NATIONAL FREIGHT DEMANDS STUDY

SEPTEMBER 2008

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Executive summary

E1 The importance of the freight sector

The movement of freight plays a vital role in sustaining and supporting economic development and contributes to the high quality of life experienced by New Zealanders. The freight sector is an essential component of export industries, linking areas of production to the ports where goods are sent overseas and its costs form a component of the overall costs of supplying world markets. An efficient freight industry can provide cost-effective forms of transport improving the overall competitiveness of New Zealand exports.
The freight sector also supports a wide range of domestic activities including:

- linking suppliers of raw materials with the industries that use or process their goods
- transporting semi-finished components within the manufacturing sector
- distributing finished products to consumers, including deliveries to the full range of retail outlets
- supporting household activities through for example the transport of waste, household deliveries and removal services.

The movement of freight touches almost all sectors of the economy and household activities and a loss of efficiency for the freight sector can have widespread impacts. In addition the freight sector is a significant consumer of energy resources, accounting for about 43 percent of the energy consumed by the transport sector and a similar proportion of greenhouse gas emissions. In support of its sustainability objectives, the government has set targets for the freight sector seeking to increase the modal shares for rail and coastal shipping in order to reduce the freight sector's energy use and emissions.

The information available on the overall patterns of movements and activities of the freight sector is however very limited. This constrains the efficient use of resources by those providing infrastructure and services and also restricts the government's ability to plan for and manage the sector.

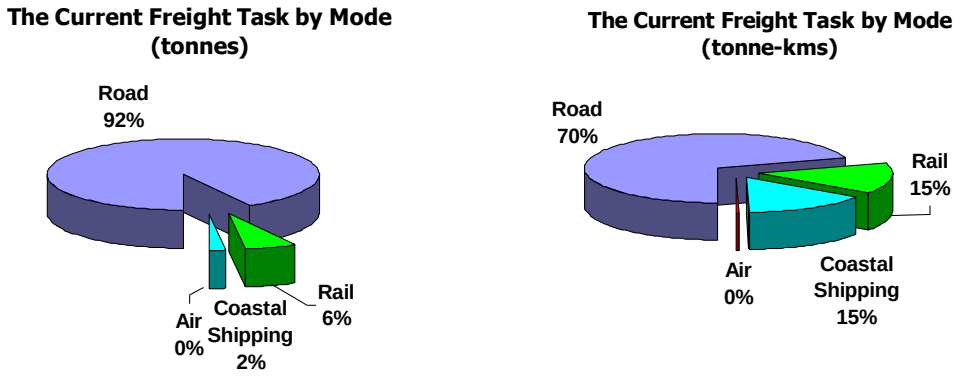
The government recognises the importance of the freight sector and the desire to improve its efficiency and achieve significant changes in modal shares. The National Freight Demand Study was therefore commissioned in early 2008 by the Ministry of Transport (MoT), the Ministry of Economic Development (MED) and Land Transport New Zealand (now the NZ Transport Agency) to look at the current operations of the sector and its future development. The study was undertaken to overcome the limited amount of data on the sector and provide a sound basis for future policies.

This work is set out in the main report of this study.

This study combined interviews and surveys of many of the key participants within the sector with a detailed review of published and unpublished information.

E2 The total current freight task

The current freight task in terms of tonnes and tonne-kms is summarised in Figure 1.



Source NFDS

Figure 1
The Current Freight Task by Mode

Activity in the sector is dominated by the movement of goods by road, although when the length of haul is taken into account in the tonne-km figures on the right, the role of rail and coastal shipping is enhanced with these having a higher share of longer distance movements.

E3 Approach to the study

In order to examine the freight task in detail, 17 key commodities were identified and separate investigations were undertaken for each of these.

The approach used for the examination of the identified commodities was based on discussions with and collection of information from with a large number of key participants within the freight sector. The information gained from these discussions and interviews was combined with analyses of available statistical material to build up a comprehensive picture of the activities undertaken within the sector.

The steps involved for each commodity were to:

- identify the total size of the market and if possible the regional distribution of activities
- determine the linkages between the areas where goods are produced or imported and those where they are consumed or exported.

The movements for each commodity were then combined and compared with the outline information on total estimated freight flows. An adjustment factor was then determined for movements as a whole and used to estimate total flows by road. These were compared with observed traffic counts to confirm the robustness of the overall findings from the study as well as the detailed analyses. It is estimated that the detailed analyses cover about two-thirds of the total activity within the freight sector.

E4 The freight task in detail

The individual commodity flows are set out in Table E1 and summarised in Figure E2

Table E1
Movements for selected commodity groups

Selected commodity group	Tonnes lifted (millions)	Tonne-kms transported (billions)
Milk & dairy products	21.0	1.9
Logs & wood products	30.3	3.8
Livestock & meat	4.5	0.6
Horticulture	4.2	1.1
Aggregate	40.2	2.3
Coal	6.4	1.3
Petroleum	9.0	2.2
Limestone, fertiliser, cement & concrete	18.8	1.6
Other metals & minerals	3.9	0.5
Retail & couriers	14.5	2.9
Total	**152.7**	**18.0**

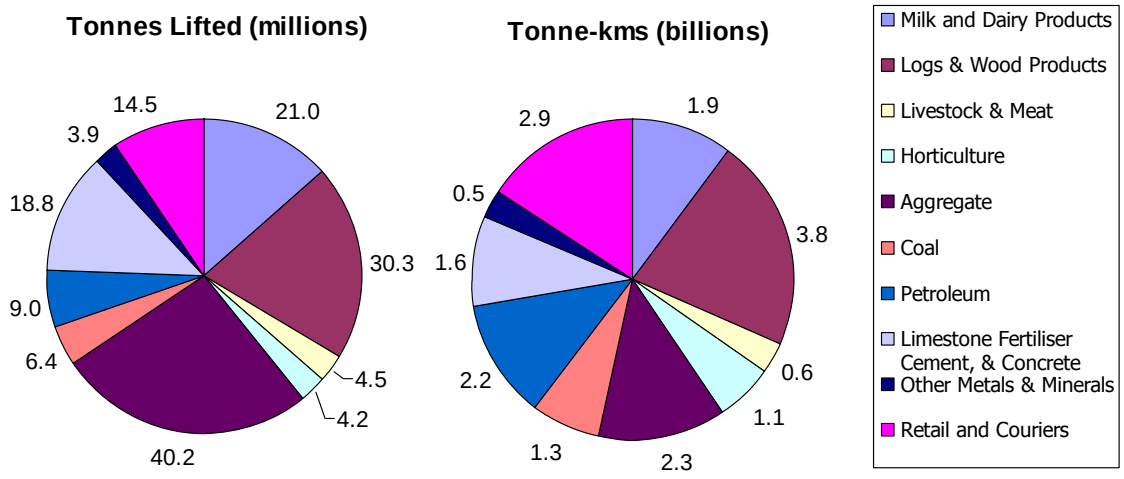


Figure E2
Movements of Key Commodities 2006/07

Total movements in terms of tonnages are dominated by aggregates, logs and wood products and by dairy products, which combined are estimated to account for about 60 percent of the total movements identified.

While the tonne-km summary shows broadly similar patterns to that for the tonnes lifted, the share of aggregates is much smaller, reflecting the shorter distances travelled for this low value product. The share for retail and couriers is much higher reflecting their nationwide distribution patterns.

The patterns of movements for the selected commodities are set out in Table E2.

Table E2 Patterns of movements for selected commodities 2006-07 (million tonnes)								
	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	33.3	3.5	0.5	1.6	0.4	0.9	0.7	**40.7**
Waikato/Bay of Plenty	7.1	32.6	0.8	1.5	0.0	0.1	0.0	**42.2**
Gisborne/Hawke's Bay	0.2	0.3	7.0	0.9	0.0	0.0	0.0	**8.4**
Taranaki/Manawatu-Wanganui/Wellington	0.3	0.7	0.4	17.4	0.0	0.2	0.0	**19.1**
Tasman/Nelson/ Marlborough/West Coast	0.2	0.0	0.0	0.3	8.1	3.7	0.2	**12.4**
Canterbury	0.2	0.2	0.0	0.5	0.5	15.0	1.1	**17.5**
Otago/Southland	0.0	0.0	0.0	0.0	0.0	0.8	11.6	**12.5**
Total	**41.3**	**37.2**	**8.7**	**22.2**	**9.0**	**20.6**	**13.6**	**152.7**

The flows are dominated by the shorter distance movements within the areas identified, although there are significant volumes of longer distance traffic.

E5 Movements by mode

Three main modes are involved in the movement of goods within New Zealand, road, rail and coastal shipping. The estimated shares for each of these for selected commodities set out in Table E3.

Table E3 Mode share for selected commodities				
Commodity	Total Volume (000 tonnes)	Share by mode (%)		
		Road	Rail	Coastal Shipping
Liquid milk	17,145	96%	4%	
Dairy products	3,816	59%	41%	
Logs and chips	21,600	94%	6%	
Manufactured timber products	8,750	97%	3%	
Livestock (all by road)	3,624	100%		
Meat	889	57%	43%	
Horticultural products	4,192	93%	7%	
Aggregate	40,188	99%		1%
Coal	6,399	36%	64%	
Petroleum products	9,020	75%		25%
Aluminium and steel	1,853	80%	20%	
Limestone, fertiliser, cement and other minerals	12,187	88%	2%	10%
Concrete (all by road)	8,949	100%		

Modal shares vary significantly by commodity, with rail having a relatively high share of coal, dairy products and meat. Coastal shipping carries significant volumes of petroleum and cement.

E6 Forecasts for the future

For each of the commodities identified forecasts have been made of future volumes and flows, based on national projections, industry views and the consultants own analysis. These are summarised in Figure E3.

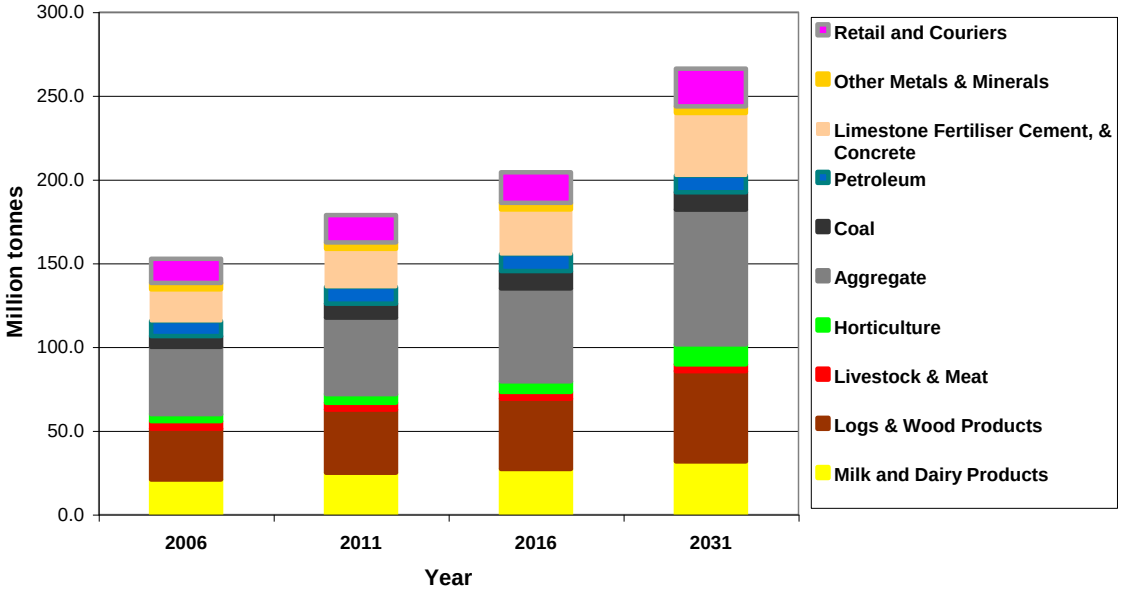


Figure E3
Growth in Total Commodities Identified in Terms of Tonnes Lifted
2006-07 to 2031

Over the period from 2006/07 to 2031 the freight task for the commodities identified is expected to increase by about 70-75 percent in terms of tonnes lifted and in terms of tonne-kms transported. This figure of growth to 2031 can be compared with alternative estimates of growth in tonne-kms of about 70 percent between 2005 and 2020 based on work undertaken by TERNZ and forecasts of growth of up to 100 percent by 2040 based on work undertaken internally by the MOT, and lies broadly between the two.

The freight task is therefore expected to continue to have strong growth, both in response to increases in outputs of basic commodities for which trip lengths are likely to be short and of more sophisticated products which are typically transported longer distances.

E7 Growth by mode and by region

E7.1 Introduction

The forecast growth of the freight task will offer expanded markets for those transporting the goods. Forecasts by mode have been made. These take into account general growth trends for particular commodities identified in the course of the study and some specific opportunities to increase the modal shares of rail and to a lesser extent coastal shipping in commodity movements in which these modes already participate. These do not include the effects of interventions by the government specifically aimed at changing modal shares, although the effects of the Emissions Trading Scheme have been considered. These effects are however likely to be only very limited.

E7.2 Forecast growth by rail

The forecast growth in rail freight movements is set out in Table E4

Table E4
Forecast growth in rail traffic 2006-07 to 2031 (million tonnes)

Product Group	2006-07	2031	Growth to 2031
Dairy products inc milk	2.20	4.08	85%
Meat	0.48	0.54	13%
Logs and woodchips	1.29	3.24	151%
Timber, wood products and pulp and paper	1.41	1.75	24%
Horticultural products	0.13	0.42	223%
Other agricultural products	0.17	0.18	6%
Coal	4.07	5.50	35%
Aluminium and steel	0.36	0.36	0%
Chemicals, fertiliser and minerals	0.21	1.38	557%
Food, other manufactured products and not elsewhere specified	3.29	5.61	71%
Total	**13.59**	**23.06**	**70%**

These forecasts would imply that the modal share of rail would remain broadly constant, with the 70 percent increase in rail tonnage being slightly below the overall increase forecast of a growth of about 75 percent. Nevertheless it would represent a very substantial increase on present day flows, representing an annual average increase of about two percent, compared to the current position of broadly constant flows.

E7.3 Forecast growth by coastal shipping

For coastal shipping, the movement of petroleum is likely to grow with the expansion of the refinery at Marsden Point and the movement of cement will be reduced as product is distributed by land within the South Island. For the rest of the commodities handled, which we have classified as general cargo, we have tentatively forecast that this might increase at the same rate as for manufactured goods. Overall this would therefore give forecasts for 2031 of about 8.5-9.0 million tonnes, broadly double those of 2006-07, but again in line with or slightly ahead of the growth of the sector as a whole.

Again this represents a considerable increase from current levels. Our understanding is that coastal shipping movements have been generally constant over recent years.

E7.4 Growth by region

The growth of traffic by region for movements originating and terminating in the regions is set out in Figures E4 and E5. In both cases the figures include movements wholly within the regions.

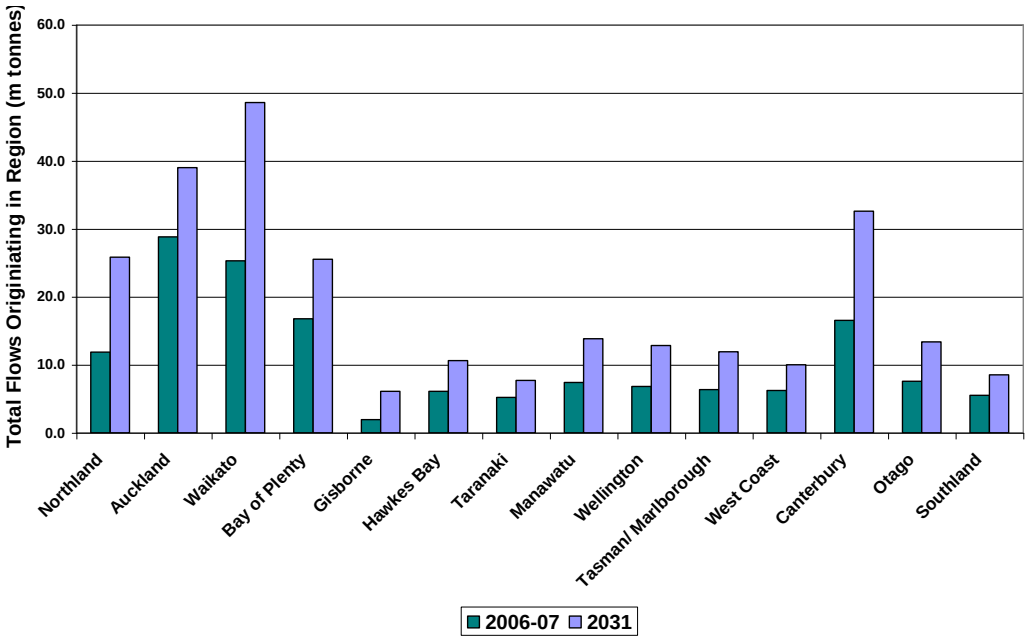


Figure E4
Forecast Growth in Freight Traffic Generated in Regions (million tonnes)
2006-07 to 2031
Identified Commodities Only

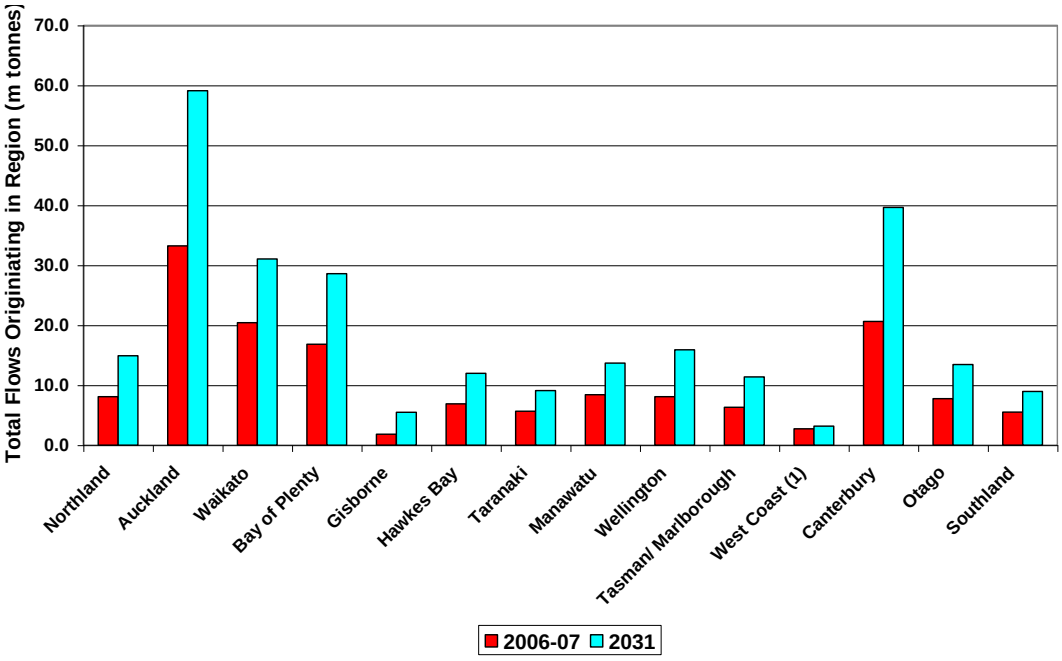


Figure E5
Forecast Growth in Freight Traffic Attracted to Regions (million tonnes)
2006-07 to 2031
Identified Commodities Only

For the traffic generated by regions, substantial growth is forecast for Waikato and Canterbury regions, reflecting growth in the forestry or dairy industries and in the case of Waikato in the volume of aggregates being produced to serve the needs of the region itself and the neighbouring Auckland region.

