2003 is recorded on a different basis.

region in 2003, accounting for about 2.1% of the region's employment. FTE employment in the sector has grown by about 665 FTEs since 1993, or by nearly 40%. This represents an annual average growth rate of 3.6%pa, which is over three times the regional annual average growth rate in FTE employment of 1.1%pa.

**Table 3.1 FTEs in forestry and wood processing**

<b>FTE employment</b>	<b>1994</b>	<b>2003</b>	<b>Change</b>	<b>%pa</b>
Forestry and logging	364	557	193	4.8%
Sawmilling	414	591	177	4.0%
Wood manufacturing	282	221	-61	-2.7%
<b>Otago</b>	<b>1,060</b>	<b>1,369</b>	<b>309</b>	<b>2.9%</b>
Forestry and logging	243	256	13	0.6%
Sawmilling	324	554	230	6.1%
Wood manufacturing	135	248	113	7.0%
<b>Southland</b>	<b>702</b>	<b>1,058</b>	<b>356</b>	<b>4.7%</b>
Forestry and logging	607	813	206	3.3%
Sawmilling	738	1,145	407	5.0%
Wood manufacturing	417	469	52	1.3%
<b>Southern region</b>	<b>1,762</b>	<b>2,427</b>	<b>665</b>	<b>3.6%</b>
<b>% of total region</b>	<b>1.7</b>	<b>2.1</b>	<b>0.4</b>	<b>n/a</b>

Source: BERL Regional Database

Table 3.1 also breaks down employment by regional council and broad industry definitions. The forest and wood processing sector employed 1,369 FTEs in the Otago region and 1,058 FTEs in the Southland region in 2003. Sawmilling accounts for the largest share of employment within the sector and recorded the most FTE growth since 1994.

### 3.1.2 *Direct value added (GDP)*

Table 3.2 shows the value of real GDP (in constant 1996 prices) generated by the forest and wood processing sector in the Southern region. The sector generated about \$264 million in real GDP for the year ending March 2003 and accounted for about 3.7% of total GDP in the Southern region. It generated 3.7% of regional GDP with only 2.1% of regional employment, which shows that the value added productivity, or the GDP/FTE in the forest sector is above average for the region.

Real GDP in the Southern region's forest and wood processing sector has increased by about \$93 million since 1994, representing an impressive annual average growth rate of 4.9%pa. This is nearly three times the annual average real GDP growth rate

of 1.8%pa for the Southern region and twice the 2.8%pa growth rate for the forest and wood processing sector on a national basis.

**Table 3.2 Real GDP in forestry and wood processing**

<b>\$Mn in 1996 prices</b>	<b>1994</b>	<b>2003</b>	<b>Change</b>	<b>%pa</b>
Forestry and logging	\$50	\$83	\$33	5.8%
Sawmilling	\$32	\$52	\$21	5.8%
Wood manufacturing	\$22	\$20	-\$2	-1.0%
<b>Otago</b>	<b>\$103</b>	<b>\$155</b>	<b>\$52</b>	<b>4.6%</b>
Forestry and logging	\$33	\$38	\$5	1.5%
Sawmilling	\$25	\$49	\$24	7.9%
Wood manufacturing	\$10	\$22	\$12	8.8%
<b>Southland</b>	<b>\$68</b>	<b>\$109</b>	<b>\$41</b>	<b>5.3%</b>
Forestry and logging	\$83	\$121	\$38	4.3%
Sawmilling	\$56	\$101	\$45	6.8%
Wood manufacturing	\$32	\$42	\$10	3.0%
<b>Southern region</b>	<b>\$171</b>	<b>\$264</b>	<b>\$93</b>	<b>4.9%</b>
<b>% of total region</b>	<b>2.8</b>	<b>3.7</b>	<b>0.9</b>	<b>n/a</b>

Source: BERL Regional Database

Table 3.2 also summarises the regional and industrial composition of real GDP in the sector, which highlights several major trends. Sawmilling recorded strong growth in the Southern region with an annual average growth rate of 6.8%pa.

Forestry and logging in the region also recorded strong growth in real GDP, with this expansion being concentrated in Otago. In contrast, Southland has recorded strong growth in wood manufacturing.

MAF data indicates that about 1,560,000 m<sup>3</sup> of roundwood was harvested in the Southern region during 2003. This suggests that about \$169 of real GDP is generated per cubic metre of roundwood harvested in the Southern region. As a broad cross-check, this is consistent with the national equivalent of \$172 of real GDP per cubic metre<sup>4</sup>.

### **3.1.3 Export volumes and earnings**

The forest and wood processing sector contributes significantly to the exports of the Southern region. However, market conditions mean exports of logs and wood

<sup>4</sup> \$3.872 billion in real GDP generated from 22,543,000 m<sup>3</sup> of wood removals for the year ending June 2003. Sources: Statistics New Zealand and MAF.

products are volatile both in volume and dollar value terms and therefore exports will tend to fluctuate substantially over time.

Table 3.3 presents indicative estimates of log and wood product exports loaded at the region's two ports (Port Chalmers and Bluff) in 2003. These are indicative estimates because Statistics New Zealand does not record the volume or value of other wood products (e.g. MDF and veneer products) loaded at the ports. Instead, BERL has estimated this category of exports.

**Table 3.3 Estimates of sector exports loaded at port in 2003**

	Port Chalmers		Bluff		Regional ports total	
	Volume <sup>(1)</sup>	\$Mn fob	Volume <sup>(1)</sup>	\$Mn fob	Volume <sup>(1)</sup>	\$Mn fob
Logs	282	\$21	58	\$4	340	\$25
Timber	53	\$23	119	\$56	173	\$79
Wood chip	56	\$3	109	\$8	165	\$11
Other products (BERL est)	n/a	n/a	n/a	n/a	175	\$60
<b>Logs &amp; wood products</b>	<b>392</b>	<b>\$47</b>	<b>286</b>	<b>\$68</b>	<b>853</b>	<b>\$175</b>
<b>Total cargo loaded</b>	<b>1,064</b>	<b>\$2,590</b>	<b>577</b>	<b>\$908</b>	<b>1,641</b>	<b>\$3,498</b>
<b>% wood products</b>	<b>37%</b>	<b>2%</b>	<b>50%</b>	<b>8%</b>	<b>52%</b>	<b>5%</b>

(1) volumes for logs and wood products are in 000m<sup>3</sup> and volumes for total cargo loaded are in 000t.

Source: Statistics New Zealand.

These estimates indicate that the sector's combined exports account for 37% of the volume of exports through Port Chalmers and 50% through Bluff. Overall, it is estimated that about \$175 million of forest and wood product exports are loaded and shipped through the region's two ports. A smaller proportion of forest and wood products are also exported outside of the region via road and rail transport.

Depending on market conditions, total forest and wood product exports (i.e. port, road and rail) are estimated to be in the order of \$180-\$200 million per annum.

### 3.2 Total economic contribution of the sector

The total economic contribution of the forest and wood processing sector is more than simply the direct employment and GDP generated by businesses within the sector. This is because forest and wood processing businesses also purchase goods and services from local supplier industries as part of their production process, which represent an additional source of economic activity in the region. In addition, a proportion of the household spending generated by wages within the sector and supplier industries is spent within the region, thus generating additional economic activity beyond the sector's production process (i.e. spending on retail trade).

It is standard best practice, both in New Zealand and overseas, to include these indirect and induced impacts as a component of the total economic contribution. These impacts are most often measured using multipliers based on national or regional input-output tables. The use of multipliers is also standard practice internationally, and multipliers have been used widely in New Zealand to measure to the total economic contribution of various businesses, industries, proposed investments, and major events (e.g. a flood or sports event).

### 3.2.1 Direct, indirect and induced contributions

Table 3.4 shows the total economic contribution that the sector made to the Southern region.<sup>5</sup> **The forest and wood processing sector's total economic contribution to the Southern region in 2003 is estimated to be 5,473 FTEs and \$478 million in real GDP (which is \$533 million in GDP at current prices). The sector's total contribution accounts for about 4.8% of the region's total FTE employment and 6.7% of the region's total GDP.**

**Table 3.4 Economic impact of the sector in 2003**

	<b>Employment</b> (FTEs)	<b>Real GDP</b> (\$Mn 1996 prices)	<b>Current GDP</b> (\$Mn 2003 prices)
Forestry and logging	813	\$121	\$135
Sawmilling	1,145	\$101	\$113
Wood manufacturing	469	\$42	\$46
<b>Direct contribution</b>	<b>2,427</b>	<b>\$264</b>	<b>\$294</b>
Road transport	370	\$20	\$22
Other services	1,843	\$125	\$139
<b>Indirect contribution</b>	<b>2,214</b>	<b>\$145</b>	<b>\$161</b>
<b>Induced contribution</b>	<b>833</b>	<b>\$69</b>	<b>\$77</b>
<b>Total contribution</b>	<b>5,473</b>	<b>\$478</b>	<b>\$533</b>
Total region	114,881	\$7,175	\$7,993
<b>% of total region</b>	<b>4.8%</b>	<b>6.7%</b>	<b>6.7%</b>

Source: BERL estimates

Table 3.4 also provides a breakdown of the sector's total economic contribution. The **direct** contribution represents the employment and real GDP generated by businesses within the sector as previously described. The sector directly employs 2,427 FTEs

<sup>5</sup> Input-Output tables for the Southern Region were purchased from Butcher & Associates for this purpose.

and generates \$264 million in real GDP, which is \$294 million GDP in current prices.

The **indirect** contribution represents the multiplier effect that the sector has upon the region through its purchases of local goods and services from supplier industries. Road transport is an important supplier industry and is considered separately from the other supplier industries. The indirect contribution of the sector on these supplier industries is estimated to be 2,214 FTEs and \$145 million in real GDP.

The **induced** contribution represents the impact of the sector upon the region through spending associated with the wages and profits generated by the sector and by the supplier industries. Induced impacts are largely felt in local consumption-related industries such as retail trade or personal services. The induced contribution associated with the sector is estimated to be 833 FTEs and \$69 million in real GDP.