For goods attracted to the regions the highest growth is predicted for Auckland, in part reflecting the movement of primary products from Northland and Waikato. The Canterbury region is also forecast to have substantial growth, reflecting the growth of the dairy industry and to a lesser extent of coal traffic from the West Coast.

E8 Following on from this freight study

To make the best use of the data summarised above and presented in the Main Report, it is recommended that the government institutes a programme of regular data collection covering the three main modes used for the transport of freight. This would provide information on emerging trends and would enhance the value of the data already collected, improving its usefulness to those who operate within the freight sector, to the government in its management of the sector and its achievement of sustainability goals and to those who provide the infrastructure and related services necessary to support an efficient freight industry.

E9 Acknowledgements

The successful undertaking of this study has been greatly assisted by the support and advice received from many participants in the freight sector in New Zealand, who have given their time and resources to assist us. These include the operators of transport services by road, rail, and coastal shipping, manufacturers and producers, employers associations and chambers of commerce, port companies and government departments. We would like to acknowledge the contribution these have made to this work and trust that they find it of use in the development of an efficient and sustainable sector able to meet the evolving needs of New Zealand.

Main report

1 Introduction and scope of study

1.1 The importance of the freight sector

The movement of freight plays a vital role in sustaining and supporting economic development and thus contributes to the high quality of life experienced in New Zealand. The freight sector is an essential component of the export industry, linking areas of production to the ports and its costs contribute to the overall costs and competitiveness of New Zealand goods on world markets. An efficient freight industry can provide cost-effective forms of transport to improve the overall competitiveness of New Zealand exports. The freight sector supports a wide range of domestic activities including:

- linking suppliers of raw materials with the industries that use or process their goods
- transporting semi-finished components within the manufacturing sector
- distributing finished products to consumers, including deliveries to the full range of retail outlets
- supporting household activities through, for example, the transport of waste, household deliveries and removal services.

The movement of freight influences almost all sectors of the economy and household activities and any loss of efficiency in the freight sector can have widespread impacts.

At an economy wide level, the Transport and Communications sector accounts for over 10 percent of GDP, a share that is only exceeded by Finance, Insurance & Business Services, by Manufacturing and by Personal and Community Services. In addition the Transport and Communications sector has been one of the fastest growing parts of the economy. Over the period Q2 2001 to Q2 2007, it grew by 27 percent in constant price terms[1] (although to some extent this may reflect growth in the Communications part of the sector). This compares with a growth of 22 percent for the economy as a whole and was only exceeded by Construction and Retailing.

1.2 The scale of the freight task

Given the range of activities that the freight task encompasses, the scale of the task is substantial. Although there are no precise numbers on this, it was estimated as part of the National Freight Matrix Study[2] (NFM) that in 2002 about 100 million tonnes of freight were transported by road and rail. Alternative estimates are available for the movement of goods by road[3], which are about 25 percent higher in tonne-km terms than those produced by the NFM. The wide range of the estimates reflects the lack of reliable and detailed information on the sector, particularly with respect to roads and emphasise the need for the current study.

There is also very little detailed information available on the levels of freight carried by coastal shipping, although in the *Sea Change* consultation document[4] it was estimated that about 8.6 million tonnes was carried by coastal shipping services (including the Cook Strait ferries) in 2003 to 2004, of which about 89 percent represented purely domestic cargo and the balance comprised import or export traffic.

[1] Statistics NZ.
[2] *Development of a New Zealand National Freight Matrix*, LTNZ Research Report 283.
[3] See Table 1.2.
[4] *Sea Change : Transforming Coastal Shipping in New Zealand*, MoT, May 2008.

Using these earlier studies, the breakdown of the freight task by mode was estimated at about 80 percent road, 12 percent rail and 8 percent coastal shipping in tonnage terms and 67 percent by road, 18 percent by rail and 15 percent by coastal shipping in tonne-km terms.

In the current study, these earlier figures have been updated and an allowance has been made for air\freight although the volumes of this are very small in relation to the total freight task. Estimates of the total volumes transported are set out in Table 1.1.

Table 1.1
Revised estimates of the freight task in New Zealand 2006/07

Mode	Tonnage lifted		Tonne-kms	
	(millions)	Percent of total	Billions	Percent of total
Road	207.8	92.0%	18.8	70.2%
Rail	13.7	6.1%	3.9	14.6%
Coastal shipping	4.2	1.9%	4	14.9%
Air	0.1	0.0%	0.08	0.3%
Total	**225.8**	**100%**	**26.8**	**100.0%**

Source: consultant's analysis described in Sections 3 and 4 of this report.

While our figures give a similar estimate of the breakdown by tonne-kms, we have derived higher estimates of the scale of the freight task in tonnage terms because of our more detailed assessment of inter-regional flows, which although relatively short, account for a high proportion of the tonnages lifted. The revised position is set out in Figures 1.1 and 1.2.

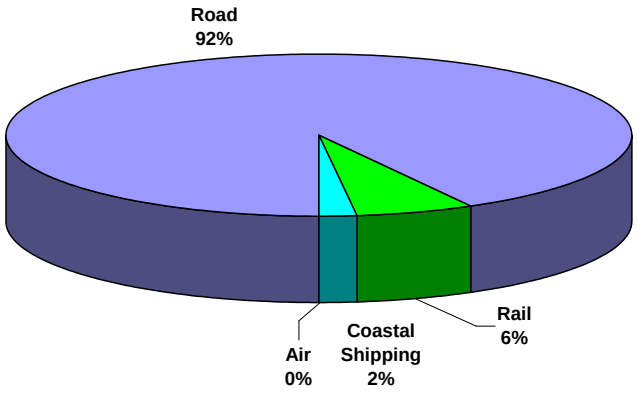


Figure 1.1
Estimates of the Current Freight Task by Mode (tonnes)

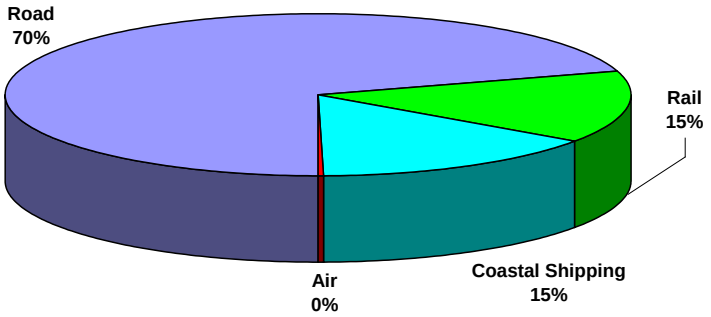


Figure 1.2
Estimates of the Current Freight Task by Mode (tonne-kms)

Source NFDS

Although aviation only reflects a very small part of the overall freight task in terms of the volumes moved, movements by air accounted for about 15 percent of all exports and 21 percent of all imports by value in 2006-07.

1.3 Historical growth

The historical growth of the road and rail freight sectors is set out in Table 1.2 and Figure 1.3.

Table 1.2
Road and rail freight movements 1993-2007
Year ending 30 June

Year	Rail			Road		
	Tonnes 000s	Net tonne-kms (millions)	Average length of haul (km)	Net tonne-kms (millions)	Tonnes (000s) (1)	Average length of haul (km) (1)
1993	8,514	2,468	290	9,877		
1994	9,444	2,835	300	10,480		
1995	9,584	3,202	334	11,205		
1996	10,305	3,260	316	11,888		
1997	11,525	3,505	304	12,289		
1998	11,706	3,547	303	12,385		
1999	12,900	3,671	285	13,573		
2000	14,699	4,078	277	14,345		
2001	14,461	3,942	273	15,224		
2002	14,330	3,766	263	16,210		
NFM 2002 (2)	*13,600*	*3,463*	*263*	*12,923*	*89,619*	*144.2*
2003	13,702	3,692	269	17,097		
2004	13,350	3,880	291	18,144		
2005	13,156	3,881	295	18,378		
2006	13,505	3,872	287	18,510		
2007	13,741	3,893	283	19,233		

Sources: EECA for rail figures from 1993-2002.
Toll NZ for rail figures from 2003 to 2007.
Rail figures for later years may not therefore be comparable with those for earlier years.
MoT for road net tonne-km figures (except for 2002 NFM estimates).

Notes (1) No estimates are available on an annual basis to estimate the average length of haul for road freight or the tonnes lifted.

(2) Estimates from the NFM are available for 2002. While these give estimates for rail, which are similar to those from 2003 onwards, they give significantly lower estimates for road freight traffic. This may reflect different approaches to the calculation of the figures with the NFM data having a stronger focus on inter-regional movements whereas the MoT approach based on the purchase of RUC-kms takes full account of both short-distance local and longer-distance movements.

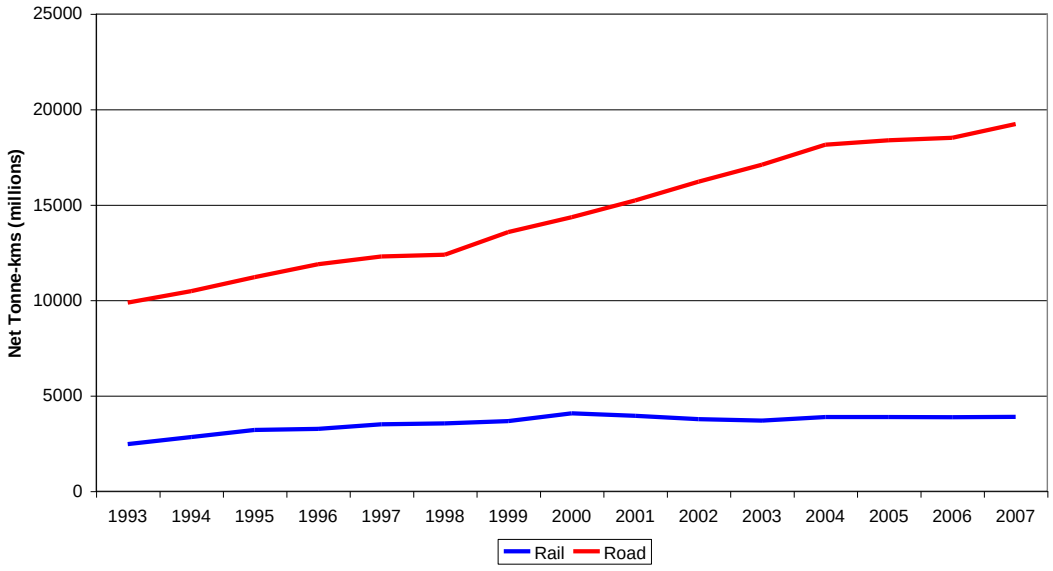


Figure 1.3
Growth in Road and Rail Freight 1993-2007
(Net Tonne Kms)

Most of the growth in freight demand over recent years has been met by road transport. Rail traffic has remained broadly constant in total at least from 2003 onwards, whereas road traffic has increased steadily although with some reduction in the rate of growth in the most recent years. While no detailed information is available on coastal shipping, we understand that the volumes transported have remained broadly constant over recent years.

1.4 Background to the study

The freight sector is estimated to consume about 43 percent of all energy used by the transport sector in New Zealand, which in turn is estimated to be responsible for 43 percent of greenhouse gas emissions[5]. The *Sea Change* report[6] gives the following figures for the relative emissions of CO_2 in terms of grams per tonne-km:-

Road	123
Heavy road	92
Rail	23
Coastal shipping	14

By switching traffic away from roads there is the possible potential for savings in emissions, although allowance would have to be made for road components if the alternative modes were unable to provide a door-to-door service.

The *New Zealand Transport Strategy 2008* places considerable weight on the development of more sustainable ways of moving freight. It states: "We must put sustainability at the centre of all of our thinking and decision making. The government's recent in-principle decision to halve per capita domestic transport greenhouse gas emissions by 2040 demonstrates this commitment to creating a sustainable nation."

Any moves to improve the sustainability of the freight sector needs to be built on a sound understanding of the activities currently undertaken and the volumes of different commodities transported by different modes between different locations. At present no information on the freight sector is collected on a regular basis and this baseline information does not exist. The purpose of the present study is to help provide this baseline.

The need to provide a more comprehensive understanding of the freight sector and give the government a better basis for developing policies and actions affecting the freight sector, especially now that it has achieved ownership of the railway system, has also been recognised by a number of the major shippers in New Zealand. The specific requirement for a better understanding of the freight sector has also been recognised by the government with the need for a Freight Demands Study being mentioned in a range of documents and policy statements.

As a result, in late 2007, the government developed the Terms of Reference for a National Freight Demands Study in the form of joint initiative by the Ministry of Transport, the Ministry of Economic Development and Land Transport New Zealand. Following the submission of bids, Richard Paling Consulting in association with IPC & Associates, Murray King Francis Small, John Bolland Consulting and Ascari Partners were appointed in January 2008 to undertake the study.

[5] *New Zealand Energy Efficiency and Conservation Strategy 2007*, p50.
[6] *Sea Change : Transforming Coastal Shipping in New Zealand*, MoT, May 2008, p10.

1.5 Structure of the report

Following on from the introduction to the freight sector in Section 1, Section 2 of this report sets out the general approach used in the study. Section 3, which forms a major component of the work, discusses the current patterns of movement for each of the 17 commodities identified for detailed analysis, and in effect provides a bottom-up analysis of the freight sector in the country. The estimates that result from this bottom-up analysis are then compared in Section 4 with alternative top down estimates of the size of the freight sector, and the section also includes a review of the modal splits within the freight sector in the year ending June 2007.

Section 5 deals with issues associated with infrastructural and sectoral development, Section 6 deals with other identified constraints and Section 7 reviews the main trends emerging in freight handling and logistics in the country. The key drivers of freight mode choice are set out in Section 8. Section 9, another core section deals with the forecasts of the growth of the freight movements associated with each of the main sectors identified and considers modal split and regional growth issues. Section 10 concludes by considering possible further steps to understand the freight sector in New Zealand and progress its development.

1.6 Agency changes

In the course of the study, there have been a number of changes in the agencies with interests in the sector. In particular, Transit New Zealand and Land Transport New Zealand have been combined into the NZ Transport Agency, and the government has acquired most of the railway assets held by Toll NZ and has transferred these to KiwiRail.

Where these agencies supplied information or published reports before these changes, these are attributed to the name of the agency at the time of supply or publication. In particular all the statistical information on the railways was provided by Toll NZ before the purchase of the rail assets by the government and is therefore attributed accordingly, but there have been subsequent discussions on its interpretation with KiwiRail.

1.7 Acknowledgements

In undertaking this study we would like to acknowledge the assistance we have received from almost all those we have approached with interests in the freight sector in New Zealand. The lack of reliable statistical information on which to base the planning of the sector is widely recognised as a major deficiency and there was widespread support for work which aimed to address this shortage. We would particularly like to thank those organisations who were able to respond to our questionnaire and supplementary questions in detail including road, rail and coastal shipping operators, producers, manufacturers and retailers, courier companies and those responsible for the provision of infrastructure, including particularly roads, railways and ports. We acknowledge the effort and resources that this must have involved.

The list of those interviewed as part of the study is set out in Appendix A.

2 Approach to the study

2.1 Introduction

The freight task in New Zealand is extremely complex involving a very large number of participants who own and transport goods and provide the infrastructure and services to support these movements. While there is a wide range of statistical material both published and unpublished collected by many of the key players and industry organisations, this tends to concentrate primarily on the production, consumption and export of goods, and information on the flows linking these activities is very limited and is often confidential. In addition the information is usually held at a wide number of locations in both the public and private sectors and there is no central database of information.

In undertaking the study we have devoted considerable effort to understanding the current pattern of flows, about which little information is currently available in a single source, since this is required to form the basis of any further analysis. We have however taken the opportunity to discuss with the key players their views on the future development of the freight requirements for the sectors in which they operate, and on the issues and constraints which they face. These views have been used in the development of the forecasts for each of the commodities and key issues and constraints have also been reported separately.

For the study we have identified three broad groups with interests in the freight sector:

- agencies who own the goods - manufacturers, wholesalers, importers
- agencies who move the goods - road haulers, shipping companies, rail companies (primarily Toll NZ - now KiwiRail)
- agencies who provide infrastructure and support services to support freight movements - ports, airports, distribution companies, freight forwarders and agents, ONTRACK, and Transit.

We have also had discussions with and received data from a number of the trade and industry associations who represent the views of groups participating in the freight sector. These have included industry associations such as Meat and Wool New Zealand, the New Zealand Forest Owners Association, the New Zealand Shippers Council, the Aggregates and Quarries Association and Roading New Zealand and trade associations including Chambers of Commerce and Employers Associations.

2.2 Interviews and questionnaires

To assist in the collection of information in a reasonably structured way, we developed a questionnaire which covered the key areas to be discussed. In general this was used as an *aide memoire* in face to face meetings, but in some instances it was used for telephone and email interviews. Three slightly different versions of this were developed covering the main groups identified:

- owners of the goods
- transporters of the goods

- facilitators of the movement of the goods.

Copies of the questionnaire and covering letter for the first group, owners of the goods are set out in Appendix B.

Formal interviews were undertaken with a wide range of organisations with interests in the freight sector. In total over 100 formal interviews were conducted and these were supported and supplemented by short telephone conversations with a large number of other firms and individuals.

2.3 Information from published and unpublished statistics

The results of the surveys were supplemented by the collection of published and unpublished data, particularly on the total outputs for individual commodities, derived either from the appropriate agencies directly or from other information sources particularly on the Internet. The type of data which was available varied widely from detailed statistical information to more qualitative data about the general patterns of operation of key industries.

Examples of sources of data of this type include:

- Statistics NZ for a wide range of data
- Ministry of Agriculture and Forestry
- Crown Minerals Mining Production Statistics
- New Zealand Forest Owners Association (NZFOA)
- New Zealand Timber Industries Federation
- Meat and Wool Economic Service
- Livestock Information Council (LIC) (for dairy statistics)
- New Zealand Horticulture
- Transit New Zealand for road traffic and heavy vehicle flows
- Land Transport New Zealand for Road User Charge (RUC) data
- port companies for details of their movements.

In other instances, specific companies that control a large part of the market often provide detailed information about their activities. An example of this is material on the movement of coal produced by Solid Energy. The information on the Solid Energy website identifies the source of production, the volume produced at that location, the main market and the main method or methods of transportation. What this information does not include is the pattern of distribution of the more minor flows which in some instances may amount to a substantial total and the published data was therefore supplemented by the results of the survey. Other information was gained from company reports and other material on company websites.

Where information on the total volumes produced or consumed was not available for particular commodities, we developed estimates using other sources for the key sectors, including where appropriate measures such as consumption per person and consumption per employee or conversion factors between weight and volume where only information on the value of output or sales existed. This approach was used particularly for retail sales, both for food and other retailing.

2.4 Assessment of present day flows

Our approach to the estimation of current day flows aimed to collect both general and detailed statistical material about their operations from a wide selection of the key players within the freight sector. This was combined with the statistical material to try to bring together as comprehensive a picture as possible of freight movements within New Zealand.

The steps involved were typically as follows:

- The total size of the market was identified using published and unpublished statistical material. This could relate to both the volumes available for distribution and the locations where the goods are consumed or exported.

- Where possible the results of the interview surveys were used to identify the linkages between the areas where goods are produced or imported and those where they are consumed or exported. Where this information was not fully available we built up estimates using a combination of the limited statistical information and our knowledge of the operations of the sector.