The difference between the sector's direct and total economic contribution provides a broad measure of how much additional activity is generated outside of the sector but elsewhere in the region. Specifically, the indirect and induced impacts of the sector generate a further 3,047 FTEs and \$214 million in real GDP elsewhere in the region. In broad terms every one FTE employed in the sector generates a further 1.3 FTEs elsewhere in the region. Similarly, every \$1 million of real GDP within the sector generates a further \$0.8 million in real GDP elsewhere in the region.

### **3.2.2 Profile of indirect contributions**

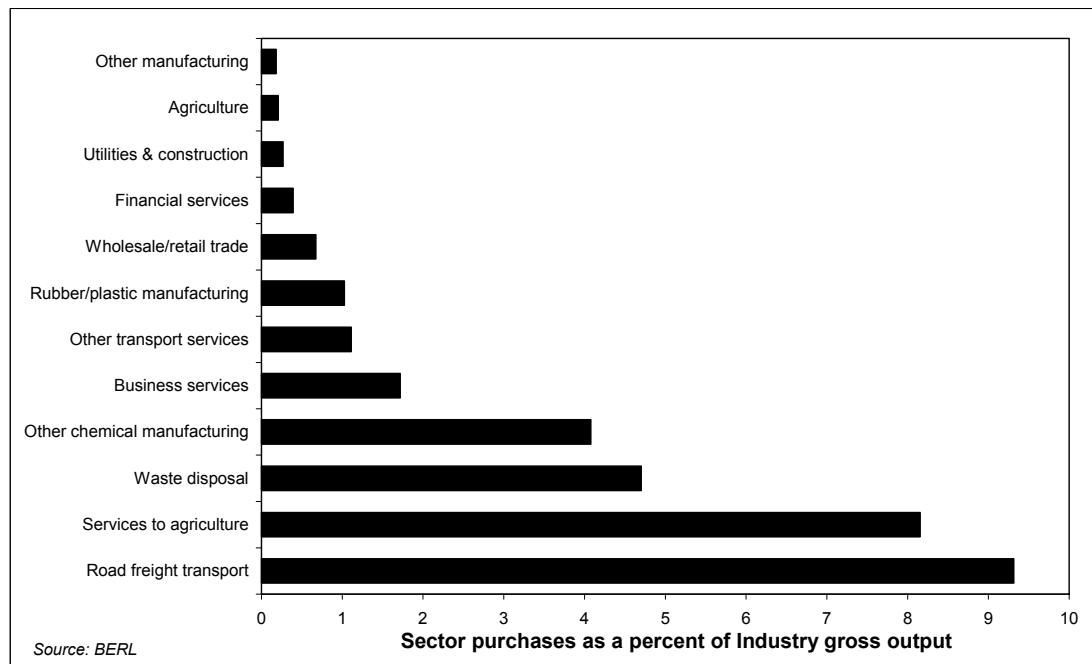
The indirect contribution of the sector refers to the linkages that exist between the sector and local supplier industries within the region. These relationships can also be viewed from the perspective of the supplier industries.

Figure 3.1 highlights the significance of the sector to other local industries in broad terms by showing the proportion of the supplier industries revenue that is accounted for by the sector's purchases.<sup>6</sup> For example, about 10% of the Southern region's road freight transport revenue is attributed to forest and wood sector. The sector also accounts for a high proportion of revenue in local services to agriculture.

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<sup>6</sup> These proportions are derived from the regional input-output tables.

**Figure 3.1 Relevance of the sector to other industries**



Note, however, that purchases made between industries *within* the sector (e.g. purchases made by sawmills from forestry) are excluded from this figure. These purchases tend to be large in absolute dollar terms.

Overall, the sector accounts for a small proportion of income across a wide range of other industries. The waste disposal, chemical manufacturing and business services industries are notable inputs into the sector's production, sales and distribution processes. This highlights the strong linkages the sector has with other industries across the region.

### **3.3 Strategic economic significance of the sector**

The forest and wood processing sector employs just 2.1% of the region's labour force, but with that employment, it 'punches above its weight', directly generating 3.7% of regional GDP and, including indirect effects, 6.7% of regional GDP. It has had strong growth and high productivity, as well as broad linkages across industries.

The \$264 million direct GDP generated in real terms is about 40% of the size of on-farm agriculture. It is larger than the total hospitality industry (of hotels, motels, cafes and restaurants) that produced \$195 million GDP and nearly as large as the whole construction industry that produced \$350 million GDP.

## **4 Social and environmental contribution of the sector**

The main types of social contribution by the forest and wood sector are its contribution to employment in communities around the region, and the involvement of the companies and their assets in the communities. There is strong involvement of the companies and the sector as a whole in their contribution to protecting and enhancing the environment, as well as assisting the communities to enjoy the region's environment.

### **4.1 Community employment**

Section 3.2 above showed that employment in the sector in 2003 was 2,427 FTEs, which was 2.1% of total regional employment. This section will show that employment generated by the sector is more significant than this implies. The employment pattern strengthens the region's communities because the:

- employment generated is spread among settlements around the region;
- forestry and wood processing industries are 'core drivers' and their growth expands demand for services to the businesses and the people and families involved;
- employment generated is nearly all year-round, fulltime rather than seasonal or part-time as with pastoral-based industries and tourism; and
- sector employs a greater proportion of younger aged people than for the region's workforce overall, so the employees raise their families in the region's settlements.

The forest sector's industry employment pattern contrasts with those seen in rural areas based on the pastoral industry. Recent dairy conversions and other changes have seen higher on-farm employment and employment in construction activity but reduced employment in towns, because employment based on processing and its support industries have become centralised in three or four main processing plants in the South and North Islands.

On the other hand the forestry and wood processing sector has a location and employment pattern that provides sound employment to people around the Southern region. This is described in the following sections.

#### 4.1.1 *Employment spread amongst settlements*

The large groups of forests in the region are owned by companies managed by small teams of forest management professionals, located in the cities or towns of Dunedin, Invercargill, Mosgiel and Tapanui. However, the employment created by these forests is spread around the region.

We surveyed and interviewed ten of the main forest companies and wood processing companies in the Southern region. Where possible we recorded the location of the contracting operator and listed the settlements mentioned as the source of the workers. Table 4.1 records this survey information.

**Table 4.1 Settlements providing forest workers 2004**

Settlement	Population 2001 Usually Resident	Forest and harvesting employment 2004		
		Silvi- culture	Harvest- ing	Total Forest
<b><i>Dunedin City</i></b>				
Dunedin	107,188	6	15	<b>21</b>
Mosgiel	6,342	18	26	<b>44</b>
Waitati	495		7	<b>7</b>
Outram	609			
<b><i>Clutha District</i></b>				
Balclutha	4,095	12	14	<b>26</b>
Milton	1,905	12	28	<b>40</b>
Lawrence	474	6	14	<b>20</b>
Kaitangata	789			
Clinton	318			
Owaka	366		7	<b>7</b>
Tapanui	846	12	7	<b>19</b>
<b><i>Gore District</i></b>				
Gore	7,664	8		<b>8</b>
Mataura	837			
<b><i>Invercargill City</i></b>	49,830	12	7	<b>19</b>
<b><i>Southland District</i></b>				
Winton	2,046		7	<b>7</b>
Riverton	1,608			
Otautau	729	35	7	<b>42</b>
Tuatapere	681		7	<b>7</b>
<b>Number of Settlements</b>		<b>9</b>	<b>12</b>	<b>13</b>
<b>Total Sample Employment</b>		<b>121</b>	<b>146</b>	<b>267</b>

Source: Employment estimates from BERL partial industry survey, December 2004.

The employment created in the forests is in the contract silviculture and harvesting gangs, as well as transport companies and roading contractors. The actual scope of involvement and employment of the roading construction companies and various

functions of the transport companies in forest sector work would require a detailed study in itself. This section therefore provides only an indication of the employment spread amongst settlements from some of the main silvicultural and harvesting contractors in the forests.

The entrepreneurs who run the silvicultural and harvesting gangs live in towns and small rural centres around the region. The contract gang members are even more widespread throughout the region. The table above lists the location of employment according to the settlement named as the base for the contracting gang. Other settlements mentioned as providing workers to the gangs are shown, but without employment numbers beside them.

The table shows that the silvicultural forest gangs were recorded as coming from nine settlements and harvesting gangs from twelve settlements. Because of incomplete overlap, thirteen of the eighteen settlements listed were given as the base for at least one contract gang. As noted, all eighteen settlements were mentioned as providing at least some workers into the forests. (The settlements in the geographic arc from Waitati to Manapouri that were not mentioned were 15 small rural centres with a total population of 7,116 people.)

The contract gangs were based on small and large settlements alike. We stress that this gives some idea of the spread, but it is a small part of the overall picture because:

- the sample recorded only a part of the industry, an estimated 267 employees, compared with the 813 FTE workers recorded officially as working in the forestry and harvesting functions in 2003;
- as well as these workers there are roading contractors coming from a range of settlements (e.g. Milton), and large suppliers of transport to forests coming from settlements including the small centres of Tuatapere and Tapanui;
- the sawmills and other processing and manufacturing plants are spread across the region generating employment in these and other settlements.

In conclusion, although the official statistics make it difficult to quantify the employment effects of the forest and wood processing sector on all settlements in the region, our small survey provides strong evidence that employment is spread across at least 18 small and large settlements.

#### 4.1.2 *Forestry and wood processing as a ‘core driver’ industry*

The forestry and wood processing sector can be considered as a ‘core driver’ industry in the Southern region’s economy. Any expansion of employment in this sector in the settlements of the region can be expected to drive an expansion of population in these settlements.

In most regional economies it is possible to identify ‘core driver’ industries as those that provide the initial employment generation. The growth of these industries then expands demand for services to the businesses, and the people and families involved in the ‘core drivers’ and the servicing businesses. In most New Zealand regions the core drivers are the primary industries of agriculture, forestry, seafood and mining; the processing and manufacturing industries based on the primary production; and other manufacturing and construction. In some regions the tourism industry is sufficiently important as to be included as a ‘core driver’. In larger cities core drivers could include creative industries like film production.

For the settlements in the Southern region at present, the ‘core drivers’ would be the primary industries, primary processing, manufacturing and construction (tourism would certainly be a core driver for settlements like Te Anau, Manapouri and Milford, but we do not analyse these in this report).

To find the total effect of increases in employment in the ‘core driver’ industries across the settlements, we need to know if there is a ‘normal level’ of employment in the supporting industries in a settlement for each 100 employees in the core driver industries.

To see if there is such a ‘normal level’ we have obtained 2001 Census employment data by industry for the settlements of interest in the Southern region. Employment has been allocated in each settlement to four types of industry as follows:

1. *‘Core driver’ industries* of primary, processing, manufacturing and construction;
2. *Business Services and Infrastructure industries* of electricity, gas, water supply, wholesale trade, transport and storage, communications, finance and insurance, and business and property services;
3. *Private Services to People*, retail trade, hospitality, cultural and recreational services, and personal and other services; and
4. *Public Services to People*, education, health and government administration.

We analysed the data for each of the settlements listed in Table 4.1, except for the cities of Dunedin and Invercargill, and the two small settlements of Waitati and Kaitangata. For each of the remaining fourteen settlements we calculated the numbers of employees in each of the following industries: (2.) Business services; (3.) Private services to people; and (4.) Public services to people. We expressed these employment figures as a number per 100 employees in industry number (1.) Core drivers.

The analysis is shown in Table 8.1 in the Appendix but summarised in Table 4.2 below.

**Table 4.2 Ratios of 'driver' and services industries in settlements**

Industry Group	'Driver' Industries Includes Constr'n	Business Services and Infrastruc ture	Private Services to People	Public Services to People	Total Per 100 Employed in 'Drivers'
<i>Employment ratios</i>					
<b>Settlements</b>					
<b>Mosgiel</b>	100	68.4	79.1	75.0	322.5
<b>Average 13 settlements excl. Mosgiel</b>	<b>100</b>	<b>35.8</b>	<b>44.4</b>	<b>35.4</b>	<b>215.5</b>
<b>Standard Deviation 13 settlements</b>		<b>12.4</b>	<b>13.6</b>	<b>11.1</b>	<b>33.0</b>

Source: BERL Regional Database

We first looked at the total employment in the three servicing industries for every 100 FTEs on the 'core drivers' and found that thirteen of the settlements fell in the range 155 per 100 to 257 per 100 FTEs, whereas Mosgiel was much higher, at 322 service employees per 100 core driver FTEs.

It is probable that Mosgiel carries out some servicing functions in a broader context of Dunedin city, so Mosgiel was dropped from the sample.

The average picture for the other 13 settlements was relatively simple. Ten jobs in 'core driver' industries are associated with:

- 3 to 4 jobs in business services, finance, insurance, real estate;
- 4 to 5 jobs in private services to people- retail, hospitality, recreation, culture;
- 3 to 4 jobs in social services – education, health, community services.

This implies that, for every 100 employees in the core driver industries in an average settlement, there are 115 employees in other industries, giving a total of 215 employees in that settlement.

This is not the same concept as the multiplier analysis in Section 2 above, which applies to the whole regional economy. This analysis is at the settlement level, and shows on average in this size of settlements, about how many people work in service, retail, education and health related industries for every 100 people employed in the driver industries within the settlement.

**While the actual effect in any given settlement may vary according to proximity to other settlements that have major services like large retail outlets, secondary schools etc, it seems that, on average, for another 100 employees in the forest and wood processing sector spread around those settlements, we could expect to generate a total of 215 additional employed people in the settlements.**

#### ***4.1.3 Permanent and seasonal employment***

The sawmills and processing plants operate year-round and so they provide permanent (year-round) employment as, consequently, do the harvesting contractors. Although the harvesting contractor will move from block-to-block and from forest-to-forest over time, the harvesting gang members live permanently in the one place, generally travelling to the forest in the contractor's bus or other transport.

Silvicultural tasks can be carried out year-round, although the volume of work is often greater in the winter, which gives some off-season employment to freezing workers from meat processing plants.

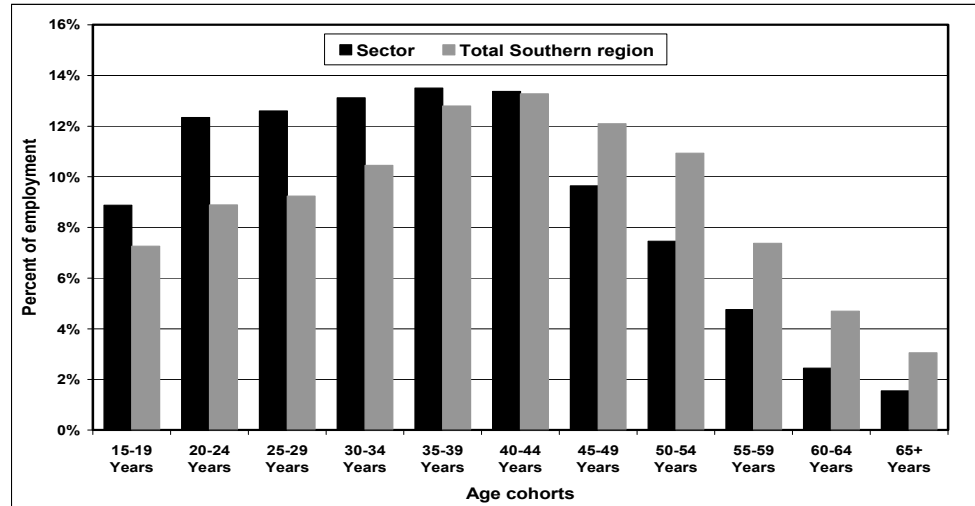
While sawmills and manufacturing plants require labour year-round, at least one large plant located in the rural area has overcome a relative shortage of unskilled mill labour by employing freezing workers in winter and tertiary students over the summer. This is not a complete coverage of the year, but shows that the industry is adapting to reduced labour availability in the tight labour market.

#### ***4.1.4 Age of the sector's employed***

The physical and rural, outdoor nature of some main occupations in the sector appeals more to younger people. Also there has been rapid expansion of processing and a new batch of younger people has been attracted into the industry.

Consequently the age distribution of the people employed in the sector is much younger than for the region as a whole, as shown in the chart.

**Figure 4.1 Age composition of Forest Sector and Southern Region**



The young composition of employment in the sector is also similar to other industries such as agriculture, retail, and hospitality. To some extent these industries represent a source of competition for attracting/retaining young and relatively unskilled people into work.

It is very much to the benefit of the settlements in the region that the forest sector attracts and employs young people to live and work in their communities. The comparison with the region is that 60% of those employed in the sector are aged 15 to 39 years, whereas there are 49% of the regional workforce aged 15 to 39 years. This population age grouping has high fertility, and so the forest sector workforce ensures that families continue to be raised in the region's settlements.

#### **4.1.5 Strengthening the region**

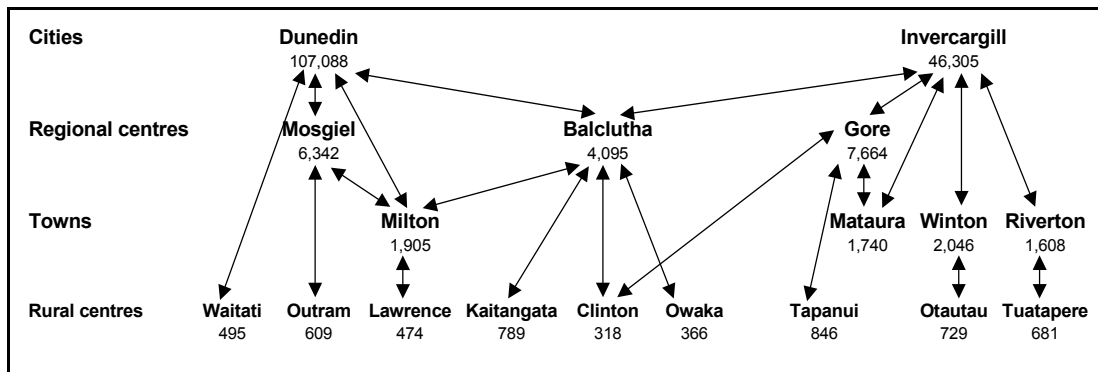
The wide regional distribution of the people working in the forest and wood sector means that a large number of small communities benefit from incomes generated by the sector. The permanent nature and types of employment mean that there is stable employment for a range of people to move to and live in the smaller communities in the region. The fact that a high proportion of those employed are in the younger age groups assists communities to retain active sports clubs, the schools and the retail services and other facilities of young, vital communities.



The sector also has small, medium and large businesses located in the settlements around the region, ranging from two- to six-person silvicultural teams, through to substantial sawmills and an MDF plant. These businesses have a range of entrepreneurs and professionals with management and other skills who in turn strengthen the management and governance of the social facilities in the communities, as in school Boards of Trustees and the like.

All of these aspects in turn strengthen the links in the whole region. The links between the settlements are shown schematically in the diagram as a settlement hierarchy.

**Figure 4.1 Southern region wood sector settlement hierarchy**



Source: Population from Census 2001; Linkages from wood sector enterprises

As the previous section showed, the forest and wood sector is a core driver industry that employs significant numbers of people in all four of the towns, as well as the regional centres and the cities of Dunedin and Invercargill. This has the effect of increasing employment in the business servicing industries, private services and social services industries and thus the employment and population of the region.

The important aspect to recognise in the diagram is that the flow of economic activity (and employment) is both ways, up and down the hierarchy. While the forest needs the road to send the logs out, the towns need the road to run their logging transport on, and for their sawmills to access the logs. Looked at another way, the forests and the small settlements provide the flow of activity that justifies the size of the towns, the regional centres and the two cities. If the forest sector declined, the region would shrink.

The interactions around this hierarchy also indicate the need to ensure that the regional road network is maintained with full, effective coverage.

The forest and wood sector is a key element underpinning the ongoing viability and resilience of the Southern region.