- The estimates of movement on a commodity by commodity basis were combined and then compared with information on total estimated freight flows built up from information on rail and coastal shipping movements and the estimated volume of road traffic derived from Road User Charges (RUC) data[7]. From this we were able to identify the extent to which the information we had collected for the specific commodities fell short of the overall totals for all commodities and movements combined, and an adjustment factor linking the estimates for the selected commodities with the forecasts for the sector as a whole was determined.

- After applying this adjustment factor to the total pattern of flows, rail and coastal shipping movements were subtracted to get an estimate of the pattern of movement by road transport. Information from this was then compared with road traffic counts in order to assess the reliability of the adjusted matrix. Given the approach taken and the differences which could occur, the results were considered to be reasonably robust.

- A comparison was also undertaken with the results of the NFM, although it was recognised that there were likely to be significant variations between the two because of the differences in approach adopted, with our study essentially taking a bottom-up approach and the NFM taking a top-down approach.

[7] *Transport Monitoring Indicator Framework 2008*, Version 1, MoT.

2.5 Evolution of the freight sector and changes in the level of demand

The surveys also sought to identify the way in which the freight sector is likely to evolve over the future in relation to changing patterns of demand and changes in the way in which freight might be handled and any constraints and issues which might impinge on this process. In developing future forecasts, these views of the respondents were combined with an appreciation of the data on recent trends and likely developments to produce estimates of future output and transport requirements for each of the major commodity groups identified. Forecasts for each of the commodities identified were produced for the short term (five years), medium term (10 years), and longer term (25 years), and overall longer-term forecasts were produced for movements by rail and coastal shipping. These combined forecasts of the total growth of the sectors identified with an assessment of the way in which the rail or coastal shipping share might change over time, either in response to specific developments or to general changes in the modal position.

The results of this forecasting exercise were then been compared with forecasts produced by other sources in particular the MoT[8] and Transport Engineering Research New Zealand (TERNZ)[9].

2.6 Other qualitative issues

As indicated above, the interviews and surveys covered a number of other issues affecting the freight sector, including the ways in which the sector might develop in the future and the constraints that those involved in the movement of freight faced now or might face subsequently. We also used the information from the surveys and discussions to identify a number of the key issues affecting freight mode choice.

A key part of our work was investigating the data that is available to assist those with interests in the sector, either by being involved directly or indirectly in the movement of goods or in developing strategies and policies for the sector. In the course of the study., it became clear that the level of information which was readily accessible on a regular basis was very limited. This is made clear in the *Transport Monitoring Indicator Framework* [10] recently published by MoT. In this framework, the information on the whole freight task is limited to aggregate estimates of the tonne-kms carried by road and includes nothing on any other modes or on any disaggregation of movements by road.

While the current study provides a snapshot of the current position for all the major modes, this needs to be supplemented by regular and more detailed data collection to ensure that it provides a reliable foundation for on-going future action. We have therefore made recommendations about the level of information which might be regularly collected and disseminated in order to assist the development of an efficient freight sector.

[8] Unpublished research by MoT.
[9] *Prediction of New Zealand's Freight Growth by 2020*, TERNZ 2006.
[10] *Transport Monitoring Indicator Framework* 2008 Version 1, MoT.

3 Present day patterns of commodity movements

3.1 General approach

In order to assess the patterns of movements of freight within New Zealand we have broken the sector down into a range of commodity groupings. As discussed in Section 2, for each of these we used the information available from a variety of published and unpublished sources to determine the total size of the commodity group and the ways in which commodities are moved both in terms of their origin-destination patterns and the modes used for this. As far as possible this information covers the period 2006-07.

For this analysis, we have combined Tasman, Marlborough and Nelson into a single area, which we have labelled as 'Tasman/Marlborough'. In addition to preserve confidentiality for some of the tables of detailed movements the regions have been further aggregated into area groupings, dividing the country into seven main areas:-

- Northland/Auckland
- Waikato/Bay of Plenty
- Hawke's Bay/Gisborne
- Taranaki/Manawatu-Wanganui/Wellington
- Tasman/Marlborough/West Coast
- Canterbury
- Otago/Southland.

The initial proposed set of commodity groupings was developed early in the study and is set out in Table 3.1.

Table 3.1
Initial proposed commodity groupings for analysis

Main commodity group	Sub groups where appropriate	Detailed definition
Agricultural		
Milk and dairy	Milk	Unprocessed bulk milk moving from farms to processing plants
	Dairy products: perishable	Perishable processed milk products moving from processing plants to consumption or export
	Dairy products: non-perishable	Non-perishable processed milk products moving from processing plants to consumption or export (including casein)
Timber	Logs	Logs moving from points of harvest to processing plants and ports of export
	Woodchips	Woodchips moving from the point of production to processing plants and ports of export
	Sawn timber	Sawn timber moving from sawmills to local consumption and ports of export
	Pulp and paper	Pulp and paper moving from production plants to local consumption / export ports
	Wood products	Wood panel products moving from production plants to local consumption / export ports
Animal products	Livestock	Live sheep, lambs and cattle moving from farms to processing plants or export ports
	Meat	Beef, veal, lamb, mutton, pigmeat and poultry and other meats moving from processing plants to local consumption and export
	Wool	Wool moving from farms to wool scourers and then to points of export or manufacture
Fish and shellfish		Unprocessed fish moving between landing point and processing plant for local consumption or export before processing (frozen fish without any other processing would be counted as unprocessed)
Horticultural and other agricultural products (nes[11])		Other agricultural products moving between the point of production and processing plants or local consumption or export
Basic minerals etc		
Basic construction materials including aggregates stone and sand		Aggregates and sand used for construction projects moving between the quarry, stockpile and construction site. Includes materials used to make concrete and concrete products
Limestone		Limestone other than for use in construction moving from point of production to local consumption or export
Coal		Coal moving from mines to local consumption or export or from import to local consumption
Other minerals		Other unprocessed ores and minerals moving between the point of production or import and the point of processing or export
Basic manufactured products		
Petroleum and related oil products		Crude oil moving from point of production or import to refinery plus refined petroleum products moving from the Marsden Point refinery or import port to final users
Fertiliser		Fertiliser moving from manufacturing plants or import facilities to local consumption
Cement		Cement moving from manufacturing plants or import ports to local consumption
Aluminium and steel		Steel and aluminium moving from manufacturing plants to local consumption and export or import locations to local consumption
Other semi-processed metals		Other semi-processed metal products (nes)
Other chemicals		Other chemicals (nes)
Consumer goods		
Manufactured food and beverages		Prepared foodstuffs and beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes
Other manufactured products		Other manufactured products either in intermediate or final form moving for further processing or for local consumption or for export.
High value items (nes)		Items typically carried by courier firms in small consignment sizes
Other		Other commodities (nes)

[11] Not elsewhere specified.

Some information was collected by these commodity groups, particularly for international trade through ports and airports and for movements by rail. However as the study progressed and more information emerged on the availability of data, particularly in terms of its detail and the confidentiality concerns of firms engaged in the industry, it was considered that it was more appropriate to adopt broader commodity groupings. These are set out in Table 3.2.

Table 3.2 Commodity groupings analysed
Liquid milk
Manufactured dairy products
Logs
Paper and packaging
Sawn timber
Other timber products
Animals and animal products
Horticultural products
Aggregates
Coal
Petroleum products
Aluminium and steel
Limestone, fertiliser, cement and concrete
Other minerals
Food products
Other retail products
Courier movements

3.2 Approach to the assessment

For each of the commodity groupings identified we have determined the total product available in New Zealand, local production plus imports and then assess the ways in which this is distributed. For this we have typically used a range of data sources sometimes combining these with reasonable assumptions about the areas in which these are consumed and the linking transport patterns.

In the remainder of this section we present a summary of the findings from this analysis.

3.3 Liquid milk

3.3.1 Introduction

The dairy industry is a very important part of the New Zealand economy and the volumes of both milk and finished products transported are substantial. These volumes include liquid milk transported from farm to factory, the movement of the finished products to export ports and to consumers in New Zealand and flows of milk and intermediate products between factories and stores. The industry is dominated by Fonterra. There are also a number of small firms within the industry either producing speciality products or operating in specific regions.

3.3.2 Information sources

Information on the dairy sector and the movements generated has been obtained from interviews with:

- Fonterra
- Westland Milk
- Open Country Cheese
- Tatua Dairy.

The information gained from these has been supplemented by information obtained from publicly available sources and also from information from transport operators and port statistics.

3.3.3 Milk production

In 2006-07, total milk production in New Zealand was just over 15 billion litres, equivalent to about 15.6 million tonnes. The estimated breakdown of production by region is set out in Table 3.3 and Figure 3.1. Figure 3.2 displays the geographical distribution of production.

Table 3.3
Liquid milk production 2006-07

	Total production (million litres)	Total production (000 tonnes)	Percent of total
Northland	905.9	933.1	6.0%
Auckland	410.9	423.2	2.7%
Waikato	4,520.7	4,656.3	29.9%
Bay of Plenty	1,235.0	1,272.1	8.2%
Gisborne	5.0	5.2	0.0%
Hawke's Bay	148.3	152.7	1.0%
Taranaki	1,706.8	1,758.0	11.3%
Manawatu-Wanganui	1,066.1	1,098.1	7.0%
Wellington	264.4	272.3	1.7%
Tasman/Marlborough	301.8	310.9	2.0%
West Coast	456.0	469.7	3.0%
Canterbury	2002.9	2,063.0	13.2%
Otago	700.4	721.4	4.6%
Southland	1,410.1	1,452.4	9.3%
Total	**15,134.2**	**15,588.2**	**100.0%**

Source: LIC New Zealand Dairy Statistics 2006-07 and consultant's analysis.

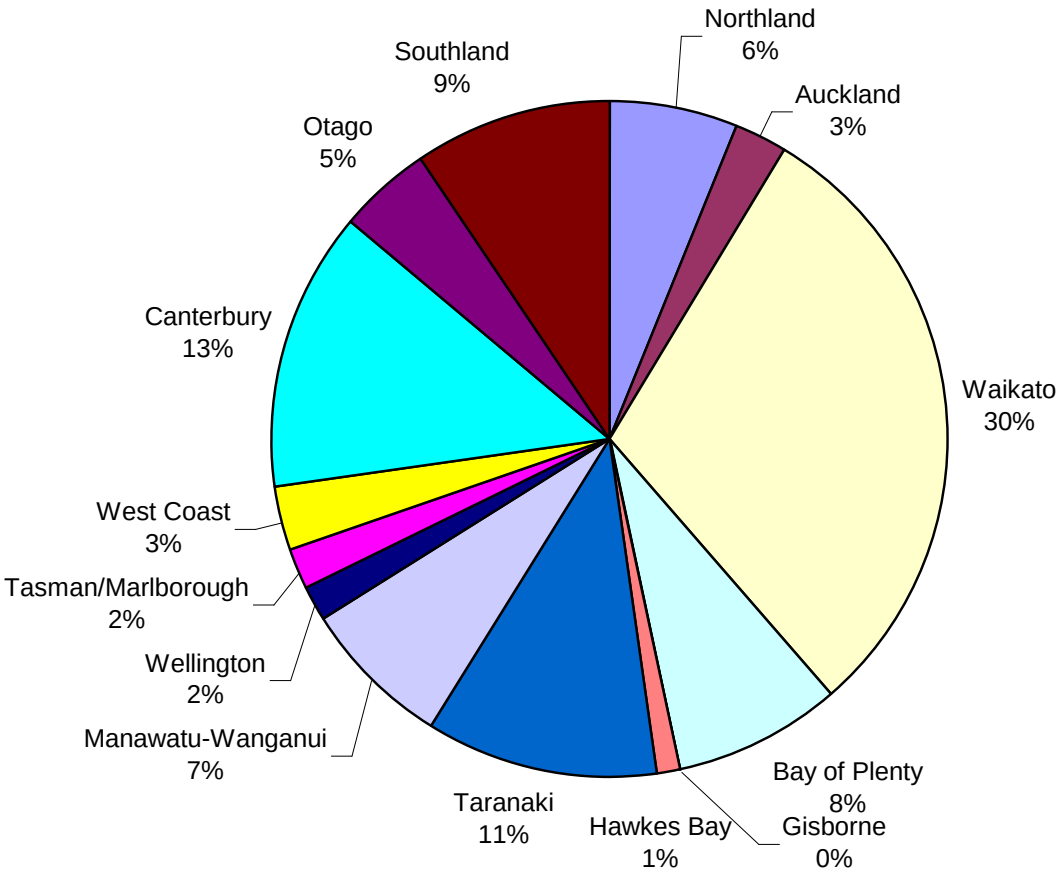


Figure 3.1
Milk Production in New Zealand by Region 2006-07

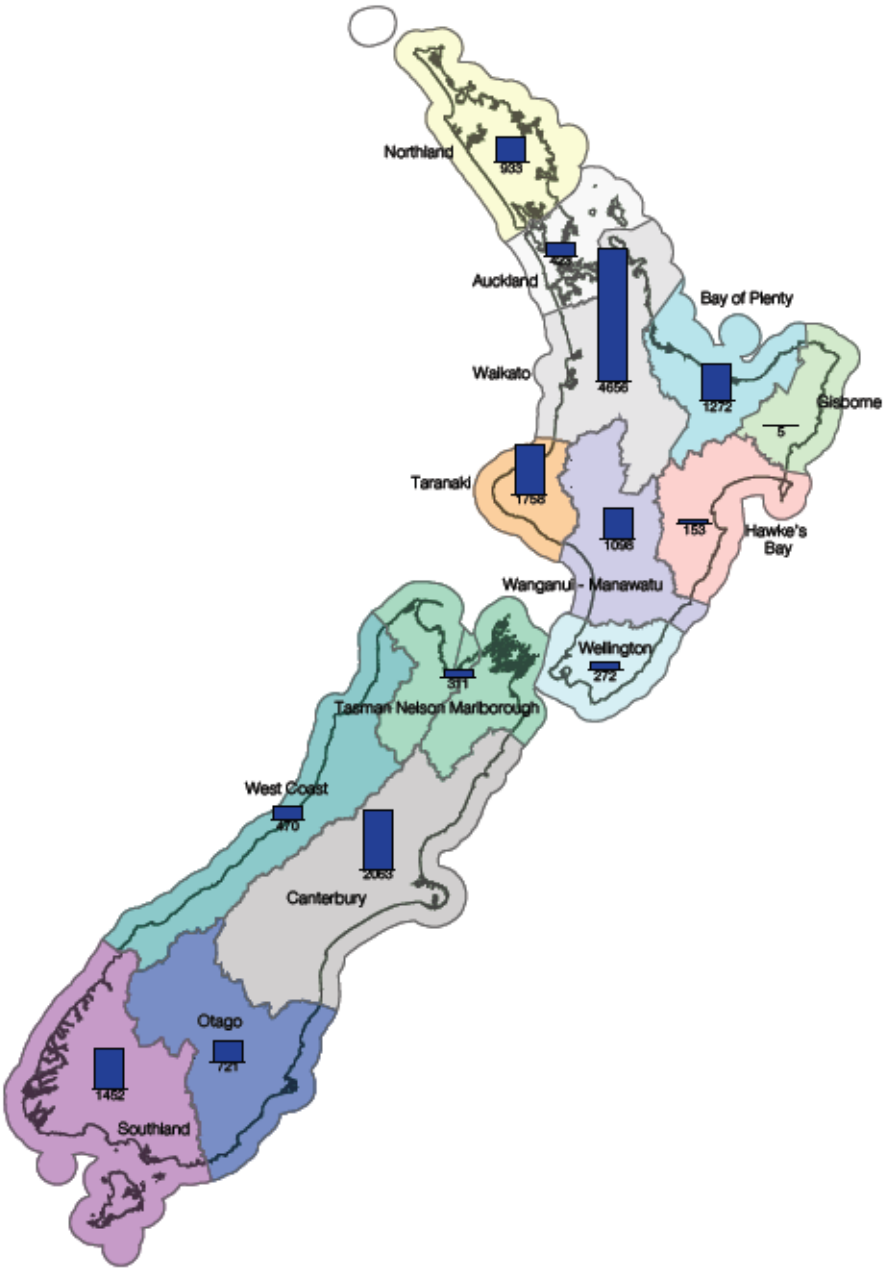


Figure 3.2
Regional Distribution of Liquid Milk Production 2006-07 (000 tonnes)

The main producing areas are the Waikato, Canterbury and Taranaki, which collectively account for almost 55 percent of total liquid milk production.

Milk production has in general been increasing steadily as can be seen in Table 3.4 and Figure 3.3.

Table 3.4 Growth of liquid milk production in New Zealand	
Year	Total milk production (million litres)
1998-99	10,563
1999-00	11,630
2000-01	12.925
2001-02	13,607
2002-03	13,906
2003-04 (1)	14,599 (1)
2004-05	14,103
2005-06	14,702
2006-07	15,134

Source: LIC New Zealand Dairy Statistics 2006-07.
Notes (1) Up to 2002/03, the production figures excluded production for town milk supplies and related to milk processed into export products only. Figures from 2003/04 include all milk produced.

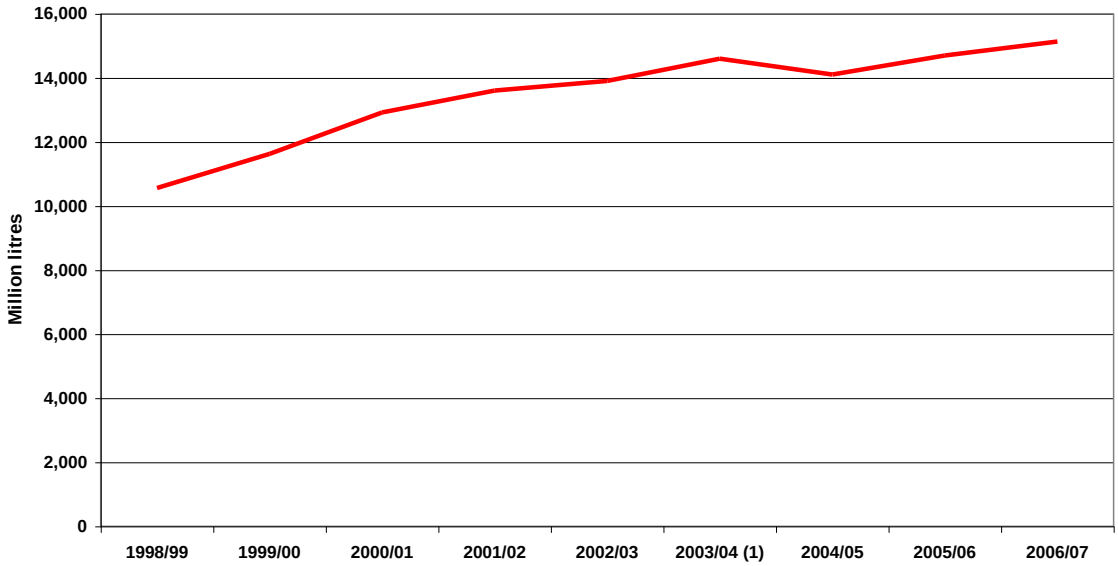


Figure 3.3
Milk Production in New Zealand 1998/99 to 2006-07
(Million Litres)

3.3.4 Movement of milk

Milk is a relatively low-value product and so is normally only moved from the farm to the nearest dairy factory or collection point. The main dairy factories and collection points are set out in Table 3.5

Table 3.5 Key dairy factories and collection points	
Company	Dairy factory
Tatua	Morrinsville
Open Country	Matamata
Westland Milk	Hokitika
Fonterra	Kauri (Whangarei) Maungaturoto Te Rapa (Hamilton) Morrinsville Waitoa Tirau Te Awamutu Hautapu (Cambridge) Lichfield Edgecombe Reparoa Whareroa (Hawera) Pahiatua Oringi (collection point only for onward rail transport) Longburn Takaka Brightwater Kaikoura Plains (Christchurch) Clandeboye (Timaru) Stirling Edenvale

While in general liquid milk is transported to the nearest dairy factory, because of the different requirements and capacities of the various Fonterra dairy factories, some of the liquid milk is transported between these to help optimise production and storage use following receipt from the farms. In part this is undertaken by train, both as part of a dedicated milk train service between the Oringi collection point and Longburn dairy factory in Manawatu and Whareroa in Taranaki, and in part by other rail services and by road.