## **4.2 Community involvement**

The forest and wood sector's involvement in local communities throughout the region is wide ranging. Some of this community support can be measured in monetary terms but most of it is 'in kind'. We have therefore not attempted to estimate a dollar value as this would underestimate or belittle the overall impact.

While some of this reflects the continuation of functions that were previously undertaken by the Crown via the NZFS, many companies now go further than that. Most forest owners allow access into forest blocks for the collection of firewood as well as manage permits for recreational activities such as hunting, tramping and fishing. One forest company has generated a web-based system for hunting permits.

Having been forced onto higher land, forest blocks are often alongside conservation estates and this requires co-operation between forest owners and DoC to enable and manage community access. One forest owner, for example, has recently spent about \$50,000 upgrading a road to improve community access into the neighbouring conservation estate. A heavily used walking track received similar funding. In a number of cases the companies have supplied wood and/or funds for major community assets such as halls in communities or on school sites (e.g. the Te Hikoi museum being promoted in Riverton). In smaller communities, company staff play an active role in administering and maintaining these community assets.

The sector's involvement in the local community also includes the support of local activities, mostly in the area of education. Most companies provide some form of non-monetary assistance to local schools through the supply of free wood for fund-raising purposes. For example, this form of assistance has generated funding for school computers in Milton. Other forms of assistance include making forest vehicles available for school trips.

Other examples of community activities include: supplying sites and facilities for forestry open days; providing staff members to speak to community and school groups; and sponsoring forestry related courses and training (i.e. polytechnic and university scholarships).

### 4.3 Environmental contribution

The forestry sector, locally and nationally, is based on sustainable plantation forests and has made strenuous efforts to improve environmental performance at the forest and mill level. Larger manufacturing plants have made major progress in reducing emissions into the atmosphere and significantly reduced the volumes of water and energy used in their processes.

Companies in the Southern region have driven the move into forest certification and have modified their procedures accordingly. Forest certification is a means of identifying forests and mills that use fully sustainable practices and can trace their wood and wood products through a 'chain of custody' to the market. Some of the initial drive for certification came from hardware retail chains in the UK that wanted to assure their customers that all wood sold in their shops had been produced sustainably. That initial drive has expanded into a significant international market demand for certified product.

The Forest Stewardship Council (FSC) certification requires commitment to, and regular surveillance of, the forest company's processes and performance in a broad range of areas. These include health and safety issues for employees and contractors; social impacts and stakeholder contacts, including contacts with neighbours on aspects of management; management of specific environmental issues like soil disturbances; and chemical usage. There are also provisions for flora and fauna monitoring and water quality monitoring in the forests.

Production plans are reviewed using information from sample plots to ensure long-term harvest sustainability. Certified forests and mills will then ensure that the processors and others in the supply chain comply with all the requirements of their FSC chain of custody certificates to supply products into the target international markets.

The FSC is a process of continual improvement. It is not a fixed attainment level. Consequently, the companies are continually working to improve standards and procedures. We understand that about 40% of forest lands in the Southern region are covered by FSC certification, which is a similar proportion to that certified nationally.

Processing plants generally make considerably better use of waste to produce energy than was the case in the past. A major processor in the Southern region has a wood-

fired co-generation electricity plant on site, which further reduces their environmental impact.

A fundamental environmental benefit of plantation forestry is that it achieves a high level of carbon sequestration. The forest sector therefore reduces the net amount of greenhouse gas emission of New Zealand as a whole. This has implications for businesses and for the whole economy as BERL has modelled at various stages of the Kyoto process.

## 5 Stocktake of Sector Issues

The forest and wood processing sector in the Southern region has made major strides over recent years and is making significant contributions to the region's economy, community and environment. However, it is still faces complex issues that it must resolve if it is to remain sustainable and to maximise its contributions in the future.

This section presents a stocktake of the main issues identified and explored with the major players in the Southern region in December 2004.

In summary, the Southern region's forest and wood processing sector needs the following to thrive in the future:

- ongoing access to sufficient, quality forest land;
- ongoing access to sufficient, quality labour;
- effective integration of woodflows and efficient transport to processing;
- wood processing that remains flexible, resilient and adds real value;
- markets and market perceptions that give premium returns for a premium product; and
- regional public perceptions that value and encourage sector development.

These factors are discussed in more detail in the following sections.

### 5.1 Land use and forestry

Plantation forestry is a long-term land use that requires significant investment in road access for harvesting. Therefore historical land use patterns tend to continue with harvested land being planted back to forest. Also, committing to new plantation forestry as a competitive land use requires certainty as to returns to the trees in the long-term.

#### 5.1.1 *Historical stigma*

Plantation forestry in New Zealand has historically had difficulty obtaining access to the better land because pastoral agriculture was entrenched early in the settlement of New Zealand as a 'preferred land use'. This was later enshrined in legislation through the Town and Country Planning Act, which ensured that only land that was totally unsuitable for agriculture could be planted in trees.

Plantation forests were originally established in a large scale at times when there was a desire or need to absorb ‘excess’ land and labour; the land was unsuitable for pastoral agriculture because of climate, altitude, or soils; and there were unemployed people due to the Depression or they were conscientious objectors to war.

When these forests matured, large-scale, relatively low-value processing for pulp and paper was established in ‘mill-towns’ in the central North Island, while the Southern region mainly handled the wood through conversion of sawmills from indigenous to exotic woods.

Through this period the plantation forest and wood processing sector developed a stigma as a low-technology, low-value industry supplying structural timber (4 by 2s) to the construction industry in New Zealand and pulp and paper to export.

Historically, therefore, the land planted in forests throughout the Southern region was the colder, higher ‘hard country’, and this continues today as the core of forest land.

### ***5.1.2 Deregulation and market land use***

In the mid 1980s the industry was de-regulated and, as part of this move, the Town and Country Planning Act 1977 was repealed in the Resource Management Act 1991 (RMA). This allowed the plantation forest industry in New Zealand to compete freely with pastoral agriculture for land.

Committing to new plantation forests requires two things:

- plantation forest must be the ‘highest and best use’ in economic terms (for the long term future); and
- in some cases this use must be able to withstand challenge under the RMA.

For plantation forests to be the ‘highest and best use’ of land, the wood processing and export industry has to generate a competitive return now and also to generate an investor expectation that this return will continue in the long term.

The New Zealand tradable sector has suffered from very wide fluctuations in exchange rate since the Reserve Bank Act, deregulation, and restructuring during the 1980s and 1990s. These fluctuations have affected competing land uses like dairy or sheep and beef production. These other uses have a much shorter production cycle than plantation forestry, so arguably the forestry suffers more from this uncertainty in the eventual level of export return.

Plantation forestry as a potential land use can be challenged under the RMA mainly where it is intended that the plantation forest will displace indigenous vegetation. The main situation in the Southern region where this would occur is where plantation forest was intended, as in the past, to replace tussock on the higher rolling country. There appears to be considerable areas of such land remaining around the region. However, the preservation of remaining tussock country has apparently become a critical issue for environmental groups and DoC.

This lends weight to the fear expressed to us that plantation forestry in the Southern region is being squeezed for land from below by pastoral agriculture and from above by a 'conservationist' hardening of attitudes and 'policy creep' against use of tussock land for plantation forestry (or pastoral agriculture).

For plantation forests to retain ongoing access to sufficient, quality forest land, it will have to build the investor perception that, despite the wide fluctuations in returns, in the long term it will remain the 'highest and best use'. It will also have to build the public perception that, far from degrading the environment, plantation forestry is environmentally sustainable and can also rehabilitate degraded pastoral land.

## **5.2 Access to quality labour**

Labour is an important resource for the sector with skilled and unskilled workers being required in silviculture, log harvesting and wood processing. The national and regional labour market is tightening and there are changes to employment participation patterns. The sector has to respond to these changes if it is to retain access to sufficient quality labour.

### **5.2.1 *Recent trends in the labour market***

Recent changes in employment in the forest and wood processing sector as well as for the wider Southern region are shown in section 3.1.1 as well as Appendix 1: Profile of the labour resource. This section summarises the information from this Appendix and considers the implications for the future growth of the Southern region's forest and wood processing sector.

The pool of available (or uncommitted) labour has been shrinking in line with strong employment growth across New Zealand, making it more difficult to attract or retain both skilled and unskilled labour. This situation is most evident in rural areas across

Otago and in the Southland region. It is less evident in Dunedin-Mosgiel due to the area's proximity to a larger population base.

Much of the increase in employment over the recent economic cycle has been met from the older age cohorts (i.e. people aged 45 and above) due to an increase in labour force participation rates. Unemployment has also fallen sharply providing further evidence of a tight labour market, even for unskilled labour.

In contrast, a high proportion of employment in the forest and wood processing sector is made up of those in the younger age cohorts (i.e. people aged below 35), due to the physicality of the tasks. This is an area of strong competition between industries in terms of attracting and retaining employees. For example, other industries such as agriculture and retail trade and tourism exhibit a similar composition in their labour resource.

Some complementarities are evident in the Southern region between the forest and wood processing sector and other industries. This is evident in the case of seasonal labour (e.g. freezing workers and tertiary students). The sector employs for part of the year these people, providing a source of seasonal income in rural areas while also meeting the sector's seasonal labour requirements.

Overall, the sector will continue to grapple with the classic attraction/retention problem. This issue is exacerbated by poor public perception based on beliefs regarding wage levels, skill requirements and career paths. These perceptions were reinforced by the virtual demise of apprenticeships within large employers across the region, especially large 'institutional' employers including the NZFS.

### ***5.2.2 Attraction and retention of quality people***

The attraction and retention of people in the sector is now being strongly addressed by the SWC, FITEC and central Government. They have created an Accelerated Learning Programme that, in the first instance, includes three processing operations, with recruits being trained on a rotation basis. The recruits will also be trained at Telford Polytechnic (Balclutha) to come out with a Level 4 Certificate. The recruits are then able to join one of the businesses, or carry on to a trade apprenticeship, a forestry diploma or a degree.