The total volumes of liquid milk transported and their estimated origin-destination patterns are set out in Table 3.6. It should be noted that in part the information on movements between plants is based on data for 2007-08, when because of drought conditions milk production may have been slightly reduced.

Table 3.6
Movements of liquid milk 2006-07 by all modes
(million tonnes)

To From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	1.15	0.29	0.00	0.00	0.00	0.00	0.00	**1.44**
Waikato/Bay of Plenty	0.02	6.36	0.00	0.01	0.00	0.00	0.00	**6.39**
Gisborne/Hawke's Bay	0.00	0.00	0.00	0.16	0.00	0.00	0.00	**0.16**
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.04	0.00	3.92	0.00	0.00	0.00	**3.96**
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.01	0.78	0.01	0.00	**0.80**
Canterbury	0.00	0.00	0.00	0.00	0.00	2.21	0.01	**2.22**
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.01	2.18	**2.19**
Total	**1.17**	**6.69**	**0.00**	**4.10**	**0.78**	**2.23**	**2.19**	**17.15**

3.4 Manufactured dairy products

3.4.1 International trade in dairy products

Substantial volumes of dairy products are exported from various ports in New Zealand. The position for 2006-07 is set out in Table 3.7. It should be noted that this includes only bulk dairy products and other dairy exports are included in the food and beverages classification.

Table 3.7
Exports of dairy products from New Zealand ports 2006-07
(000 tonnes)

	Milk	Dairy - perishable	Dairy non-perishable	Total
Whangarei	0.0	0.0	0.0	**0.0**
Auckland Seaport	27.5	237.7	293.1	**558.3**
Tauranga Seaport	10.6	236.8	242.6	**490.1**
Gisborne	0.0	0.0	0.0	**0.0**
New Plymouth	0.4	111.9	124.9	**237.2**
Napier	0.0	9.8	26.8	**36.7**
Wellington Seaport	0.0	8.7	9.3	**18.0**
Nelson	0.0	2.6	13.4	**16.0**
Picton	0.0	0.0	0.0	**0.0**
Westport	0.0	0.0	0.0	**0.0**
Christchurch Seaport (Lyttelton)	37.8	32.2	50.7	**120.7**
Timaru	2.1	63.1	105.6	**170.9**
Dunedin Seaport (Port Chalmers)	1.3	172.3	272.4	**446.0**
Invercargill Seaport (Bluff)	0.0	0.0	0.1	**0.1**
Other Seaports	0	0	0	**0**
Auckland Airport	0.0	0.0	4.3	**4.3**
Wellington Airport	0.0	0.0	0.0	**0.0**
Christchurch Airport	0.0	0.0	0.3	**0.3**
Other Airports	0.0	0.0	0.0	**0.0**
				0.0
Total	**79.8**	**875.1**	**1,143.7**	**2,098.7**

Source : Statistics New Zealand port statistics.

Dairy products are exported from various ports in New Zealand, reflecting to a large extent the patterns of production. The most important ports are Auckland, Tauranga and Dunedin. There are also significant volumes exported through New Plymouth, Timaru and Christchurch.

3.4.2 Patterns of distribution: manufactured dairy products

Manufactured products are transported by both road and rail for the domestic and international markets. The overall pattern of movement for Fonterra and Westland Milk is set out in Table 3.8. The Fonterra data for 2007/08 has been adjusted to give an estimate of the 2006-07 figures.

Table 3.8
Estimated distribution of dairy products (all modes)
(million tonnes in 2006-07

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.29	0.01	0.00	0.00	0.00	0.00	0.00	0.30
Waikato/Bay of Plenty	0.47	0.92	0.00	0.04	0.00	0.00	0.00	1.43
Gisborne/Hawke's Bay	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Taranaki/Manawatu-Wanganui/Wellington	0.04	0.05	0.05	0.57	0.00	0.00	0.00	0.71
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.00	0.04	0.08	0.00	0.12
Canterbury	0.01	0.00	0.00	0.01	0.00	0.60	0.02	0.65
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.02	0.58	0.60
Total	**0.81**	**0.99**	**0.06**	**0.62**	**0.04**	**0.70**	**0.60**	**3.82**

3.5 Log, timber and wood products

3.5.1 Introduction

Forestry and its related industries play a key role in the New Zealand economy. It is therefore to be expected that they are also major players in the transport of freight around the country. This is supported by the NFM study in 2005, which estimated (see NFM Table 5.2) that forestry, sawn timber and wood products together account for about two billion road tonne-km annually, compared with about 800 million each for livestock and dairy, the closest specific commodities (ie ignoring 'Other').

In terms of the raw products, there are currently almost two million ha of plantation forestry in New Zealand, a figure which has approximately doubled in the last 25 years. Most regions have some area under forestry but the main ones are Northland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Manawatu-Wanganui, Tasman, Canterbury and Otago. The distribution of forestry areas by Regional Council is set out in Table 3.9 and Figure 3.4.

Table 3.9
Forest areas by regional council as at 30 June 2006 (hectares)

Region	Plantations of exotic trees intended for harvest	Proportion of total
Northland	157,708	9%
Auckland	45,867	3%
Waikato	259,672	15%
Bay of Plenty	265,535	16%
Gisborne	150,432	9%
Hawke's Bay	115,612	7%
Taranaki	22,489	1%
Manawatu-Wanganui	136,640	8%
Wellington	60,289	4%
North Island	**1,214,244**	**72%**
Tasman	83,256	5%
Nelson	10,840	1%
Marlborough	59,385	4%
West Coast	30,500	2%
Canterbury	99,375	6%
Otago	111,946	7%
Southland	72,754	4%
Area Outside		0%
South Island	**468,272**	**28%**
Total New Zealand	**1,682,517**	**100%**

Source: Statistics NZ. It should be noted that the New Zealand Forest Owners Association (NZFOA) also publish estimates of forest areas which although having a similar total area have a different geographical allocation. It is assumed that this reflects differences in the definitions of regions and some differences in the approach to data collection.

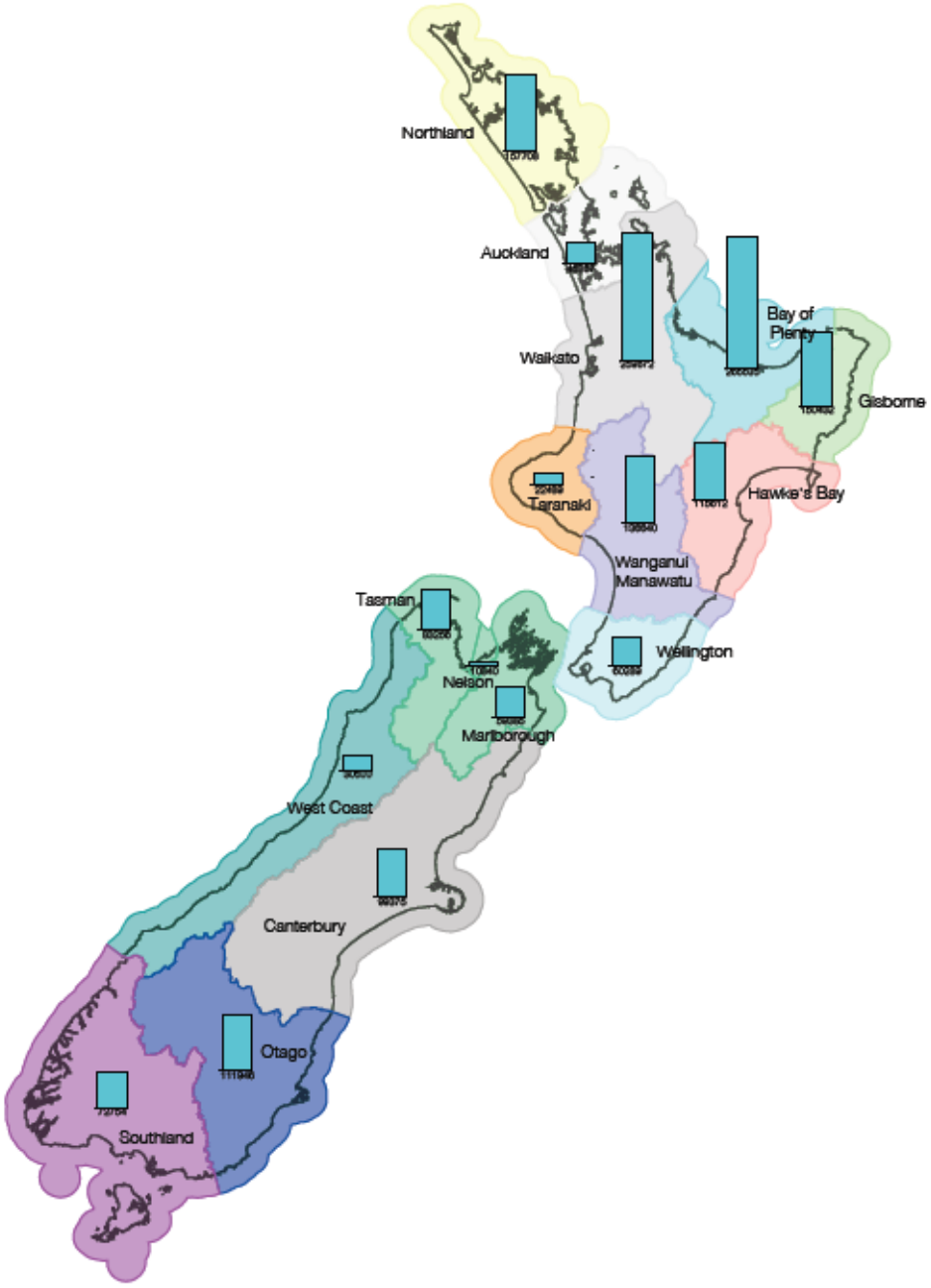


Figure 3.4
Geographical Distribution of Forest Areas by Regional Council 2006 (hectares)

The approximate annual harvest of logs is currently about 20 million tonnes. These logs get used in a number of ways and including the outputs of intermediate processing, the total weight of forestry products lifted is estimated to be about 30 million tonnes in total.

Because of the relatively low value of many forest products, keeping transport costs as low as possible is an important objective for the major players in the industry.

Finally, the forest industry is a considerable contributor to exports, with around 10.5 million tonnes of wood and wood products being exported every year. By weight this represents almost half of the annual export total of 22 million tonnes for all commodities.

3.5.2 Information sources

Sources of information used include statistics produced by Ministry of Agriculture and Forestry (MAF), Statistics New Zealand and NZFOA, reports produced by Land Transport New Zealand (particularly the paper by Ron Veltman[12]) and discussions with a number of key stakeholders in the industry including Carter Holt Harvey, Laminex and Norske Skog.

3.5.3 Industry structure

The ownership structure of forests in New Zealand is set out in Table 3.10.

Table 3.10
New Zealand planted forest ownership/management (ha)
as at 1 December 2006

Owner	Land area (Hectares)	Percent of total
Hancock Natural Resource Group	289,000	16%
Kaingaroa Timberlands	167,000	9%
Matariki Forests	143,000	8%
Ernslaw One	75,000	4%
Weyerhaeuser New Zealand (1)	60,000	3%
Juken New Zealand	56,000	3%
Crown Forestry (MAF)	37,000	2%
Pan Pac Forest Products	33,000	2%
Global Forest Partners (2)	27,000	1%
Timberlands West Coast (3)	27,000	1%
Hikurangi Forest Farms	27,000	1%
Blakely Pacific	25,000	1%
Wenita Forest Products	24,000	1%
Roger Dickie New Zealand	24,000	1%
Forest Enterprises	22,000	1%
Winstone Pulp International (4)	16,000	1%
City Forests	15,000	1%
Other	751,000	41%
Total (5)	**1,818,000**	**100.0**

Source: NZFOA
Footnotes:
1. At the reference date for this table Weyerhaeuser owned 51% of these Nelson forests. In June 2007 Weyerhaeuser announced that these forests were to be sold to Global Forest Partners effective from 1 November 2007.
2. In addition to the outright ownership of 27,000 hectares as at 1 December 2006 Global Forest Partners has further equity interests in a range of New Zealand forest investments including joint ventures in Mangakahia Forest with Hancock Natural Resource Group, Wenita Forest Products forests and the Nelson forests managed by Weyerhaeuser NZ inc.
3. Since the reference date for this table, Timberlands West coast has been transferred to crown Forestry.
4. Since the reference date for this table, Ernslaw One has purchased Winstone Pulp international.
5 Based on the total net stocked area reported in *A National Exotic Forest* description as at 1 April 2006.

[12] *The Forest Industry's Demand for Transport*, unpublished research by Ron Veltman of Land Transport New Zealand, November 2007.

About a third of the total belongs to the three main owners, a third to small owners and farms and the rest to medium-sized owners such as Pan Pac and Crown Forestry. While the breakdown of ownership of forests is not directly related to the breakdown of volume produced it is likely to be similar.

3.5.4 End uses of logs

There are four primary destinations for logs, which are shown below along with the percentage split between them:

a) export logs and chips - 35 percent

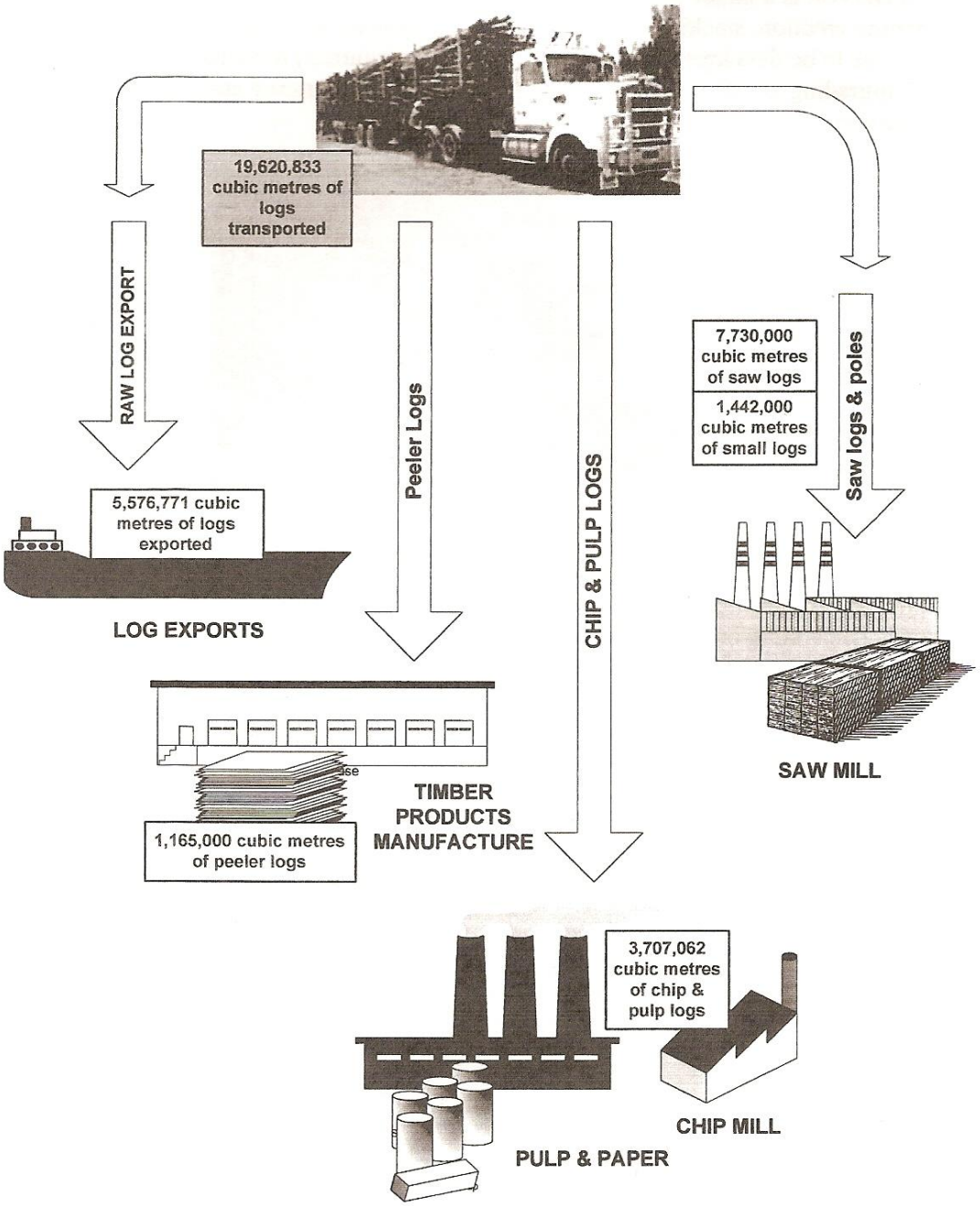
b) peeler logs to timber product plants - eight percent

c) saw and small logs to sawmill - 41 percent

d) pulp logs for chip, pulp, paper etc - 16 percent.

Note that some of (b) to (d) will be exported after value has been added – this accounts for 40 to 50 percent of total exported weight of wood products (see below) with the remainder being exported logs (a). Additionally there is movement within the industry, eg residue from product plants is used in the manufacture of paper and packaging.