It is hoped that further operations will become involved so that there may be six people per year entering the programme. After ten years this would result in about

60 people with a solid knowledge of the sector. Possibly a core of 15 or so retained in the Region's industry would be trade or professionally trained. Although the numbers are small relative to other initiatives nationwide, the core of the sector at the professional (i.e. managerial and technical) level is relatively small and so the numbers represent a strong base from which to sustain the sector. This is a far-sighted initiative that deserves strong promotion to obtain quality recruits for the sector.

The labour market will remain tight in the future with on-going competition to attract/retain labour, especially school leavers and those people in their 20s and early 30s. The composition of the labour market will shift towards older age people due to increased participation rates in the older age cohorts and a general ageing of the population.

To be successful in attracting and retaining quality people, the sector will need to continue to change both the perception and reality of work within the sector. This includes improving productivity and profitability, automation of physically demanding tasks, and improving wages within the sector.

The experienced people in the sector may be retained if their roles can evolve into less physically-demanding roles as they get older. More sector and/or region-wide coordinated approaches to training (such as the Accelerated Learning Programme) and career path development will also assist.

### **5.3 Effective access to wood resource**

For some years there has been the cliché that there is a wall of wood coming. This is not true for the Southern region. In the rest of the country a hole was put in the wall by 'over-export' of young logs when the NZ\$ was at all time lows around the year 2000.

Some increase in harvest volumes is projected for the Southern region. However, there are a number of issues to be addressed to ensure effective future woodflows to processing, manufacturing and to the market. The main issues are:

- integration (and smoothing) of woodflows from the diversifying range of forests that will be harvested;
- developing marketing infrastructure to achieve that;

- potential importation of logs; and
- exploring the possibility of lower cost log transport, integrated with the process to allocate different parts of the log to end uses.

### **5.3.1 *Projected wood resource***

The thorough estimations and comparisons of projections of woodflows contained in the *Otago & Southland Forest Industries Profile*, completed in June 2004 by the Otago Southland Forest Products group (now the Southern Wood Council) indicated a roundwood harvest in 2003 of about 1.6 million m<sup>3</sup>. In the period to 2013, the total smoothed Radiata projection is generally in the range of 1.7 to 1.9 million m<sup>3</sup> per annum. It is not until after 2020 that this projection exceeds 2 million m<sup>3</sup> per annum. The hardwood, eucalypt harvest is projected to be a substantial 250,000m<sup>3</sup> per annum from 2012 onwards.

The general expectation is that there is little growth in the available core wood resource of Radiata logs over the next twenty years. This Radiata has high intrinsic qualities for long internodes and a light colouring that gives it a strong competitive advantage as ‘appearance grade’ lumber.

### **5.3.2 *Potential Douglas fir woodflows***

There is a considerable Douglas fir resource in the region. The corporate forest harvest of Douglas fir is expected to increase from the present 60,000m<sup>3</sup> per annum to between 140,000 to 160,000m<sup>3</sup> per annum by 2020. (In 2013 it is expected to be about 100,000m<sup>3</sup> per annum). We understand that Douglas fir can now replace Radiata in the woodflow to existing mills because the new building regulations in New Zealand require all structural timber to be treated and Douglas fir can now be treated to H1.2. Douglas fir is a widely-traded quality softwood and obtaining markets for these volumes should present little difficulty.

Douglas fir can be expected to make a small addition to woodflow in future.

### 5.3.3 *Access to supply from small private owners*

The SWC profile showed that 36% of the net stocked area of planted forest in 2003 was owned by growers with less than 1,000 ha of forest. This area totalled 88,000ha and the woodflow from this resource was estimated in the Port Otago study<sup>7</sup> to oscillate between 200,000 m<sup>3</sup> and 600,000 m<sup>3</sup> per annum over the period 2000 to 2020. Thereafter it is expected to increase strongly to 1.0 million m<sup>3</sup> and presumably beyond, although these levels may not be sustainable continuously.

While a significant source, difficulties with this resource include that:

- the forest is in small areas;
- many blocks are far from the road making access difficult;
- harvesting and transport across farms is undertaken only in summer;
- silvicultural treatment is inconsistent and hence the quality of logs is uncertain and likely to be variable; and
- the owners are opportunistic, and so unmanaged, the flow could vary widely over time.

The process of obtaining an orderly flow from this resource to complement the corporate woodflows over the next twenty years will be crucial to the stability of the overall forest and wood sector in the Southern region.

This can present an opportunity for developing marketing infrastructure that fits the needs of the small forest owners (typically farmers) with the needs of the industry for effective woodflows. It could therefore involve the following:

- improved certainty and perhaps variation of harvesting so that forest income complements owners' farm income fluctuations;

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<sup>7</sup> Perley, C.J.K. & Edmonds, J.W. 2000. Sector Study: Forestry from the Rangitata River South and its Implications for Port Otago. Contract report for Port Otago Ltd., Unpublished.

- expansion of activities of supply from stock by smaller players in the market. These players presently include companies involved in transport and sawmilling, as well as the forest companies;
- constructing physical infrastructure of tracks and/or developing purpose-made equipment; and
- finance and/or joint-ownership or marketing structures to smooth returns and own stumpage inventories.

**It will be in the interest of the forest and wood sector if some players (existing or new players) generate the marketing infrastructure to get the wood resource from small private owners to market in an orderly flow.** This opportunity would seem to be unique to the Southern region, but some of the ownership structures developed in other regions like the Hawke's Bay may provide some prior experience and options of relevance.

#### ***5.3.4 Potential log imports***

A further possibility to increase the woodflow to the Southern region processing and manufacturing industries is to access logs from other regions in New Zealand. We understand that some logs have already been procured from other South Island regions for processing in the Southern region. It is possible that the region's integrated industry may increase productivity as a whole and be in a position to effectively compete for logs from other regions, particularly in the South Island.

#### ***5.3.5 Rationalising transport***

As the sources of logs in the region diversify, there may be some opportunities to change transport flows and patterns as the market allocates logs or parts of logs among present and future end users. However, there is also the need to ensure that the present road network is maintained in sound, effective condition.

The present cost of log transport from the forests in the north to the sawmills in the south is about \$10-\$12 per m<sup>3</sup> more than the cost of transport to a nearby mill. This is a significant added cost onto the delivered log cost, or a reduction in the value of logs supplied to the distant mills. Any rationalising of transport that avoided long road hauls would generate benefits to forests and mills as well as other benefits.

There could be a number of advantages to utilising more rail for log transport, though double-handling costs may rule it out. Advantages include removing logging trucks from some congested roads (e.g. SH85 to Port Chalmers). There is a much more conducive climate to rail in New Zealand at present. For example, Toll is looking to construct or re-commission branch lines for the dairy plants at Clandeboye, South Canterbury and Tatua in the Waikato. The Government will also provide a subsidy for Alternative To Road (ATR) projects, to obtain benefits as required under the New Zealand Transport Strategy 2002.

There is at least one forest in the Southern region where, in the future, initial log loading can be straight onto rail. It could be that this may also be possible in other forests. However, in general, transport of whole trees may be infeasible because of the corner geometry needed in the forests and on the rail.

Taking a broad-thinking approach there may be some advantage in establishing an ‘inland port’ at a location relatively central to the forests.<sup>8</sup> If in-forest, or near-forest loading of trees onto rail was possible for some trees, the inland port could be an efficient place to locate the decision process to optimise log cutting-to-length and allocating the logs or trees among uses.

The possible medium-term approaches to optimum handling and transport of trees and logs should be investigated. It should include integrating the trees and logs from small, private forests to ensure effective future woodflows to processing, manufacturing and to market.

#### **5.4 Sustainable wood processing and manufacturing**

There are national clichés around wood processing that say *we should process here and not export logs, and to avoid market fluctuations we should increase value added.*

These clichés ignore reality in that it is necessary to maintain some log export to balance the utilisation through New Zealand’s wide fluctuation cycles. Also, wood

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<sup>8</sup> The role of an ‘inland port’ is to consolidate cargoes at a location in the hinterland of the port. These cargoes can then be transported by efficient means (usually rail) direct into the port. An example is Prime Port’s Middleton site near Christchurch. The ‘inland port’ can also provide related services like storage, documentation, and some processors may be attracted to locate nearby.

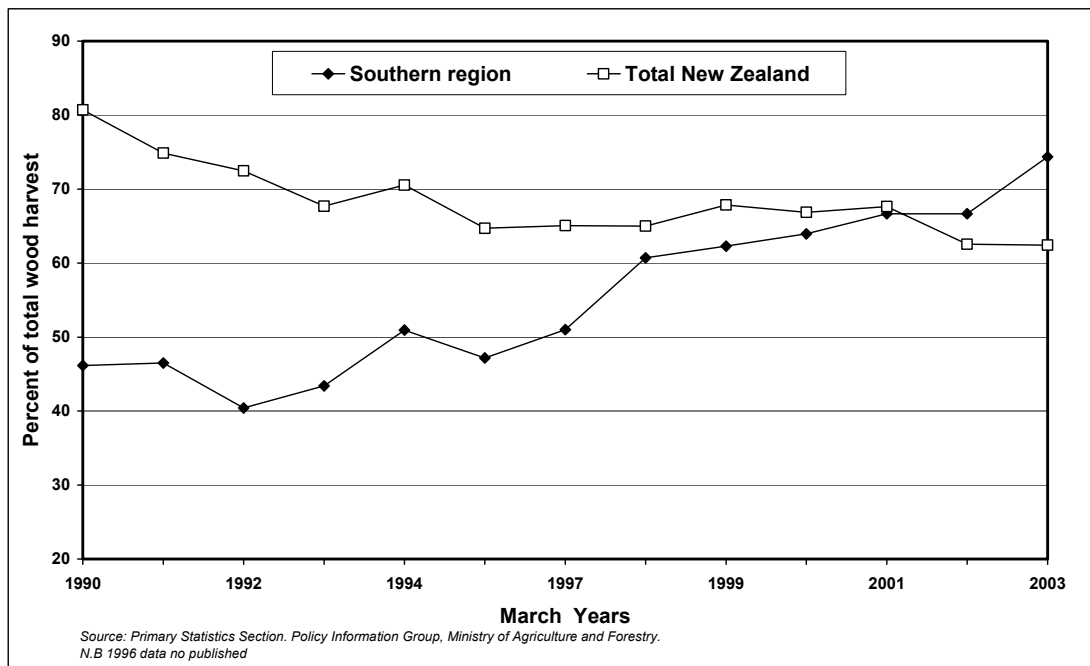
processing which may be adding value in a buoyant market may be adding costs and generating losses in a soft market.