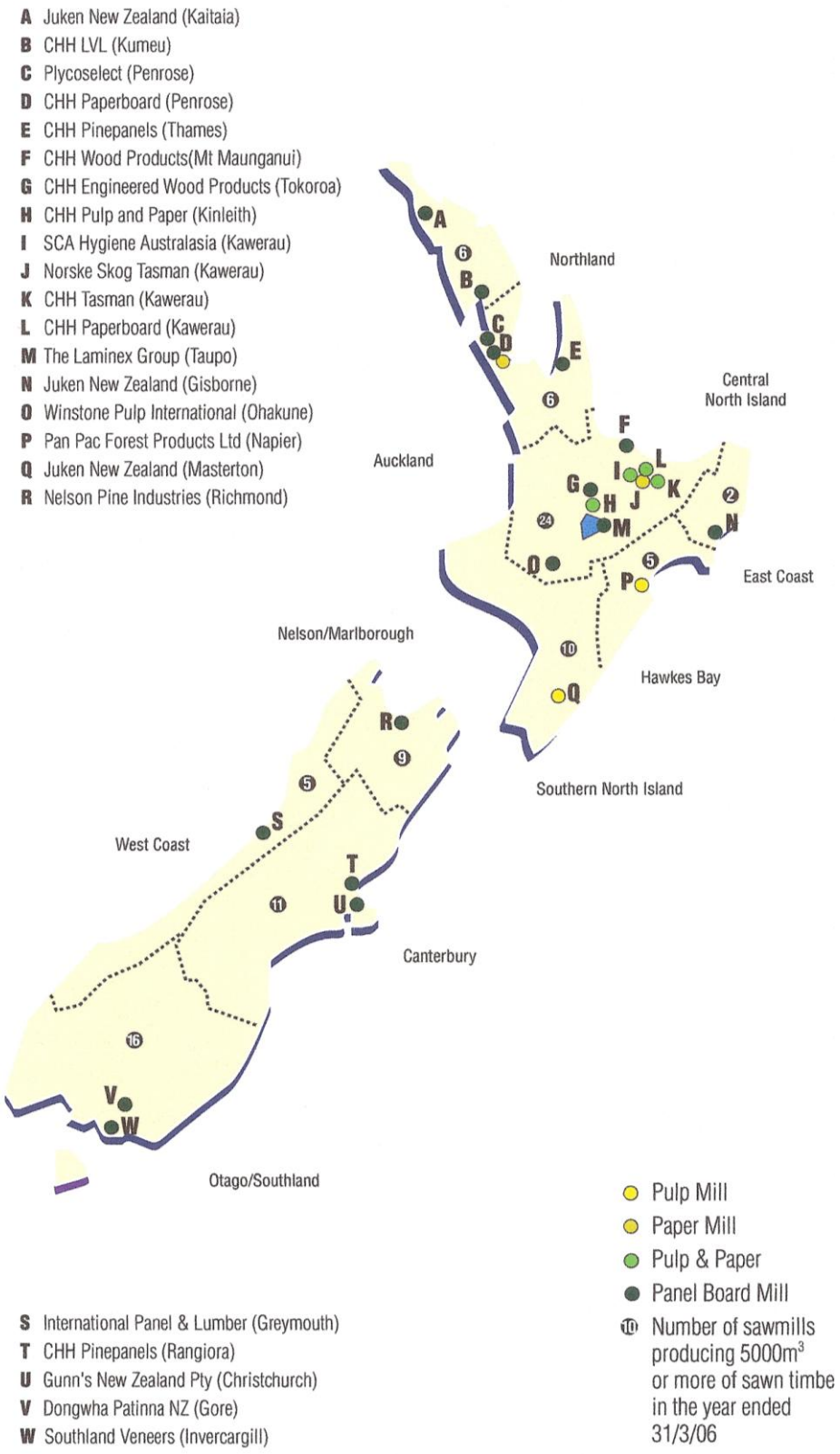
The processes involved are illustrated in Figure 3.5.



Source : Veltman

Figure 3.5
Processes Involved in the Wood, Timber and Wood Products Sector

The key locations of activity in the industry are set out in Figure 3.6.

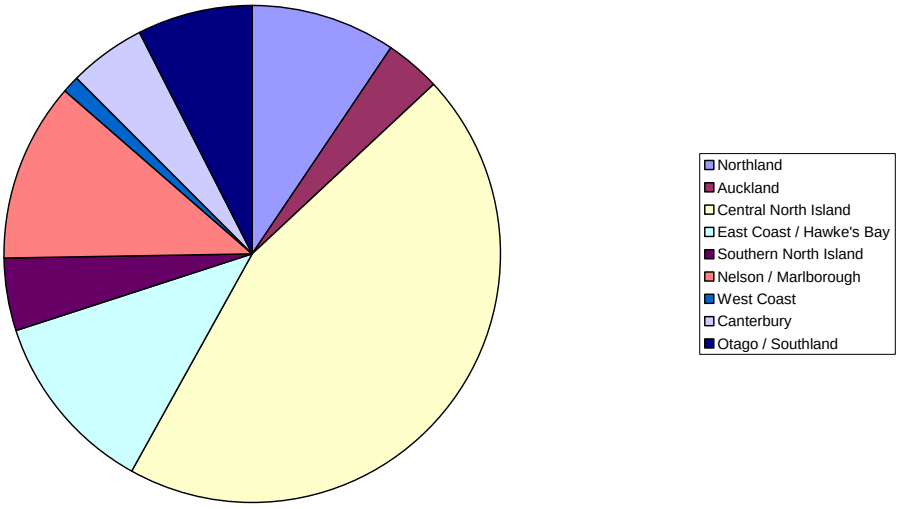


Source: New Zealand Forest Industry Facts and Figures 2007-2008

Figure 3.6
Locations of Key Activities

3.5.5 Production

Figure 3.7 below shows the breakdown of log production by region. The dominance of Central North Island is clear, accounting for around 45 percent. Northland, Hawke's Bay/East Coast and Nelson/Marlborough each produce a further 10-12 percent.



Source: MAF

Figure 3.7
Log Removals by Region

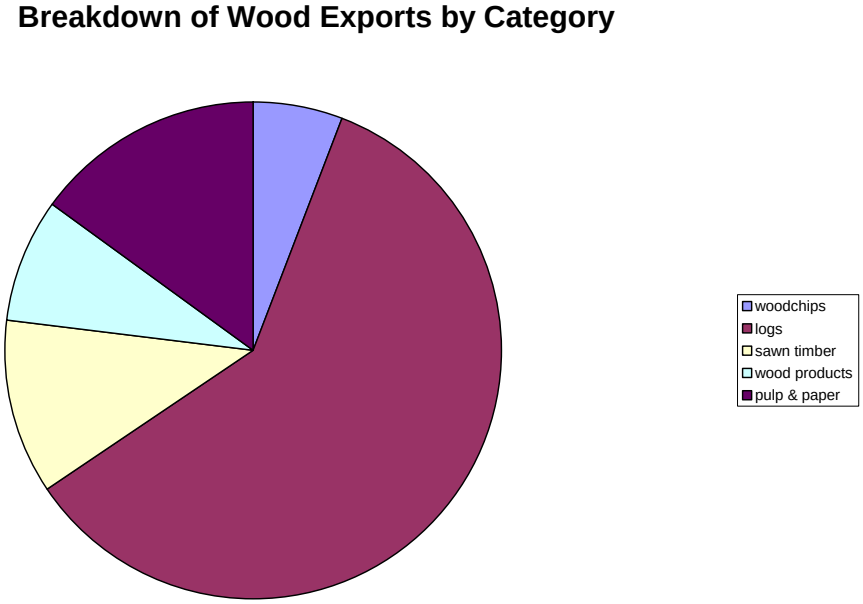
3.5.6 International trade

Imports

The total of imported wood products is 660,000 tonnes per annum. For comparison this is about six percent of the volume of exports. Pulp and paper represent 85 percent of imports, and wood products are nine percent, with most of the remainder being sawn timber. Pulp and paper imports are mainly through Auckland (60 percent) and around 10 percent each through Tauranga, Wellington and Christchurch.

Exports

About 65 percent of the 10.5 million tonnes exported is logs and woodchips, with sawn timber, wood products and pulp/paper each accounting for 8-15 percent. This is illustrated in Figure 3.8



Source: Stats NZ

Figure 3.8
Breakdown of Wood Exports by Category

In terms of the ports used, the pattern of exports varies by category, although Tauranga plays a key role in most. Table 3.11 summarises all the port data.

Table 3.11
Export traffic by logs and wood products by port for 2006-07
(000 tonnes)

Port	Woodchips	Logs	Sawn timber	Wood products	Pulp & paper	Total
Whangarei	188.0	712.5	15.8	113.3	0.0	1,029.6
Auckland Seaport	0.4	1.9	178.3	110.5	138.5	429.7
Tauranga Seaport	0.1	2,358.2	466.9	102.1	922.7	3,850.0
Gisborne	0.0	519.2	7.6	13.4	0.0	540.2
Napier	229.9	634.2	185.5	9.1	220.3	1,279.1
New Plymouth	0.1	29.7	5.3	0.5	0.0	35.6
Wellington Seaport	0.1	236.9	49.6	44.5	208.7	539.8
Nelson	0.0	702.4	87.3	218.8	4.3	1,012.9
Picton	0.0	377.2	0.7	0.0	0.0	377.9
Westport	0.0	0.0	0.0	0.0	0.0	0.0
Christchurch Seaport (Lyttelton)	0.0	162.5	69.7	94.3	64.2	390.7
Timaru	0.0	138.1	25.8	12.9	2.8	179.6
Dunedin Seaport (Port Chalmers)	58.4	335.5	61.6	54.6	15.1	525.2
Invercargill Seaport (Bluff)	124.7	93.9	48.4	57.5	0.3	324.8
Total	**601.8**	**6,302.2**	**1,202.4**	**832.0**	**1578.4**	**10,516.9.**

Source: Statistics NZ

The key pointers to emerge for each product are as follows:

Woodchips (annual exports 0.6 million tonnes): Napier has around 40 percent, Whangarei 30 percent, Bluff 20 percent and Port Chalmers the rest.

Logs (annual exports 6.3 million tonnes): Tauranga has around 40 percent; Whangarei, Gisborne, Napier and Nelson each have 10 percent; Picton and Dunedin around five percent each.

Sawn timber (annual exports 1.2 million tonnes): 40 percent Tauranga; 15 percent each Napier and Auckland; Nelson, Lyttelton and Port Chalmers each have 5-7 percent.

Wood products (annual exports 830,000 tonnes): Nelson 26 percent; Whangarei, Auckland, Tauranga and Lyttelton each have around 13 percent; Wellington, Port Chalmers and Bluff each have 5-7 percent.

Pulp and paper (annual exports 1.6 million tonnes): Tauranga 60 percent; Napier and Wellington 14 percent each; Auckland nine percent.

3.5.7 End uses of logs

Logs and woodchips to port

Given the high cost of transport and the weight of the product, as far as possible all logs exported will come from the region of the export port with the exception of Manawatu (product exported through Wellington), Waikato (through Tauranga) and West Coast (through Lyttelton). The same has been assumed for woodchips for export. The resulting pattern of movements is given in Table 3.12.

Table 3.12
Export log and woodchip movements
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	0.90														0.90
	Auckland		0.02													0.02
	Waikato				1.19 (1)											1.19
	Bay of Plenty				1.19 (1)											1.19
	Gisborne					0.52										0.52
	Hawke's Bay						0.86									0.86
	Taranaki							0.03								0.03
	Manawatu									0.16						0.16
	Wellington									0.08						0.08
	Tasman/ Marlborough										1.08					1.08
	West Coast															0
	Canterbury												0.30			0.30
	Otago													0.39		0.39
	Southland														0.22	0.22
	Total	**0.90**	**0.02**	**0**	**2.38**	**0.52**	**0.86**	**0.03**	**0**	**0.24**	**1.08**	**0**	**0.30**	**0.39**	**0.22**	**6.94**

Source: Statistics NZ and consultant's analysis.
Notes (1) Based on an assessment of the forested areas, log and woodchip traffic through Tauranga is assumed to derive equally from Waikato and Bay of Plenty.

Timber products

Currently around eight million tonnes of logs go annually from harvest to the mill to be converted into sawn timber such as construction timber and posts and poles. Figures are available on the total volumes of sawn timber produced by region and these are set out in Table 3.13.

Table 3.13
Production of sawn timber by region 2006-07 (m^3 000s)

Wood producing area	m^3 000s	Equivalent inputs (000 tonnes) (1)
Northland	287	540
Auckland	268	510
Central North Island	1,885	3,560
East Coast/Hawke's Bay	424	800
Southern North Island	260	490
Nelson/Marlborough	452	850
Canterbury	235	440
West Coast	89	170
Otago/Southland	430	810
Total	**4,330**	**8,170**

Source : MAF/Statistics NZ

The production by Region within the wood supply regions has been estimated to be proportional to the area planted. The matrix of movements is set out in Table 3.146

The finished product either goes to local markets or to export, with around 1.2 million tonnes exported annually. The milling process produces residue which goes in part to the manufacture of pulp and paper and in part to a wide variety of other uses.

The number of sawmills handling over 5,000 m^3 per year is reported by Veltman to be 57 in the North Island and 42 in the South. Unsurprisingly the mills are located close to the main forestry areas, with 24 in the Central North Island but there are no mills in the Wellington or Auckland regions.

Although it is a simplification of the true position, with the widespread distribution of sawmills, virtually all timber processed by sawmills is likely to be sourced within the region in which the mill is located. The average distances travelled by the logs are derived from Veltman.

The estimates of local consumption have been determined using an average consumption per person based on the overall volumes available to the local market in New Zealand. The balance between supply and demand has been estimated on the assumption that in principle materials travel the shortest distance possible. However, because of imbalances between demand and supply for the regions, this results in some longer distance flows between regions.

The pattern of movement which results is set out in Table 3.15.

Table 3.14
Logs to sawmills
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	0.54	-	-	-	-	-	-	-	-	-	-	-	-	-	0.54
	Auckland	-	0.51	-	-	-	-	-	-	-	-	-	-	-	-	0.51
	Waikato	-	-	1.78	-	-	-	-	-	-	-	-	-	-	-	1.78
	Bay of Plenty	-	-	-	1.78	-	-	-	-	-	-	-	-	-	-	1.78
	Gisborne	-	-	-	-	0.27	-	-	-	-	-	-	-	-	-	0.27
	Hawke's Bay	-	-	-	-	-	0.53	-	-	-	-	-	-	-	-	0.53
	Taranaki	-	-	-	-	-	-	0.02	-	-	-	-	-	-	-	0.02
	Manawatu	-	-	-	-	-	-	-	0.33	-	-	-	-	-	-	0.33
	Wellington	-	-	-	-	-	-	-	-	0.14	-	-	-	-	-	0.14
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	0.85	-	-	-	-	0.85
	West Coast	-	-	-	-	-	-	-	-	-	-	0.17	-	-	-	0.17
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	0.44	-	-	0.44
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	0.53	-	0.53
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28	0.28
	Total	**0.54**	**0.51**	**1.78**	**1.78**	**0.27**	**0.53**	**0.02**	**0.33**	**0.14**	**0.85**	**0.17**	**0.44**	**0.53**	**0.28**	**8.17**

Source: Statistics NZ and consultant's analysis.

Table 3.15
Sawmill output to markets
(000 tonnes p.a.)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.12	0.17	-	-	-	-	-	-	-	-	-	-	-	-	0.29
	Auckland	-	0.27	-	-	-	-	-	-	-	-	-	-	-	-	0.27
	Waikato	-	0.65	0.23	-	-	-	0.04	-	-	-	-	-	-	-	0.92
	Bay of Plenty	-	-	0.05	0.64	-	0.06	-	0.15	-	-	-	-	-	-	0.89
	Gisborne	-	-	-	-	0.04	0.10	-	-	-	-	-	-	-	-	0.14
	Hawke's Bay	-	-	-	-	-	0.14	-	-	0.15	-	-	-	-	-	0.28
	Taranaki	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	0.01
	Manawatu	-	-	-	-	-	-	0.03	0.01	0.16	-	-	-	-	-	0.21
	Wellington	-	-	-	-	-	-	-	-	0.07	-	-	-	-	-	0.07
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	0.21	-	0.24	-	-	0.45
	West Coast	-	0.01	-	-	-	-	-	-	-	-	0.03	0.05	-	-	0.09
	Canterbury	-	0.02	-	-	-	-	-	-	-	-	-	0.22	-	-	0.24
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.05	0.23	-	0.28
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.13	0.15
	Total	**0.12**	**1.11**	**0.28**	**0.64**	**0.04**	**0.29**	**0.08**	**0.16**	**0.38**	**0.21**	**0.03**	**0.56**	**0.24**	**0.13**	**4.28**

Pulp and paper

Total pulp production in New Zealand in 2006-07 was about 1.5 million tonnes. Using ratios developed by Veltman a tonne of pulp typically requires about 2.5-3 tonnes of inputs, with these typically in the range of 60-70 percent logs and 30-40 percent residues, although this can vary significantly for individual plants. On this basis about three million tonnes of logs would be required and up to about 1.5 million tonnes of residues.

Paper is manufactured mainly from pulp with one tonne of pulp producing about 1.7 tonnes of paper. In 2006-07 about 0.9 million tonnes of paper was produced in New Zealand, using about 0.4 million tonnes of pulp and also some recycled paper collected from various collection points mainly in the North Island. For example, Carter Holt Harvey (CHH) recycles paper from a number of collection points which is then transported to their mill in Penrose in Auckland.

About three million tonnes per annum of the log harvest goes to pulp and paper, in addition to the mill residue referred to above. There are eight mills producing either pulp or paper or both in New Zealand, all of them in the North Island and half in Eastern Bay of Plenty. Again the output goes to either local markets or export. Some information on the capacity of the pulp and paper mills is available from published sources and this is set out in Table 3.16.

Table 3.16
Pulp and paper mill capacities

Company	Mill	Pulp and paper capacity (tonnes)
CHH	Kinleith	605,000
CHH	Tasman (Kawerau)	270,000
CHH	Whakatane	115,000
CHH	Penrose	80,000
PanPac	Whirinaki	260,000

Source: company websites

The sources of timber for the pulp mills are assumed to be as close to the mills as possible. Results from the interviews indicated that this could involve distances of up to about 300 kms between forest and mill, although the average distance is much smaller, probably in the range of 100-150 kms.

A total of 1.6 million tonnes of pulp and paper was exported in 2006-07. This is set out above in Table 3.11. Given the mill locations it is not surprising that Tauranga is the dominant port for exports. Local consumption of paper has been assessed in part using data from manufacturers and in part on the basis of a constant average consumption per person. The pattern of distribution has been assessed to balance the estimated supply and demand and takes into account the patterns reported by the firms interviewed.

The estimated pattern of movements into and out of the pulp mills is set out in Table 3.17.

Board

There are seven board mills in the North Island and six in the South Island. Again their locations coincide with forestry areas, for example Nelson, Wairarapa, Gisborne and Northland north of Whangarei. The total logs used for board production amounts to about 1.5 million tonnes.

The total output of board mills in 2006-07 was about 2.5 million tonnes, with about one million tonnes exported and the remainder going to local markets. Some information about the patterns of distribution is available from the results of interviews and this has been taken into account in deriving the origin-destination patterns for these movements. The combined pattern of movement is set out in Table 3.18.

Table 3.17
Pulp and paper mills: inputs and outputs
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	-	-	-	0.20	-	-	-	-	-	-	-	-	-	-	0.20
	Auckland	-	0.26	0.01	0.01	-	-	-	-	-	-	-	0.00	-	-	0.28
	Waikato	0.01	0.13	1.81	0.44	-	0.14	-	-	-	0.01	0.00	0.05	0.01	0.00	2.61
	Bay of Plenty	-	0.01	0.00	1.79	-	0.14	-	0.30	-	-	-	0.05	0.01	0.00	2.30
	Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hawke's Bay	-	0.01	-	-	0.00	0.67	-	-	0.03	-	-	-	-	-	0.71
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Manawatu	-	-	-	-	-	-	0.01	0.26	0.21	-	-	-	-	-	0.47
	Wellington	-	-	-	-	-	-	-	0.05	-	-	-	-	-	-	0.05
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**0.01**	**0.41**	**1.82**	**2.44**	**0.00**	**0.95**	**0.01**	**0.61**	**0.23**	**0.01**	**0.00**	**0.10**	**0.03**	**0.01**	**6.63**

Table 3.18
Board mills: inputs and outputs
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.40	0.24	0.03	0.00	-	-	-	-	-	-	-	-	-	-	0.67
	Auckland	0.01	0.18	0.04	0.01	0.00	0.01	0.00	0.01	0.02	-	-	0.00	0.00	-	0.29
	Waikato	0.01	0.12	0.21	0.06	0.00	0.01	0.02	0.03	0.01	-	-	-	-	-	0.48
	Bay of Plenty	0.00	0.03	0.01	0.11	0.12	0.01	0.00	0.00	0.19	-	-	0.00	-	-	0.48
	Gisborne	-	0.02	0.03	0.04	0.06	0.03	0.00	0.02	0.05	0.01	-	0.00	-	-	0.25
	Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Manawatu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wellington	-	0.01	0.06	0.04	-	0.01	0.01	0.02	0.05	0.03	-	0.00	-	-	0.23
	Tasman/ Marlborough	-	0.01	0.00	-	-	-	-	0.00	0.01	0.53	0.01	0.15	0.03	0.02	0.77
	West Coast	-	0.00	0.00	-	-	-	-	0.00	0.00	0.04	0.10	0.07	0.02	0.01	0.25
	Canterbury	-	0.01	0.01	-	-	-	-	0.00	0.01	0.02	-	0.45	0.08	0.01	0.59
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.06
	Southland	-	0.00	0.00	-	-	-	-	0.01	0.02	0.01	-	0.05	0.02	0.11	0.22
	Total	**0.42**	**0.61**	**0.39**	**0.27**	**0.19**	**0.06**	**0.04**	**0.10**	**0.37**	**0.65**	**0.11**	**0.72**	**0.15**	**0.20**	**4.29**

3.6 Summary

The overall patterns of movement for timber products are set out in Table 3.20 and 3.21

The table below summarises the approximate volumes of timber flowing between the various parts of the value chain. While the figures are approximate the table shows that the total volume moved is about 50 percent higher than that for logs alone.