The Southern region has a quality wood resource. However, fluctuations in market conditions (caused mainly by extreme cycles in the currency) mean the emphasis in wood processing is to be flexible in order to be resilient to market fluctuations. This flexibility is likely to be to the detriment of specialised secondary processing or manufacturing.

#### 5.4.1 Average log utilisation in processing

In the past, much of the wood produced in the Southern region was exported as logs or chips. In the last six or seven years, the proportion processed in the region has increased strongly and is now about 80% of forest removals.

**Figure 5.1 Proportion of wood harvest processed**



While the average proportion of forest removals processed throughout New Zealand has declined since 1990, the proportion processed in the Southern region has increased, and is now higher than the national average. This steady increase in the average processing utilisation disguises movement of logs, and different parts of logs, among the high value and low value end uses during the market fluctuations.

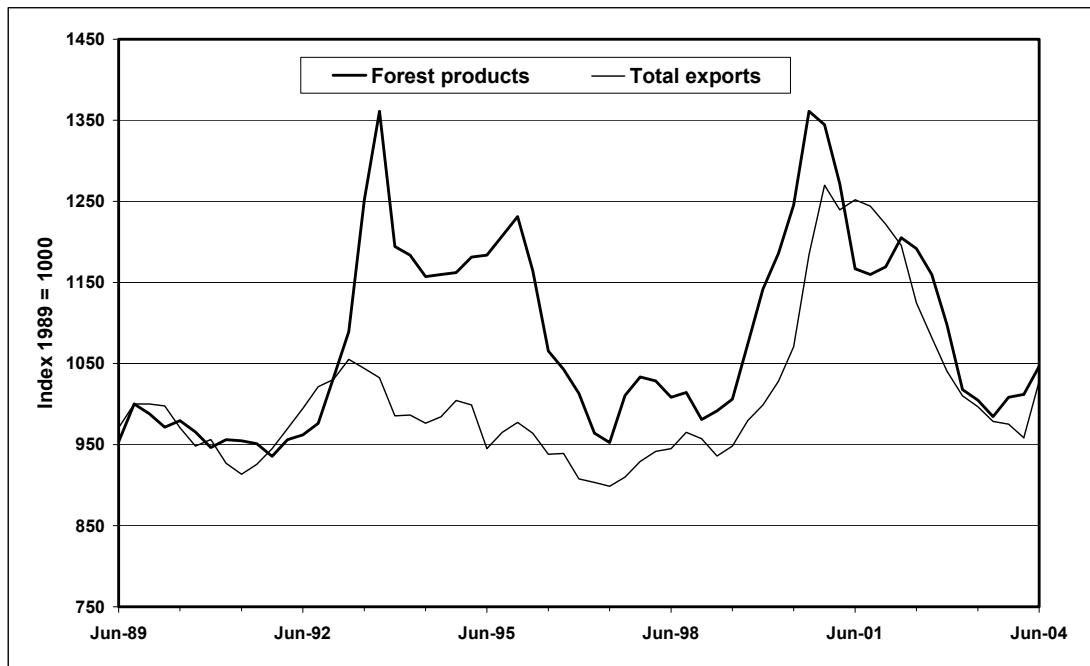
#### 5.4.2 *Fluctuations in export market returns*

To a large extent, the sector's current and future performance is subject to external influences. In particular, export returns fluctuate considerably depending on world product prices, the exchange rate and shipping costs.

These external factors have short and long-term impacts on behaviour and decisions within the sector in relation to capital investment as well as the harvesting and disposal of the local wood resource.

Figure 5.2 shows the movement in *unit export prices* for total New Zealand forestry product since 1989. This period has seen two significant price cycles with variations from peak-to-trough of around 30% during each. Overall, the current situation in terms of export prices for forestry products is similar to the late 1980s or during the Asian crisis in the late-1990s.

**Figure 5.2 Overseas price indices for New Zealand exports**



The latest cycle in export prices from 1998 to 2004 was heavily influenced by changes in the NZ exchange rate (driven by the monetary market and monetary management reaction to strong economic growth and strong inward migration in 1995-1996 and 2002-2004). The two currencies of particular relevance to wood exports are the \$USD and \$AUD which fluctuated as follows in the most recent cycle.

**Table 5.1 NZ exchange rate cycle 1997 to 2004**

Foreign Currency	1997	2000	2004	Average 1990 to 2004	Range
	<i>Exchange rate in NZ cents per US/AU Dollar</i>				
<b>\$USD</b>	69	40	71	57	+/-25-30%
<b>\$AUD</b>	90	75	94	83	+/-10-13%

*Source: BERL Database, ex Reserve Bank of New Zealand*

Clearly fluctuations of +/- 25%-30% around the average, for a total fluctuation of 54% of the average rate, make it extremely difficult to concentrate on specialised manufactured products. The New Zealand dollar exchange rates are likely to continue moving in a wide band (unless monetary policy emphasis changes) and thus uncertainty and fluctuations in export prices and returns will continue.

The current situation has also been compounded by high shipping costs due to a rebalancing in ocean going shipping capacity as well as strong demand from China for these services. Generally speaking, shipping costs are expected to remain high at least through to 2008.

#### **5.4.3 Flexibility to be resilient**

In the Southern region there is capacity and capability to produce nearly all of the forms of wood product and consequently a reasonably strong, robust market for most forest and wood products. Uses for Radiata particularly include solid wood as lumber either as clearwood, appearance grade, or construction grade; further manufacturing as finger-jointed lengths, mouldings or veneers; manufacture of pulp, paper, or panel products from pulp logs, waste from other processes or chipped wood. Alternatively, there is the export market for generally lower grade logs, smaller diameter logs and for chip.

The industry in the Southern region has also increased resilience by increasing processing productivity. Deregulation and diversified investors in the industry have acted as a spur for the introduction of new technology to sawmilling and processing. The range of wood processing has broadened and many players have introduced smart technology to increase productivity and innovation and are continuing to do more. The widespread use of scanners and sensors in sawmills has brought major improvements in productivity, as have automated wood-handling systems. These

changes have also made the work conditions more attractive and have allowed the industry to better withstand some fluctuations.

In relatively normal market and economic conditions, the quality pruned logs will go to those sawmills producing top quality 'appearance grade' lumber. Logs further up the tree have some knots, and will go to sawmills for structural grade lumber, while the top, smaller diameter logs, and those with rough branches will go to export either as logs or chips, or as 'pulp' logs to the local MDF plant. Some of the better, short logs, and others less suitable for lumber, will go to chip or veneer. Close working relationships between a number of the players see fairly effective allocation of the parts of most logs.

At times when there is a strong export market for logs, the log exporters may 'move down the tree' a little and therefore only sell the higher quality logs to the local mills. At times when the high dollar makes log export unattractive, as at present, an 'optimum' level of log export may reduce from about 35% of harvest as appears to have happened in 2003 (see Figure 5.1).

**Change in the allocation among the various domestic and export uses and markets according to economic conditions provides some resilience. Although fluctuations in market conditions are severe, the Southern region has some ability to strengthen its market position internationally. It is doing this by catering to the international demand for timber products from certified sustainable sources and by building on the market attraction of the quality appearance grade lumber.**

#### ***5.4.4 Processing plant location***

At present the majority of processing capacity is south of Balclutha, while the majority of current and future volume of wood growth is north of Balclutha. Players in the industry have experienced difficulty in securing consents under the RMA to establish processing plants in Dunedin City (in the general Mosgiel area) due to public perceptions of large-scale forest processing plants and Council planning requirements.

The Clutha District Council, and presumably ratepayers/public, has shown more enthusiasm for these plants and so they are expected to be established in Clutha District at Milburn or Milton. Public perception can be expected to be important in future plant location.

## **5.5 The importance of sector perceptions**

Discussion of a number of issues faced by the Southern region forest and wood processing sector has shown that future sustainability and growth are dependent on positive perceptions of the sector by various stakeholders.

The sector in the Southern region has been shown to make very considerable contributions to:

- the regional economy;
- employment in, and viability of, most regional communities;
- community facilities and pursuits;
- the range of environmental concerns; and
- training and career paths.

By building these positive perceptions of the sector by various stakeholders, the sector will improve its:

- environment for obtaining access to land;
- attraction and retention of quality labour;
- generation of effective woodflows as production diversifies;
- attraction of investment capital;
- access to location of processing plants on preferred sites; and
- base to obtain premium prices for premium woods, and further secondary processing to add real value.

## 6 Future economic contribution of the sector

This section presents a medium-term projection of the sector's future economic contribution to the Southern region. The projection incorporates related discussions with the members of the Southern Wood Council. However, the sector's growth profile is subject to some uncertainty with respect to a number of underlying trends.

In addition, the sector's medium-term growth profile will continue to be volatile due to cyclical movements in a range of factors including world markets/prices and the exchange rate. The medium-term projection does not incorporate these short-term cyclical movements except to the extent that it influences the medium-to-long term structure of the sector.

Therefore, the projection is determined by a number of underlying factors, which as noted above is subject to uncertainty. In instances where these uncertainties cannot be resolved, the projection incorporates historical trends and/or adopts a "business as usual" approach to the future. There is uncertainty in the following areas.

- the volume of wood available for harvesting;
- the volume of wood harvested that will be exported as unprocessed logs;
- the volume of wood harvested (or imported) that will be processed in the Southern region;
- the composition of this processing (i.e. timber, panels, remanufacturing, etc) and the returns associated with this processing; and
- the rate of labour productivity growth associated with the sector.

The medium-term projection makes the following generalisations with respect to several of these factors.

- The volume of woodflows in the Southern region rises to about 1,750,000m<sup>3</sup> in 2013. Two previous studies have indicated a range between 1,669,000m<sup>3</sup> and 2,158,000m<sup>3</sup> in 2013.<sup>9</sup> We have assumed a volume that is close to the

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<sup>9</sup> MAF and Port Otago projections presented in page 34 of the *Otago and Southland Forest Industries Profile* (June 2004).

lower end of this range. However, this volume is still dependent on gaining access to wood from the small, private blocks.

- Log export volumes decline to about 350,000m<sup>3</sup> but stabilise around this level depending on market returns and the major forest owners' desire to maintain this avenue of disposal as an option. The underlying volume of log exports will also depend on the quality and volume of harvest from private blocks.
- Wood processing activity is expected to rise, due largely to some additional investments in sawmilling in the Otago region. The net volume of wood *directly* processed (i.e. excluding transfers from sawmills to other manufacturing) increases to about 1,400,000m<sup>3</sup> depending on market conditions.
- The composition of wood processing is based largely on a “business as usual” scenario but with the addition of some new sawmilling. The projection does not incorporate any significant growth in value-added manufacturing. However, other wood manufacturing may record a small expansion from increased residuals from sawmilling, and direct purchase from forest owners.
- Labour productivity in forestry & logging can be measured in several ways.<sup>10</sup>
  1. The number of FTEs used per m<sup>3</sup> harvested has declined on average by 1.0%pa in the region and 1.7%pa nationwide since 1994. The projection uses the historical average of 1.0%pa although greater adoption of new technology could see the labour requirement decline even further/faster.
  2. The value of real GDP per FTE has increased by about 1.0%pa in the Southern region and nationwide since 1994. The projection assumes an average growth rate of 0.5%pa. Note this implies that the value of Real GDP per m<sup>3</sup> harvested in the region declines by an average of 0.5%pa, compared to the nationwide historical average of 0.8%pa<sup>8</sup>.
- The value of real GDP per FTE in wood processing has risen nationally by 1.7%pa since 1994. This historical growth rate of labour productivity has

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<sup>10</sup> Historical and projected growth rates referred to in this section are presented in Table 8.2 of the Appendix.

been used in the projection. Note the projection does not include any major changes in the overall composition of wood processing output in the region. Such changes (i.e. more value added manufacturing) could *potentially* alter this trend in labour productivity. In addition, future changes in technology or general processing efficiency could also affect this trend.

Table 6.1 presents the projection of the sector's medium-term economic contribution to the Southern region adopting the broad-based parameters above. The sector's further contribution is measured in terms of the direct employment and real GDP generated by the sector.

**Table 6.1 Projection of the sectors future economic contribution**

	Year			Change (volume)		Change (%pa)	
	1994	2003	2013p	1994-03	2003-13p	1994-03	2003-13p
log exports	520	400	350	-120	-50	-2.9%	-1.3%
Wood processed	540	1,160	1,400	620	240	8.9%	1.9%
<b>Woodflow (000m<sup>3</sup>)</b>	<b>1,060</b>	<b>1,560</b>	<b>1,750</b>	<b>500</b>	<b>190</b>	<b>4.4%</b>	<b>1.2%</b>
<b>FTE employment</b>							
Forestry and logging	607	813	828	206	15	3.3%	0.2%
Wood processing	1,155	1,614	1,689	459	75	3.8%	0.5%
<b>Total FTEs</b>	<b>1,762</b>	<b>2,427</b>	<b>2,517</b>	<b>665</b>	<b>90</b>	<b>3.6%</b>	<b>0.4%</b>
<b>GDP (\$Mn in 1996 prices)</b>							
Forestry and logging	\$83	\$121	\$130	\$38	\$9	4.3%	0.7%
Wood processing	\$88	\$143	\$177	\$55	\$34	5.5%	2.2%
<b>Total Real GDP</b>	<b>\$171</b>	<b>\$264</b>	<b>\$307</b>	<b>\$93</b>	<b>\$43</b>	<b>4.9%</b>	<b>1.5%</b>

Source: BERL

**Total direct FTE employment in the sector is projected to increase to around 2,517 FTEs in 2013 or by about 90 FTEs compared to 2003.** This total increase reflects a slight expansion in harvest volumes and a robust expansion in volumes going to local wood processing. This increase in activity is offset over the medium-term by on-going gains in labour productivity growth through technology adoption and increased processing efficiency.

**Total direct real GDP in the sector is projected to increase to about \$307 million in 2013 or by \$43 million compared to 2003. Overall, the Southern region's forest and wood processing sector is expected to expand by about 0.4%pa in FTE employment and 1.5%pa in real GDP between 2003 and 2013.**

The prospect for the coming decade is for a total increase in GDP of 16% and a total increase in employment of 4%, a rate consistent with a tight labour market.

## 7 Conclusions

The forest and wood processing sector makes considerable contributions to the Southern region's:

- Economy
- Employment in its settlements
- Communities
- Environmental improvement.

The sector faces issues going forward to maintain:

- Quality land
- Quality labour
- An effective flow of wood resource
- Processing and manufacturing resilient to fluctuations.

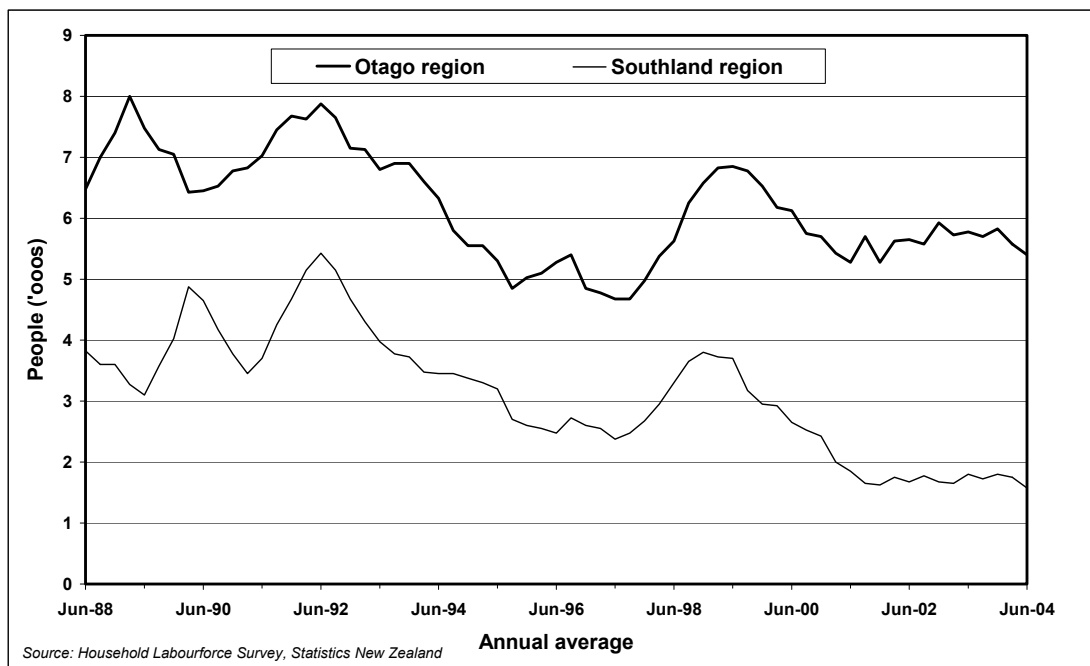
The sector has a strong story and can use that to lift public perceptions and the support for the sector to develop.

## 8 Appendices

### 8.1 Appendix 1: Profile of the labour resource

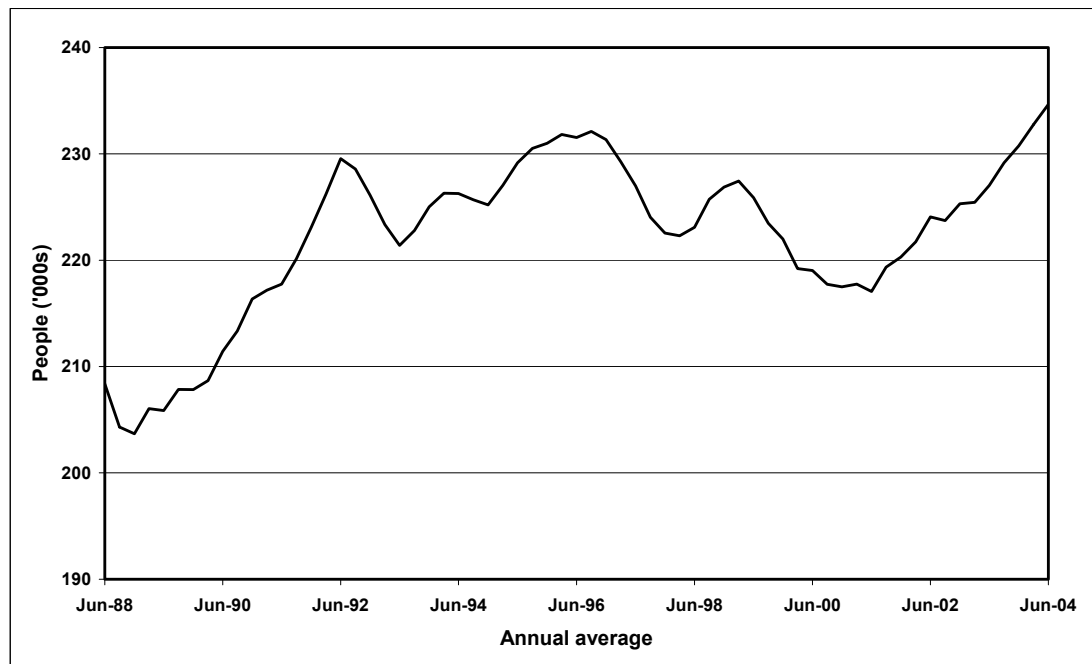
The pool of available (or uncommitted) labour in the Southern region has been shrinking in line with strong growth in employment across New Zealand making it more difficult to attract/retain both skilled and unskilled labour. The tightness of the labour market is evident in the decline in unemployment for the Southern region, which has fallen from 10,600 in 1999 to 7,000 in 2004.