Table 3.19
Summarised main movements of logs and timber (million tonnes)

From	To port	To sawmill	To pulp & paper	To board	To local market	Total
Forest	6.9	8.2	3.0	1.6	-	19.7
Sawmill	1.2	-	1.7	-	3.1	6.0
P & P	1.6				0.2	1.8
Board	1				1.6	2.6
Total	**10**	**8.2**	**4.7**	**1**	**6**	**30.1**

Source: consultant's analysis.

Rail carries about 1.5 million tonnes or about five percent of the total volume.

Main movements

It is clear from the analysis above that the majority of movements for all wood-related products will be 'on the diagonal' as far as a region-to-region matrix is concerned, although as the product moves up the value chain it is likely to be transported greater distances. Logs for export therefore tend to be taken to the nearest port with the major exception of movements from the Central North Island and the Waikato to Tauranga and the West Coast to Lyttelton whereas for board products, those manufactured in Southland (and in other locations), are distributed nation-wide.

It should also be noted that forests are no respecters of regional boundaries. While we have identified movements as entirely intra-regional, there may in practice be significant movements from just over the regional boundary when large forest areas are felled. This type of movement can fluctuate substantially from year to year. The movement of timber residues can also vary significantly depending on the balance between supply and demand for particular type of product. For some specialised commodities, the distances travelled can be quite long with, for example, the movement of long-fibre wood chip from Whangarei to the pulp mills in the central North Island.

Unsurprisingly, bearing in mind the size of the regions involved, intra-regional trips are relatively long reflecting the distance of the log producing areas from ports or processing facilities. Veltman quotes an average trip length of around 150 km within the Northland, East Coast, South Canterbury and Otago regions although these are at the upper end of the scale. Overall the average intra-regional trip length is of the order of 90 km.

Looking at the picture for wood and timber products as a whole the total transport task for both logs and wood and timber products amounts to about 3.8 billion tonne-kms annually, with an average journey length of about 120-130 kms.

The overall figure of over 3.8 billion tonne-kms is substantially higher than the two billion reported in the NFM. The difference can be attributed to:

- growth in the 4–5 years since the NFM data was collected, which would add perhaps 10 – 20 percent

- more robust data being available and a more detailed breakdown undertaken for the current study, particularly taking into account the movements of manufactured wood products.

Use of rail

As indicated above the rail accounts for about five percent of the tonnages lifted, mainly logs and paper. In general distances for logs and wood products are relatively low at about 160 kms compared to the overall average for rail of 283 kms.

A high proportion of rail traffic is either within or to the Bay of Plenty from Waikato and typically feeds into the port at Tauranga. There is also some movement within Northland feeding Whangarei, but limitations on the rail track may inhibit movements to areas further south. Rail is also used to distribute wood products from Southland.

Table 3.20
Total movements of forest products
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	1.96	0.40	0.03	0.20	-	-	-	-	-	-	-	-	-	-	2.60
	Auckland	0.01	1.23	0.05	0.02	0.00	0.01	0.00	0.01	0.02	-	-	0.00	0.00	-	1.37
	Waikato	0.02	0.90	4.03	1.70	0.00	0.15	0.07	0.03	0.01	0.01	0.00	0.05	0.01	0.00	6.98
	Bay of Plenty	0.00	0.04	0.06	5.51	0.12	0.20	0.00	0.45	0.19	-	-	0.05	0.01	0.00	6.64
	Gisborne	-	0.02	0.03	0.04	0.88	0.13	0.00	0.02	0.05	0.01	-	0.00	-	-	1.17
	Hawke's Bay	-	0.01	-	-	0.00	2.10	-	-	0.17	-	-	-	-	-	2.29
	Taranaki	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	0.06
	Manawatu	-	-	-	-	-	0.05	0.04	0.61	0.42	-	-	-	-	-	1.11
	Wellington	-	0.01	0.06	0.04	-	0.06	0.01	0.07	0.45	0.03	-	0.00	-	-	0.73
	Tasman/ Marlborough	-	0.01	0.00	-	-	-	-	0.00	0.01	2.68	0.01	0.39	0.03	0.02	3.16
	West Coast	-	0.01	0.00	-	-	-	-	0.00	0.00	0.04	0.30	0.18	0.02	0.01	0.57
	Canterbury	-	0.03	0.01	-	-	-	-	0.00	0.01	0.02	-	1.35	0.08	0.01	1.51
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.05	1.16	0.06	1.27
	Southland	-	0.00	0.00	-	-	-	-	0.01	0.02	0.01	-	0.05	0.03	0.74	0.87
	Total	**1.99**	**2.66**	**4.27**	**7.51**	**1.02**	**2.70**	**0.17**	**1.21**	**1.36**	**2.81**	**0.31**	**2.12**	**1.35**	**0.84**	**30.31**

Table 3.21
Total movements of forest products
(billion tonne-kms in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.20	0.07	0.01	0.07	-	-	-	-	-	-	-	-	-	-	0.35
	Auckland	0.00	0.05	0.01	0.00	0.00	0.01	0.00	0.01	0.01	-	-	0.00	0.00	-	0.09
	Waikato	0.00	0.11	0.25	0.18	0.00	0.04	0.02	0.01	0.01	0.01	0.00	0.04	0.02	0.00	0.70
	Bay of Plenty	0.00	0.01	0.01	0.51	0.04	0.06	0.00	0.18	0.10	-	-	0.04	0.02	0.00	0.96
	Gisborne	-	0.01	0.01	0.01	0.10	0.03	0.00	0.01	0.03	0.01	-	0.00	-	-	0.20
	Hawke's Bay	-	0.00	-	-	0.00	0.16	-	-	0.05	-	-	-	-	-	0.22
	Taranaki	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	0.01
	Manawatu	-	-	-	-	-	0.01	0.01	0.04	0.06	-	-	-	-	-	0.12
	Wellington	-	0.01	0.03	0.02	-	0.02	0.00	0.01	0.03	0.00	-	0.00	-	-	0.13
	Tasman/ Marlborough	-	0.01	0.00	-	-	-	-	0.00	0.00	0.26	0.00	0.17	0.03	0.02	0.48
	West Coast	-	0.01	0.00	-	-	-	-	0.00	0.00	0.01	0.02	0.05	0.01	0.00	0.12
	Canterbury	-	0.03	0.01	-	-	-	-	0.00	0.00	0.01	-	0.10	0.03	0.01	0.18
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.02	0.12	0.01	0.15
	Southland	-	0.01	0.01	-	-	-	-	0.01	0.01	0.01	-	0.03	0.01	0.03	0.12
	Total	**0.21**	**0.31**	**0.32**	**0.80**	**0.14**	**0.32**	**0.04**	**0.27**	**0.31**	**0.31**	**0.03**	**0.45**	**0.23**	**0.08**	**3.82**

3.7 Meat movements

3.7.1 Introduction

Meat and its co-products is another major component of the New Zealand economy and in 2006/07 represented about 13 percent by value of all exports and about 30 percent of the country's primary exports by value (year ending April 2007).

3.7.2 Information sources

The main sources of published information on the movements of meat are:

- Statistics NZ
- Meat & Wool New Zealand
- New Zealand Meat Board
- New Zealand Meat Industry Association
- KiwiRail
- port companies.

This information has been supplemented by discussions with a number of those engaged in the industry either as producers or transporters. It is possibly worthy of note that the main meat processing companies were unwilling to provide information to the study, and we have therefore had to use other approaches to estimate the patterns of movement which are associated with this commodity.

3.7.3 Development of the sector

The New Zealand meat industry has made enormous technical and marketing advances since the first export shipment of frozen meat was made from Port Chalmers in 1882. This initiative gave the industry the ability to preserve meat in order to serve markets at the other side of the world and to the northern hemisphere generally. Further technical developments allowed a gradual move from large bulk tonnages of frozen lamb towards higher value chilled cuts. As a consequence, New Zealand has a reputation for producing high standard, high-protein food.

However, over recent years there has been little growth in the overall volumes of meat produced by the industry. This is set out in Table 3.22. This lack of growth has had an impact on the current patterns of transport for the industry.

Table 3.22
Growth of meat production in New Zealand
(000 tonnes – bone-in)

Year	Lamb	Mutton	Beef	Calf	Other	Total
1989-90	347.0	153.0	459.9	11.5	44.3	1015.8
1990-91	383.6	145.7	519.4	12.3	47.5	1108.6
1991-92	399.3	157.7	523.1	13.3	64.4	1157.8
1992-93	351.8	134.5	558.7	13.6	74.4	1132.9
1993-94	397.9	124.8	523.7	14.0	70.9	1131.3
1994-95	389.2	143.9	606.8	22.3	75.3	1237.6
1995-96	375.5	134.4	607.2	25.0	69.0	1211.1
1996-97	419.1	123.5	625.4	24.6	68.6	1261.2
1997-98	416.5	128.6	610.3	23.8	75.2	1254.4
1998-99	401.0	116.6	540.0	21.7	73.8	1153.0
1999-00	427.8	104.9	548.8	18.8	69.5	1169.8
2000-01	433.5	128.7	571.8	19.7	75.8	1229.5
2001-02	414.1	107.2	554.5	21.8	71.8	1169.4
2002-03	433.5	112.9	634.1	26.2	78.2	1284.8
2003-04	411.3	107.0	686.1	23.5	76.3	1304.1
2004-05	437.6	105.2	629.5	22.2	52.4	1247.0
2005-06	435.8	103.0	620.3	21.7	91.9	1272.7

Source: Statistics NZ

The movement of meat from farm to market consists of two separate movements, the movement of livestock from farm to processing plant and the movement of meat products from processing plant to customer. Both are considered in this section.

The volumes of livestock slaughtered by region or area of origin are set out in Table 3.23 and Figure 3.9. Detailed information by region is only available for export traffic and the rest of this section considers this component only. This is estimated to represent about 85 percent of total meat production, and probably accounts for a higher proportion of transport demand.

Table 3.23
Livestock numbers slaughtered by region of origin (2006-07) for export (000s)

Region	Lamb	Sheep	Beef	Total
Northland/Auckland	490.0	196.7	702.9	1,390
Waikato	1,960.0	646.5	734.1	3,341
Bay of Plenty	272.2	93.7	125.0	491
Gisborne	1,927.3	377.4	190.9	2,496
Hawke's Bay	4,289.7	880.6	332.1	5,502
Taranaki	341.3	72.2	94.5	508
Manawatu/Wanganui	3,461.3	742.3	508.9	4,712
Wellington	1,072.5	216.5	123.6	1,413
Nelson	348.2	72.2	49.2	470
Marlborough	609.3	135.3	70.3	815
Canterbury	7,746.6	1,596.5	583.5	9,927
Otago	3,451.6	708.0	121.9	4,282
Southland	4,134.4	708.0	90.1	4,932
Total	**30,104.1**	**6,445.9**	**3,727.0**	**40,277**

Source: Meat and Wool New Zealand.

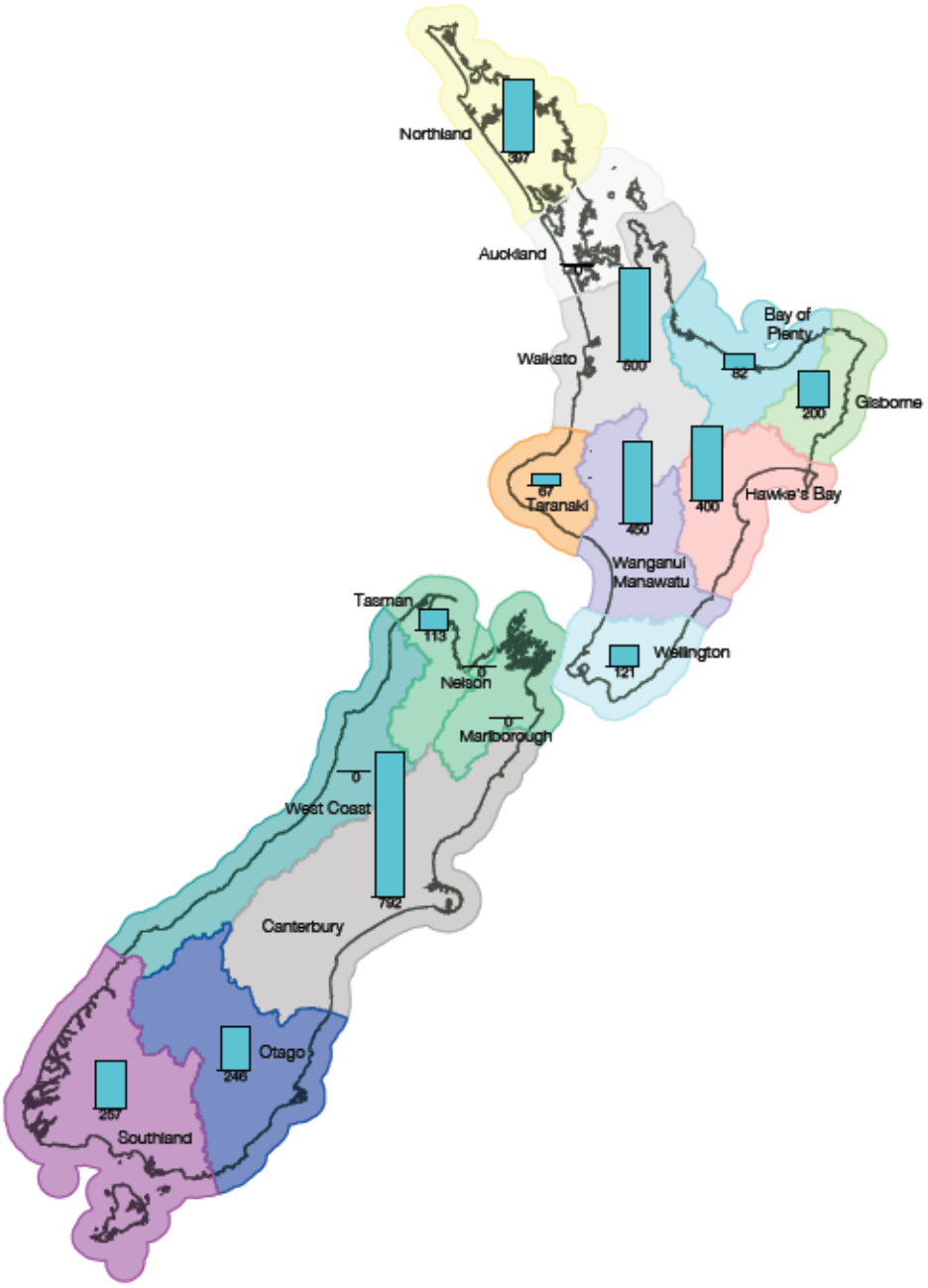


Figure 3.9
Livestock Slaughter by Region 2006-07
(000 tonnes)

The weight of meat produced by area is set out in Table 3.24.

Table 3.24 Meat production for export by region (2006-07) (000 tonnes)				
Region	Lamb	Sheep	Beef	Total
Northland/Auckland	14.2	2.0	80.2	96.5
Waikato	21.5	6.6	83.8	111.9
Bay of Plenty	3.0	1.0	14.3	18.2
Gisborne	21.5	4.1	12.8	38.4
Hawke's Bay	47.9	9.5	22.3	79.7
Taranaki	4.1	0.9	14.8	19.9
Manawatu/Wanganui	41.8	9.7	79.8	131.4
Wellington	13.0	2.8	19.4	35.2
Nelson	3.7	0.8	5.6	10.2
Marlborough	6.5	1.5	8.0	16.1
Canterbury	83.2	17.9	66.6	167.7
Otago	41.1	10.8	14.3	66.2
Southland	49.2	10.8	10.6	70.6
Total	**350.7**	**78.6**	**432.5**	**861.8**

Source: Meat and Wool New Zealand

3.7.4 Industry structure

The New Zealand meat industry remains relatively fragmented today as it has for many years. While a number of farmer shareholder co-operatives still control the bulk of the industry the returns for individual processing and exporting companies have fluctuated considerably from year to year and there is a growing recognition that the structure of the industry needs improvement.

Inter-island rivalry for the guarantee of live animal supply, particularly at a time when the numbers of animals offered has been relatively stable or even falling, has seen a mix of company reactions. This includes the major takeover of Richmond (North Island) by the (then) PPCS (South Island) through to companies deliberately placing single plant operations in the heart of the supply networks of their 'other' island competition. Examples of this have included Invercargill-based Alliance Meats opening a sheep plant in Hawke's Bay while Hamilton-based AFFCo responded with a similar enterprise in Southland.

Most recently, Alliance Meats and Silver Fern (ex PPCS) tried to engage in a number of initiatives whereby they could join forces for both front-end supply and downstream marketing gains. However, nothing concrete has emerged. The next move was a mid-2008 amalgamation between Silver Fern and the innovative PGG Wrightson group that caught many by surprise. Shareholder (ie mainly farmer) approval at Silver Fern has yet to be tested regarding this initiative. Media sources currently indicate that some of the remaining larger companies may well move towards each other to match the single seller desk skills in PGG Wrightson.

Smaller players on the fringe tend to specialise in single specie meats while selling on their by-products (offal and other non-meat products) to specialised processors. These by-products have often been very lucrative, but sale values for hides and pelts internationally have seen a steady decline since 2000. However there has been some reversal in this trend as growing wealth in emerging countries has intensified the demand for some of these products.

3.7.5 Transport of livestock

Generally meat processors are driven by the need to keep meat plants running continually at full capacity to minimise the costs per head of throughput, either with one shift or two shifts during seasonal peaks. For this to work most effectively there is a need to secure a steady supply of animals for slaughter. This sometimes results in fierce competition at the farm gates for animals with buyers attempting to balance the higher prices that they are forced to pay for livestock against lower rates for road haulage. Generally meat export companies in New Zealand are not highly skilled in transport related logistics with their marketing arms trying to squeeze down transport prices and reduce spot rates rather than by introducing more advanced distribution techniques.

As the meat company invariably buys stock 'at gate', the cost of the truck transport is paid by the processor. The arrangements for these movements are very varied. Some meat companies leave the arrangements in the hands of their individual stock buyers, who negotiate spot rates with hauliers and give the operator little chance to develop more sophisticated arrangements to minimise operating costs by arranging return loads. This results in some very differing transport charges with regard to distance although there is now evidence that the meat industry is attempting to investigate this opportunity for backloading. The high number of single truck owner-driver rigs in the livestock industry does not help the somewhat muddled culture that currently prevails and inhibits the development of more advanced distribution techniques.