**Figure 8.1 Unemployment in the Otago and Southland Regions**



The Southern region has also recorded strong growth in its underlying working age population (i.e. people aged 15+). There were 234,700 people of working age in the Southern region in June 2004 representing an expanding base from which to recruit workers. Overall, the recent increase in employment for the region has come through a combination of reduced unemployment numbers, increased numbers in the working age population, and higher labour force participation.

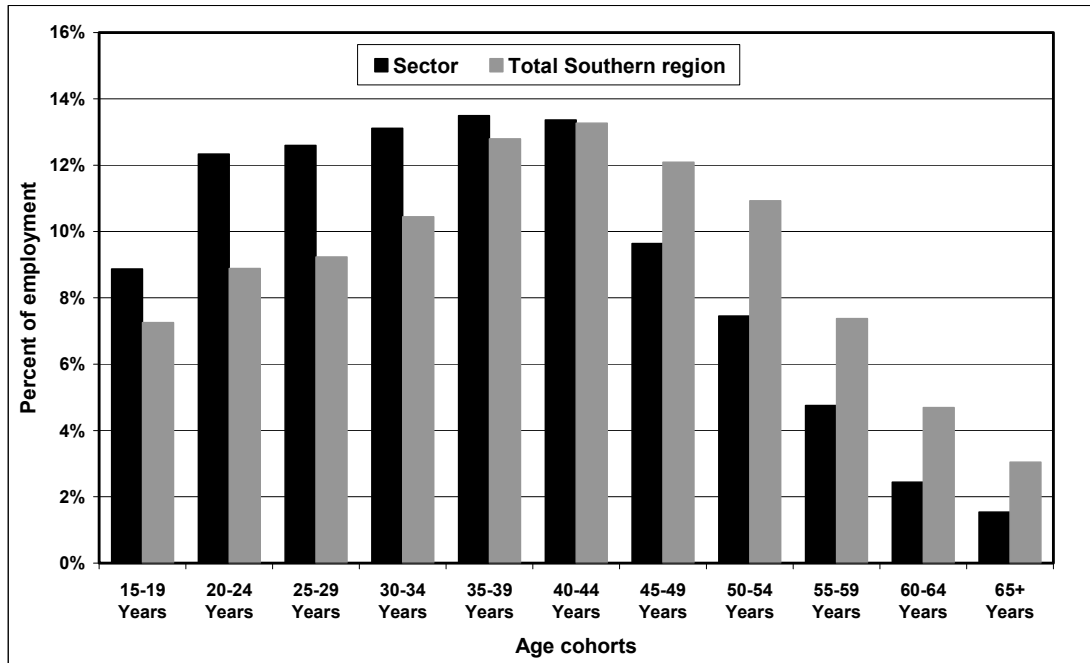
**Figure 8.2 Southern region's working age population**



Higher labour force participation has also made a large contribution to employment growth nationwide, with participation in the older age groups (those aged 45+) rising. As a result, much of the recent increase in national employment has come from those aged 45 and above.

Figure 8.3 shows the age profile of people employed within the sector compared against the profile of employment for the whole of the Southern region using 2001 census data. This shows that a high proportion of labour in the sector is sourced from younger age cohorts. This is balanced by a much lower proportion of workers in the 45+ age cohorts.

**Figure 8.3 Age composition of Sector and Southern Region**

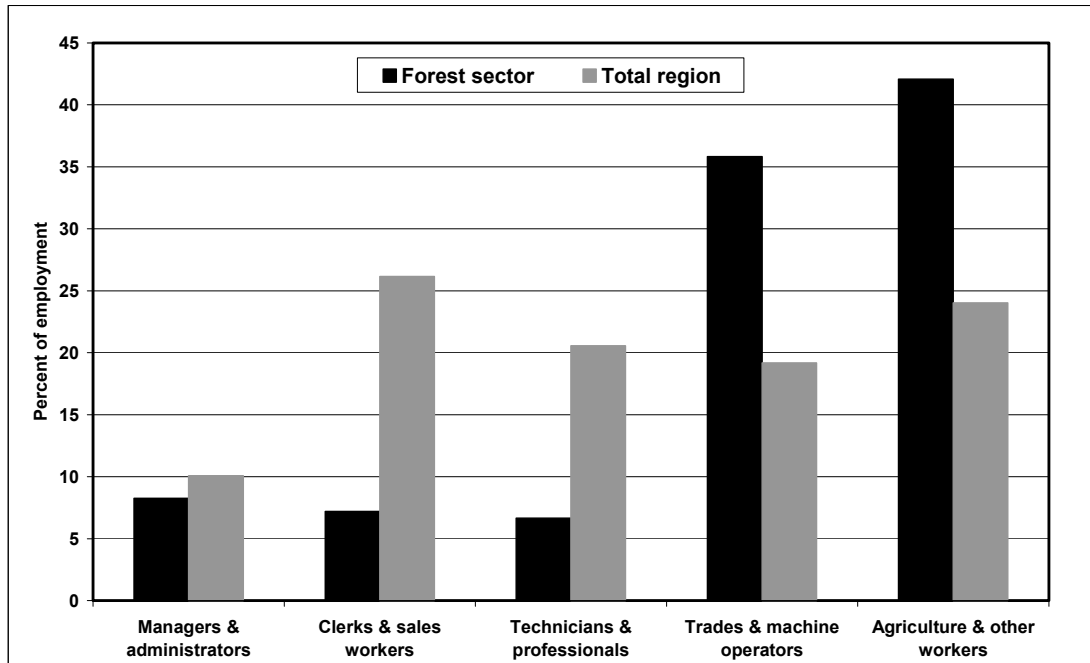


These differences reflect a number of factors such as the physical and seasonal nature of some main occupations in the sector, which appeals more to younger people. The pattern could also reflect difficulties for the sector in attracting and retaining workers in more experienced, older age cohorts.

The young composition of employment in the sector is also similar to other industries such as agriculture, retail, and hospitality. To some extent, these industries represent a source of competition for attracting/retaining young and relatively unskilled people into work. Other industries and trades are also focusing on recruiting people at an early age, thus sharpening the level of competition for these potential workers.

The sector has an *occupation* profile quite different from the Southern region as a whole. This is shown in Figure 8.4 using 2001 census data. 78% of employment in the sector is in the Agriculture & other workers and Trades & machine operators *occupation* groups. In contrast, the sector has a lower proportion of workers in the Manager and administrator, Clerks and Sales *occupation* groups.

**Figure 8.4 Occupational composition of employment**



A number of wood processors have indicated that one of their main constraints will be in the area of skilled labour (e.g. technicians, machine operators, and trades people). This concern was most relevant in the rural areas of Otago and across Southland rather than the Dunedin-Mosgiel area. As discussed, this reflects both a tight labour market in general, as well as location specific shortages of skilled labour in less populated and more remote areas.

## 8.2 Appendix 2: Driver and services industries in settlements

**Table 8.1 Ratios of 'driver' and services industries in settlements**

Industry Group	'Driver' Industries Includes Constrn	Business Services and Infrastructure	Private People Services	Public People Services	Total Employment	'Driver' Industries Includes Constrn	Business Services and Infrastructure	Private People Services	Public People Services	Total Per 100 Employed in 'Drivers'
<b>Settlements</b>										
Mosgiel	732	501	579	549	2361	100	68.4	79.1	75.0	322.5
Gore	1413	606	978	555	3552	100	42.9	69.2	39.3	251.4
Balclutha	921	276	417	360	1974	100	30.0	45.3	39.1	214.3
Milton	441	66	150	147	804	100	15.0	34.0	33.3	182.3
Winton	372	153	213	159	897	100	41.1	57.3	42.7	241.1
Riverton	246	114	147	126	633	100	46.3	59.8	51.2	257.3
Mataura	492	81	120	75	768	100	16.5	24.4	15.2	156.1
Outram	129	66	66	66	327	100	51.2	51.2	51.2	253.5
Tapanui	210	51	69	60	390	100	24.3	32.9	28.6	185.7
Otautau	150	66	54	42	312	100	44.0	36.0	28.0	208.0
Tuatapere	141	54	57	33	285	100	38.3	40.4	23.4	202.1
Lawrence	96	42	36	36	210	100	43.8	37.5	37.5	218.8
Owaka	81	15	48	39	183	100	18.5	59.3	48.1	225.9
Clinton	78	24	33	12	147	100	30.8	42.3	15.4	188.5
<b>Average excl. Mosgiel</b>						<b>100</b>	<b>35.8</b>	<b>44.4</b>	<b>35.4</b>	<b>215.5</b>
<b>Standard Deviation</b>							<b>12.4</b>	<b>13.6</b>	<b>11.1</b>	<b>33.0</b>
<b>Rural Areas</b>										
Kaitangata	243	15	57	30	345	100	6.2	23.5	12.3	142.0
Clutha	1302	123	144	177	1746	100	9.4	11.1	13.6	134.1
Bruce	891	153	162	165	1371	100	17.2	18.2	18.5	153.9
Benhar	33	3	6	9	51	100	9.1	18.2	27.3	154.5
Te Waewae	483	69	69	63	684	100	14.3	14.3	13.0	141.6
<b>Average Rural Sample</b>						<b>100</b>	<b>11.2</b>	<b>17.0</b>	<b>17.0</b>	<b>145.2</b>

Source: BERL Regional Database

## 8.3 Appendix 3: Labour productivity in the sector

**Table 8.2 Growth rates in labour productivity**

	1994-2003		2003-2013p
	Total NZ	Region	Region
Forest & logging FTEs/000m <sup>3</sup>	-1.7%	-1.0%	-1.0%
Forest & logging real GDP/000m <sup>3</sup>	-0.8%	-0.1%	-0.5%
Forest & logging real GDP/FTE	1.0%	0.9%	0.5%
Wood processing GDP/FTE	1.7%	1.7%	1.7%

Source: BERL

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