Average farm-to-plant journey lengths for the South Island are slightly shorter for lamb/mutton products than for beef. North Island movements in general are shorter than those in the South Island.

Inter-island movements

There is also some movement of livestock between the North and South Island. This is in two distinctive groups:

- cattle for the stocking of mainly South Island dairy conversions (from sheep or forestry land)

- mainly sheep and lambs for topping up animal-starved plants to the 'other' island.

Dairy cattle

It was reported that the flow of cattle for dairy conversions is, understandably, directly linked with the speed and number of such changes. As an example while there were 60 conversions planned for Southland over the past 12 months this work slowed because of a shortage of the necessary labour. Against this was a push by North Island farmers to move drought-starved cattle away from the north towards the lusher south where they could await the conversions taking place.

The season for moving such animals is the normal drying off period from late April through to June starting with heifers and later cows. In a 'good' year such a movement could reach as high as 30,000 animals with the geographical source being as far north as Northland and the destination as far south as Southland. The trucking industry advises that an average range would be Waikato to South Canterbury or North Otago. As a result, we estimate that 25,000 cattle over 1,165 kms would amount to a freight task of about 12 to 13,000 tonnes and 14.6 million tonne kms. Of note is the fact that most cattle tend to lose condition after 12 hours in a moving truck and as a result the stock movers have arrangements for stopover feeding lots along the course of the lengthy journeys.

Sheep – lambs

Figures for these movements are extremely hard to ascertain because of the meat processors confidential views on market share. With the CEO of the country's largest processor predicting a lamb shortage in excess of 2.5 million animals for the next season, such an attitude is understandable.

There are two main reasons for the inter-island movement of ovine animals:

- topping up meat plants at short notice to ensure that premises with both high fixed and high variable costs are not idle during the normal working day

- moving animals away from areas being converted into dairy units. An inter-island movement of both ewes and lambs would result in a shortage of new lambs the following season in the 'donor' island.

Movements are both northbound and southbound. Plants nearer to the Cook Strait ferries tend to be favoured for reasons of both costs and the need to keep the animals in good condition. One stock-moving carrier acknowledged that they can often move in excess of 5,000 animals a week. Inter-company competition at the farm gate is so strong that if a processing company perceives a large number of available stock in one island they will often move them inter-island at 'cost' rather than leave them at the originating farms to be snapped up by a competitor.

It was reported that all the major processors are involved with the inter-island business but detailed quantification of animals or distances was not possible. As a guide it was ascertained that the average distance for inter-island movements would be equivalent to the North Canterbury to Manawatu range. We estimate that these movements would amount to about 10,000 head each week across 40 weeks, with a resultant freight task of about 6.9 million tonne kms. It must be stressed that, without any meat company source figures, this is only an approximate estimate. Nevertheless the movement is real and on-going, and with national shortages forecast for forthcoming years, such movements may well increase.

Overall, across New Zealand, the livestock journey averages a relatively low 60 km and despite the presence of some inter-island flows, most livestock are delivered to processing plants within their region of origin or neighbouring regions. On the basis of information on the regions as to where the livestock are reared and the locations of processing plants, we have estimated the matrix of movements which results. This is set out in Table 3.25. In general movements lie within the region of origin or close to this but as discussed above we have made estimates of some longer movements crossing the Cook Strait in both directions.

Table 3.25
Movements of livestock
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40
	Auckland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Waikato	-	-	0.50	-	-	-	-	-	-	-	-	-	-	-	0.50
	Bay of Plenty	-	-	-	0.08	-	-	-	-	-	-	-	-	-	-	0.08
	Gisborne	-	-	-	-	-	0.20	-	-	-	-	-	-	-	-	0.20
	Hawke's Bay	-	-	-	-	-	0.40	-	-	-	-	-	-	-	-	0.40
	Taranaki	-	-	-	-	-	-	0.07	-	-	-	-	-	-	-	0.07
	Manawatu	-	-	-	-	-	-	-	0.42	-	-	-	0.03	-	-	0.45
	Wellington	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	0.12
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	0.11
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Canterbury	-	-	-	-	-	-	-	0.08	-	-	-	0.71	-	-	0.79
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	0.25	-	0.25
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	-	0.26	0.26
	Total	**0.40**	**-**	**0.50**	**0.08**	**-**	**0.60**	**0.07**	**0.50**	**0.12**	**0.11**	**-**	**0.74**	**0.25**	**0.26**	**3.62**

3.7.6 Distribution of processed meat

Because of the need to keep products within constrained temperature limits, especially for the premium chilled products, the transport of output from the meat plants requires a sophisticated and well-managed distribution network. Shipping companies have become very adept at supplying and maintaining highly-efficient temperature-controlled containers within finely tuned parameters, which have temperature recording capability Likewise, as international sea freight hubbing is growing markedly, the ability of mid-point container terminals to reduce off-power times to a minimum has become very important. Road transport is concentrated in the larger carriers that have the equipment and expertise to maintain the product within the required temperature limits.

The volumes of meat exported by ports in 2006-07 are set out in Table 3.26.

Table 3.26
Meat exports by port 2006-07
(000 tonnes)

Port	Volume exported
Auckland Seaport	174.5
Tauranga Seaport	180.8
New Plymouth	31.1
Napier	123.0
Wellington Seaport	22.0
Nelson	10.7
Christchurch Seaport (Lyttelton)	59.7
Timaru	46.1
Dunedin Seaport (Port Chalmers)	219.2
Invercargill Seaport (Bluff)	3.5
Other Seaports	0.0
Auckland Airport	4.2
Christchurch Airport	2.3
Other Airports	0.0
Total	**877.3**

Source: Statistics NZ

Note: It should be noted that the total in Table 3.26 is slightly different to that set out in Table 3.24, although the differences are small. These probably reflect either slightly different definitions or time periods.

The most important port for meat exporting is Dunedin, with about a quarter of the total export traffic, followed by Tauranga and Auckland, each with about 20 percent of the total. Napier also has a significant flow at about 14 percent of the total.

As shipping companies are reducing their numbers of port calls with an increasing predominance at the top end of the North Island and in Dunedin, transport patterns are having to change to accommodate this. As discussed above, none of the major meat companies was prepared to provide details of their transport arrangements and we have had to estimate current day patterns of flows indirectly from a range of other data, including port data, rail data and some information from road carriers.

Of the 860-870,000 tonnes of meat shown in the table above, the split between North and South Islands kill is almost 50:50 with beef predominating in the North and lamb and mutton in the South. About 60 percent of the total export movement moves by rail (on the assumption that rail moves solely export meat in containers mostly requiring power support) and about 60 percent goes through North Island ports.

In general product sourced in one island uses a port in the same island, although the pattern of movements is complex with products moving both north and south across the Cook Strait, responding to the calls made by the overseas shipping lines.

Clearly a high tonnage of export meat in containers still reaches the ports by road (46 percent). The road share of this movement is particularly high in the North Island and a number of major meat plants now transport all of their product by road. In part this reflects shorter distances between plant and port, which permit trucks without refrigeration support to make the journey within the meat industry's acceptable cold chain requirements and in part because of dissatisfaction with rail services, including quality of service and pricing issues. In the South Island the rail share is much higher. Road transport also benefits from more flexibility in collection times.

The estimated origin-destination pattern of export meat products is set out in Table 3.27. As discussed above this has been compiled from a limited amount of quantitative statistical data and our assessment of the consequent pattern of flows which is likely to result. This shows that there are movements from the South Island to the ports of Auckland and Tauranga, bypassing the South Island ports, and within the North Island these two ports draw from almost all regions.

Table 3.27
Movements of processed meat products
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	-	0.05	-	0.05	-	-	-	-	-	-	-	-	-	-	0.10
	Auckland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Waikato	-	0.06	-	0.05	-	-	0.01	-	-	-	-	-	-	-	0.11
	Bay of Plenty	-	0.01	-	0.01	-	-	-	-	-	-	-	-	-	-	0.02
	Gisborne	-	-	-	0.01	-	0.03	-	-	-	-	-	-	-	-	0.04
	Hawke's Bay	-	0.01	-	0.03	-	0.05	-	-	-	-	-	-	-	-	0.08
	Taranaki	-	0.03	-	0.04	-	0.01	0.01	-	0.00	-	-	-	-	-	0.09
	Manawatu	-	0.02	-	0.01	-	0.02	0.00	-	0.02	-	-	-	-	-	0.07
	Wellington	-	0.02	-	0.00	-	0.01	0.00	-	-	-	-	-	-	-	0.03
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	0.00	0.01	-	0.01	-	-	0.02
	West Coast	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	0.01
	Canterbury	-	0.01	-	0.01	-	-	-	-	-	-	-	0.06	0.09	-	0.17
	Otago	-	0.01	-	0.00	-	-	-	-	-	-	-	0.03	0.03	-	0.07
	Southland	-	-	-	-	-	-	-	-	-	-	-	0.01	0.07	0.00	0.08
	Total	**-**	**0.20**	**-**	**0.20**	**-**	**0.12**	**0.03**	**-**	**0.03**	**0.01**	**-**	**0.11**	**0.19**	**0.00**	**0.89**

3.7.7 The future

With long standing lamb number reductions, the industry currently has excess processing capacity. If the base objective is to maximise plant throughput on a daily basis there is clearly room for a number of plant closures and this process has already started. The largest meat company in the country has, over recent months, closed two major and three minor plants plus five lamb processing lines. If the trend towards amalgamation or take-overs continues then we can expect to see changes in the routing structure and distances that both livestock and finished products travel. In addition the possible move towards increased use of coastal shipping may well see inter-island moves by rail declining. However, if the shipping companies desire to minimise their shipping call costs, the increasing predominance of upper North Island port loading may well see the rail mode maintaining or improving on the current status quo.

There is a dichotomy between the historical geographical siting of meat plants and the relative distance to the nearest port which relates to the area where the animals are farmed. Clearly plans made 50 to 100 years ago for the siting of meat plants are now not applicable in the light of the changing and rationalisation of shipping patterns. The resultant costs of transport (regardless who pays) must have a material effect on the sale price of the meat and its competitiveness on world markets. The simple dictum of 'nearest and cheapest' practised by some meat processors fails to encompass the full part that internal distribution plays within the whole supply (or in some cases) demand chain. Not only does there appear to be a need for the distribution logistics of the meat industry to be drawn together but economies of scale for inland and possibly shipping services would appear to be achievable if the meat companies coordinated their port choice decisions. This would assist rail and road operators to see the total distribution picture as a single entity and enable improved planning for transport hardware.

3.8 Horticulture products

3.8.1 Introduction

This section covers the movement of horticultural products, primarily fruit and vegetables, along with grains and cereals. New Zealand is a fairly important producer of these commodities with total annual production amounting to about 3.1 million tonnes of which about 1.5 million tonnes is exported.

3.8.2 Data sources

The main source of data on domestic production has been derived from *Fresh Facts – New Zealand Horticulture 2007* published by HortResearch, with some additional data being provided by Statistics New Zealand. Export and import data is also from Statistics New Zealand. Zespri have provided data on kiwifruit exports, representing significant proportion of the totals exported. Information on grain production and consumption was provided by NZ Grain and Seed Trade Association Inc (NZGSTA)

3.8.3 Imports and exports

New Zealand is a net exporter of horticultural products and cereals, although almost one million tonnes of produce is imported. The main exports are kiwifruit (around 360,000 tonnes per annum) and apples (300,000 tonnes per annum).

As would be expected from the location of the main producing areas, the main export ports are Tauranga and Napier. Auckland is the third main export port, followed by Christchurch and Nelson. Auckland has the highest level of imports, followed by Tauranga. The detail of international trade which includes grain and horticultural products is set out below in Table 3.28. Small volumes of horticultural produce are transported by air.

Table 3.28
International trade in grain and horticultural products 2006-07
(000 tonnes)

Port	Exports	Imports
Whangarei	10.5	0.0
Auckland Seaport	209.0	398.1
Tauranga Seaport	466.7	312.9
Gisborne	48.8	0.0
New Plymouth	22.9	62.2
Napier	345.4	9.4
Wellington Seaport	14.3	45.1
Nelson	97.7	9.5
Picton	0.0	0.0
Westport	0.0	0.0
Christchurch Seaport (Lyttelton)	112.4	76.4
Timaru	59.5	16.4
Dunedin Seaport (Port Chalmers)	60.8	5.7
Invercargill Seaport (Bluff)	19.3	0.0
Auckland Airport	21.0	9.8
Wellington Airport	0.0	0.0
Christchurch Airport	1.8	1.0
Other Airports	0.0	0.0
Total	**1,490**	**946.5**

Source: Statistics NZ

While nearly 1.5 million tonnes is exported, the table shows that over 900,000 tonnes are imported. Presumably these are crops which do not grow here or which are not grown here in sufficient quantities to meet demand, either in general or in seasons when local produce is not available.

3.8.4 Production

Total annual production of horticultural produce in New Zealand is about 2.2 million tonnes, made up as follows:

- apples – 420,000 tonnes
- kiwifruit - 360,000 tonnes
- other fruit - 110,000 tonne
- vegetables – 1.3 million tonnes.

In addition about 900,000 tonnes of cereal and grain is produced annually. About two-thirds of this is for feeding animals and the remainder is for human consumption.

National horticulture production figures have been obtained from HortResearch. The areas under fruit and vegetable production by region are set out in Tables 3.29 and 3.30.

Table 3.29
Distribution of planted areas of fruit by regional councils (ha)

Regional council	Apples a	Wine grapes b	Kiwifruit c	Summer-fruit	Avoca-dos d	Citrus	Berry-fruit	Nuts	Olives	Other sub-tropical	Other fruit and hops	Total fruit
Year Ended 30 June	2006	2006	2005	2005	2006	2005	2005	2005	2005	2005	2005	
Northland	0	30	506	7+	901	367+	1+	187+	C	112	7+	
Auckland	36	474	528	31+	57	105+	112+	47+	270	141	36	
Waikato	227	132	411	42+	54	17+	503+	C	C	47	17+	
Bay of Plenty	3	18	8,830	16+	1,789	143	31+	C	C	99+	13+	
Gisborne	152	1,913	265	4+	C	776	C	40+	C	90+	4+	
Hawke's Bay	5,681	4,346	163	812	C	7+	34+	C	426	19+	210+	
Taranaki	0	0	25	C	C	C	C	C	C	42+	C	
Manawatu Wanganui	23	0	79	25+	C	1+	38+	11+	C	C	C	
Wellington	104	777	21	18+	C	C	24+	45+	284	C	27+	
Tasman Nelson	2,341	695	636	38+	C	C	193+	47+	122	5+	632+	
Marlborough	15	11,488	0	63+	0	C	C	64+	322	8	12+	
West Coast	0	0	0	0	0	C	C	C	0	C	0	
Canterbury	21	925	0	103+	0	C	792+	730+	514	C	48+	
Otago	348	1,253	0	1,005	0	0	16+	78+	38	0	53+	
Southland	C	0	0	0	0	0	C	C	C	0	0	
Other	49	565	0	C	106	C	C	C	C	C	C	
Total	**9,000**	**22,616**	**11,464**	**2,324**	**2,907**	**1,701**	**2,541**	**1,751**	**2,483**	**648**	**1,118**	**58,553**
1996	15,819	6,110	10,210	2,692	946	1,919	1,691	n/a	n/a	728	1,846	n/a
% change	-43%	270%	12%	-14%	207%	-11%	50%	n/a	n/a	-11%	-39%	

C Some data have been suppressed for reasons of respondent confidentiality.
\+ Incomplete data set due to some crop data being suppressed.
'Other' region includes data not assigned to a specific region.
Sources: Fresh Facts 2007 HortResearch/Statistics NZ Agricultural Production Survey 2005
a Pipfruit NZ Inc
b New Zealand Winegrowers Annual Report 2006

c Zespri Group Ltd Annual Report 2005-06
d NZAGA and Avocado IC Annual report 2006
e NZ Kabocha Council Inc

Table 3.29
Distribution of vegetables and indoor crops by regional councils (ha)

	Vegetables											Indoor crops					
Regional council	Potatoes	Peas & beans	Onions	Squashes	Sweet-corn	Broccoli, cabbage & cauliflowers	Carrots	Asparagus	Lettuce	Other	Total	Tomatoes	Capsicum	Cucumber	Nursery crops	Flowers, bulbs etc	Other indoor crops
Year ended 30 June	2005	2005	2005	2006	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
Northland	11	C	C	17	C	C	C	C	C	1,560+		72	54	51	51	240	301
Auckland	897	57+	1,388	0	77	5,092	206	C	355	1,301+		624	369	396	258	571	944+
Waikato	2,267	C	1,574	233	C	248+	78	354	96	656+		294	19	123	101	257	456+
Bay of Plenty	C	C	C	232	C	23+	0	193	4	253+		20	C	C	48	223	291+
Gisborne	C	C	C	2,191	1,732	C	C	0	C	432+		C	C	C	C	10	24+
Hawke's Bay	899	C	767	2,457	C	65	C	319	19	471+		27	6	C	C	72+	140+
Taranaki	C	C	C	0	C	C	C	C	C	5+		C	C	C	40	C	93+
Manawatu-Wang.	1,873	C	222	1,036	C	509	C	295	203	583		14	C	C	86	77	171+
Wellington	C	C	C	59	C	76	C	C	60	89+		C	C	1	12	16	48+
Tasman-Nelson	C	C	15	0	C	192	C	10	99	173+		91+	C	C	58+	31+	111+
Marl-borough	C	997+	25	0	963	C	57	C	C	164+		C	C	C	C	6	43+
West Coast	0	0	0	0	0	0	0	0	0	C		C	C	0	C	0	C
Canterbury	4,562	6,377 +	759	100	C	671	474	117	83	604+		86	29	51	136	205	445+
Otago	72	C	C	0	C	166+	C	C	61	63+		6	C	C	88	23	115+
Southland	C	C	C	0	0	C	C	0	C	C		C	C	C	25	C	33+
Other	C	C	C	0	C	C	C	C	C	C		C	C	C	C	C	C
Total	**10,850**	**8,747**	**4,931**	**6,325**	**7,115**	**3,504**	**C**	**1,372**	**1,207**	**6,732**	**50,783+**	**1,308**	**547**	**716**	**1,000**	**1,806**	**3,663**
1992	9,695	5,893	2,925	4,396	3,485	3,309	1,221	2,453	861	4,212	38,450	920	82	68	477	n/a	637
% change	12%	48%	69%	44%	104%	6%	C	-44%	40%	60%	32%	42%	567%	953%	110%	n/a	475%

C -Some data have been suppressed for reasons of respondent confidentiality
\+ Incomplete data set due to some crop data being suppressed.
"Other" region includes data not assigned to a specific region
Sources: Fresh Facts 2007 HortResearch/Statistics NZ Agricultural Production Survey 2005

Virtually all data at the regional level (eg from Statistics New Zealand or MAF) covers the area planted (ha) rather than actual production as illustrated above. In order to overcome this and to derive a regional matrix of produce movements, the following approach was adopted.

An analysis was undertaken for each of the following, which comprise the main horticultural crops (production of others, such as olives, is significantly less):

- apples
- kiwifruit
- grapes
- summerfruit
- berryfruit

- citrus fruit
- vegetables.

For each of these the national production was divided between regions on the basis of area planted. For example, 46 percent of the area planted for summerfruit is in Otago, so 46 percent of the annual production of 22,400 tonnes was allocated there. The production of all seven of the above crops was then summed for each region and the overall national total was found to be within five percent of the total given by HortResearch.

For cereal, the breakdown of production by region in the year to 30 June 2007 was obtained from Statistics New Zealand Agricultural Production Statistics. This includes wheat, barley, oats, maize and a small amount of 'other'. The national total was 907,000 tonnes, of which 64 percent was grown in Canterbury. This is in broad agreement with the figure of 990,000 tonnes from the NZGSTA (year unknown).

NZGSTA further states that 600,000 tonnes per annum is used for animal feed.

3.8.5 Balancing production and consumption

Production can be viewed as being from two sources: (a) New Zealand production and (b) imports. Of these, (a) has been derived as described above for both horticulture and cereals, and (b) is available from the port data and can readily be assigned to the region of entry (eg Tauranga = Bay of Plenty). As a result both of these quantities are known on a regional basis.

Similarly, consumption can be viewed as having three components: (c) exports, (d) human consumption and (e) animal consumption. Again, (c) is known from the port data. (e) has been estimated regionally on the basis of an annual total of 600,000 tonnes, broken down by livestock numbers (sheep, beef and dairy cattle and deer) for each region (from Statistics New Zealand agricultural production statistics).

The above process leaves (d), human consumption, unknown. However, we can make use of the fact that, over the whole country, production equals consumption, ie:

$$(a) + (b) = (c) + (d) + (e)$$

or $$(d) = (a) + (b) - (c) - (e).$$

From this the total consumption for New Zealand can be determined, which has then been allocated to the regions on the basis of population.

The outcome of the above process is an estimate of total production and total consumption of grain and horticultural products for each region, given that for New Zealand as a whole the total production equals total consumption. This gives the row totals (production) and column totals (consumption) in the origin-destination matrix. The regional totals are shown in the table below.

Table 3.31 Total production and consumption by region in 2006-07 (000 tonnes)		
Region	Production	Consumption
Northland	72	104
Auckland	690	903
Waikato	257	265
Bay of Plenty	653	614
Gisborne	198	98
Hawke's Bay	463	476
Taranaki	62	95
Manawatu-Wanganui	177	216
Wellington	62	280
Tasman Marlborough	342	182
West Coast	0	20
Canterbury	1088	562
Otago	102	246
Southland	44	149
Total	**4208**	**4208**

Source: consultant's estimates.

Bearing in mind that consumption includes exports, it can be seen that Canterbury has an excess of production, as do Gisborne and Marlborough to a lesser extent. Auckland, Wellington and Southland all have consumption in excess of production.

Having established the row and column totals, the origin-destination matrix was then populated in such a way as to meet these totals. There are some significant movements within regions; for example kiwifruit is exported from Bay of Plenty through Tauranga and apples from Hawke's Bay through Napier. In general, imports are also likely to come from the nearest port although some regions, notably Waikato and Manawatu, do not have a single obvious port.

In general, certain parts of the country tend to specialise in particular products (eg apples in Hawke's Bay and Nelson) and these will be consumed throughout New Zealand. This has been taken into account in populating the matrix, with major areas of production feeding major areas of consumption. To assist with this process, the rail matrix of horticulture movements was used as a starting point to indicate where off-diagonal movements already exist.

The resulting origin-destination patterns in terms of tonnes and tonne-kms are shown below in Tables 3.32 and 3.33. The result is an annual total of about 1.1 billion tonne-kms for horticulture including cereals and grains. About nine percent of this is by rail and the remainder by road.

In comparison, *Heavy Vehicle Movements in NZ* [13] estimates a total of 87 million km of truck movements for 'horticulture and other agriculture' in 2001. With an average load of 10 tonnes this gives a tonne-km figure similar to ours after an allowance is made for the substantial recent growth in the industry. There will also be year-to-year variation because of factors such as the weather and general quality of the harvest. Although the match is not perfect, the TERNZ work does provide some independent confirmation that the figure we have derived is very much of the correct order of magnitude.

[13] *Heavy Vehicle Movements in NZ*, (TERNZ 2003).

Table 3.32
Movements of horticultural and grain products
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
	Auckland	0.01	0.56	0.00	0.02	-	-	-	0.00	0.02	0.00	-	0.08	0.00	-	0.69
	Waikato	-	0.05	0.13	-	-	0.08	-	-	-	-	-	-	-	-	0.26
	Bay of Plenty	-	0.10	0.03	0.50	-	-	-	0.00	0.00	-	-	0.02	-	-	0.65
	Gisborne	0.01	0.02	-	-	0.10	0.08	-	-	-	-	-	-	-	-	0.20
	Hawke's Bay	0.02	0.10	0.03	0.01	-	0.30	-	-	0.00	-	-	-	-	-	0.45
	Taranaki	-	-	-	-	-	-	0.05	0.00	-	-	-	-	-	-	0.05
	Manawatu	-	0.00	-	0.01	-	0.00	-	0.04	0.04	-	-	0.09	-	-	0.18
	Wellington	-	0.00	-	0.00	-	-	-	-	0.06	-	-	-	-	-	0.06
	Tasman/ Marlborough	-	-	-	-	-	-	-	0.04	0.04	0.11	-	0.15	0.00	-	0.34
	West Coast	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	0.00
	Canterbury	0.01	0.07	0.07	0.08	-	0.02	0.05	0.13	0.11	0.08	0.02	0.22	0.13	0.11	1.09
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.00	0.10	-	0.10
	Southland	-	0.00	0.00	-	-	-	-	0.00	-	-	-	-	0.01	0.03	0.04
	Total	**0.10**	**0.90**	**0.26**	**0.61**	**0.10**	**0.48**	**0.10**	**0.21**	**0.28**	**0.18**	**0.02**	**0.56**	**0.24**	**0.14**	**4.19**

Note: because of the way in which the individual movements were estimated, the total in this matrix is slightly smaller than that in Table 3.31 above. The differences are however negligible and do not affect the broad findings.

Table 3.33
Movements of horticultural and grain products
(million tonne-kms)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
	Auckland	0.00	0.02	0.00	0.00	-	-	-	0.00	0.01	0.00	-	0.08	0.00	-	0.12
	Waikato	-	0.01	0.01	-	-	0.02	-	-	-	-	-	-	-	-	0.04
	Bay of Plenty	-	0.02	0.00	0.05	-	-	-	0.00	0.00	-	-	0.02	-	-	0.09
	Gisborne	0.00	0.01	-	-	0.01	0.02	-	-	-	-	-	-	-	-	0.04
	Hawke's Bay	0.01	0.04	0.01	0.00	-	0.02	-	-	0.00	-	-	-	-	-	0.08
	Taranaki	-	-	-	-	-	-	0.00	0.00	-	-	-	-	-	-	0.00
	Manawatu	-	0.00	-	0.00	-	0.00	-	0.00	0.01	-	-	0.04	-	-	0.06
	Wellington	-	0.00	-	0.00	-	-	-	-	0.00	-	-	-	-	-	0.01
	Tasman/ Marlborough	-	-	-	-	-	-	-	0.01	0.00	0.01	-	0.06	0.00	-	0.09
	West Coast	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	0.00
	Canterbury	0.01	0.07	0.06	0.07	-	0.01	0.03	0.06	0.04	0.03	0.01	0.02	0.05	0.06	0.52
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.00	0.01	-	0.01
	Southland	-	0.00	0.00	-	-	-	-	0.00	-	-	-	-	0.00	0.00	0.01
	Total	**0.02**	**0.18**	**0.09**	**0.13**	**0.01**	**0.07**	**0.03**	**0.08**	**0.07**	**0.04**	**0.01**	**0.22**	**0.06**	**0.07**	**1.07**

3.9 Aggregate

3.9.1 Introduction

Aggregate is New Zealand's most-mined mineral. Some 40-50 million tonnes are produced annually (about 10 tonnes per head). It is a low value per weight product, so its cost increases sharply with distance, doubling every 30 km. Most aggregate is produced and used locally, but there are exceptions. In Auckland, reduced availability locally (often for amenity reasons) has led to material being sourced from further afield.

3.9.2 Information sources

Aggregate production data comes from Crown Minerals, along with their Industrial Minerals series. A series of interviews with producers and users has contributed transport information.

3.9.3 Industry structure

Aggregate is produced in about 600 quarries across the country. Volumes produced vary widely. Ownership ranges from individual farmers and contractors through to regional groupings like J Swap, to major integrated groups, such as Fulton Hogan, Winstones and Holcim. Often the ownership of quarries is combined with business as roading or haulage contractors.

For example, in the Auckland region there are 19 active quarries and 23 in the Waikato region. They range in size from over two million tonnes to less than 10,000 tonnes. Most of the Auckland operations are in the range 100,000 to one million tonnes. Most capacity is now for mining greywacke rather than volcanic rock.

3.9.4 Production: aggregate

In Table 3.34, taken from Crown Minerals statistics, the following sub-sectors are taken to represent the aggregate market:

- rock for reclamation and protection (820,000 tonnes)
- rock, sand, and gravel for building (8,518,000 tonnes)
- rock, sand , and gravel for roading (24,067,000 tonnes)
- rock, sand, gravel and clay for fill (4,432,000 tonnes)
- industrial sand (2,438,000 tonnes).

On this basis the total aggregate industry produces 40.3 million tonnes.

Table 3.34
Aggregate production by region, 2006
(000 tonnes)

Region	Reclamation	Building	Roading	Fill	Sand	Total
Northland	17	521	2,015	281	130	2,964
Auckland	70	1,835	4,089	1,118	803	7,914
Waikato	195	1,520	3,795	1,018	466	6,994
Bay of Plenty	89	311	1,968	335	134	2,837
Gisborne	5	69	267	-	-	341
Taranaki	27	169	569	129	92	987
Hawke's Bay	-	387	756	118	66	1,327
Manawatu/Wanganui	54	723	1,736	102	5	2,621
Wellington	36	657	1,074	347	288	2,403
Nelson/Tasman	31	243	627	55	2	958
Marlborough	12	155	190	48	60	465
Canterbury	159	1,381	3,918	691	166	6,314
Otago	-	262	2,200	18	216	2,697
West Coast	103	80	363	10	5	561
Southland	21	204	492	163	5	885
Chatham Is	-	-	8	-	-	8
Total	**820**	**8,518**	**24,066**	**4,432**	**2,439**	**40,275**

Source: Crown Minerals.

These statistics may be understated, because they originate from a questionnaire of quarries without a mining permit. These make up the majority of all quarries. Some of the permitted quarries are included, usually because of common ownership with non-permitted quarries. It is estimated that half of the permitted quarries are not included.

The regional distribution of production is set out in Figure 3.10.

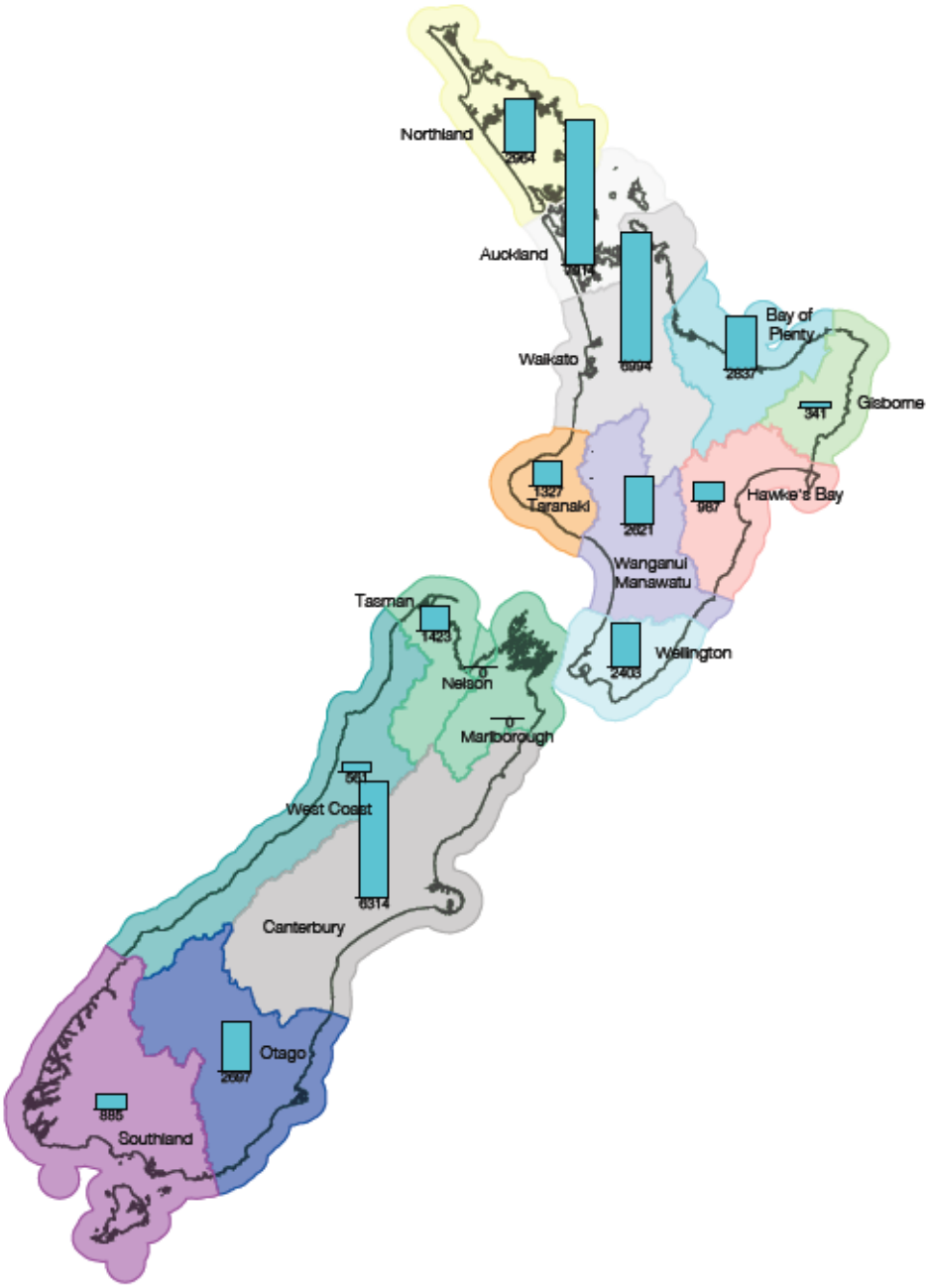


Figure 3.10
Aggregate Production by Region 2006-07
(000 tonnes)

3.9.5 Trade

Minimal quantities of aggregate are traded into or out of New Zealand.

3.9.6 Mode

Nearly all aggregate moves by road. The exceptions are barge movements from Waikato to Auckland, and rail movement of its own ballast.

3.9.7 Main movements

Aggregate is produced at a large number of locations, and is of low value, which means that movement is essentially local. An interpretation of the locations of quarries suggests that an average haul in the vicinity of 10 km is likely in Wellington, Canterbury and Otago, and 20-40 km elsewhere. Auckland is an exception. Even districts where good aggregate is scarce, such as the East Coast and Taranaki, have local basecourse supplies, or use cement and lime stabilisation techniques as a substitute. Apart from into Auckland, longer distance interregional flows are uncommon, although there are some shorter distance movements across regional boundaries.

There are several exceptions to the "local only" rule. The first is in Auckland, where internal sources of supply have been mined out, and where further sources are inaccessible because of the land use above the resource, or planning restrictions. As a result, aggregate is supplied mainly from the periphery of the region, from Northland, North Auckland, the south of the Auckland region, and from the Waikato.

Significant quarries are located near Wellsford and near Kaupakapaka in the north and at Hunua, Drury, Bombay, Maramarua, Mangatarata, and Huntly in the south. A barge service carries aggregate from the Matatoki quarry near Thames to West Auckland. Some aggregate for the Auckland region comes from the Otaika quarry near Whangarei.

On average in New Zealand, about 10.4 tonnes of aggregate is produced and (given minimal international trade) consumed per person per year. On this basis the Auckland region would consume 12.9 million tonnes rather than the 7.9 million tonnes reported as produced. The shortfall is made up by Waikato (mainly Franklin district) and Northland quarries. On the same average consumption, Northland consumes 1.4 million tonnes and produces 3.0 million tonnes; and Waikato consumes 3.8 million tonnes and produces 7.0 million tonnes. The 4.8 million tonnes excess production is likely to move to Auckland, matching the shortfall as calculated. Aggregate from Auckland is now being sourced from as far away as Mangatarata (about 80 km from central Auckland) and Huntly (about 90 km away). A major quarry in the Huntly area has consent for 400 trucks per day, about 2.5 million tonnes. About 75 percent of the output from these quarries goes to the Auckland area.

There are also quarries in the Bombay area of the Waikato region. The overall traffic from the Waikato is estimated to move about 70 km from quarry to use. The quarries within the Auckland region are also on the edges of the region, more distant than average, at probably about 30 km.

About 300,000 tonnes of slag is produced as aggregate at Bluescope Steel, Glenbrook. This is not included in the published production figures for aggregate. It is used in Franklin district and in the greater Auckland area, with small amounts going much further afield, such as to Hawke's Bay. An average of 30 km has been taken to be representative of the average distance.

Ballast for railway use is sourced at a limited number of sites in both islands. About 142,000 m^3 is used, or 213,000 tonnes. This is expected to rise in the near future in line with increased work on the track. Principal sources in the North Island are Drury, Matamata, and Otaki, with a smaller amount at Manunui and some minor sites; and in the South Island at Westport and Green Island, with lesser amounts at Blenheim, Hapuku, Islington, Greymouth, and other minor sites. The sources in the North Island produce quantities between 35,000 and 64,000 tonnes each, and the ballast is used over large parts of the network. An estimated average distance for a total of 160,000 tonnes is 100 km or 16 million tonne-kms. In the South Island the sources are smaller (maximum 11,000 tonnes) but the average distance is about the same, estimated at 125 km (for 53,000 tonnes) or seven million tonne-kms.

Some specialised aggregate travels much larger distances. Sealing chip does move into the deficient districts noted above, but the quantities are small. Some chip with high PSV (polished stone value, a measure of anti-skid properties) also travels longer distances (e.g. 400 km from Moutohora to Auckland), but again the quantities are generally small. An example is 10-20,000 tonnes from Bay of Plenty to Auckland, about four million tonne-kms. In view of the incomplete information on such movements, and their small size, they are not included in the origin-destination matrix below.

Overall, an estimated 1,100 million tonne-kms are produced in the aggregate sector. All aggregate except railway ballast moves solely by truck. Railway ballast is partly by train and partly by truck.

The patterns of movements of aggregates are summarised in Tables 3.35 and 3.36.

3.9.8 Future

The dominant influence will be growth in aggregate demand, and exhaustion of accessible local supplies in Auckland (and possibly elsewhere, like Wellington). This will continue the trend towards longer distance haulage of aggregates, despite the impact that transport has on the price of the product. Longer distances may make rail attractive for the hauls, though a suitable discharge location in Auckland may be problematic. Growth in demand has been strong in recent years, because of building and roading increases. While building demand may decrease, there is as yet no indication that road building may lessen. In the longer term, changes in road use because of fuel prices may bring about a reduction in road building, and therefore aggregate use. Any consequent increase in rail aggregate usage is likely to be a very small proportion of the total output.

Table 3.35
Movements of aggregates by all modes excluding pipelines
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	1.40	1.56	-	-	-	-	-	-	-	-	-	-	-	-	2.96
	Auckland	-	8.21	-	-	-	-	-	-	-	-	-	-	-	-	8.21
	Waikato	-	3.19	3.04	0.19	-	-	0.19	-	-	-	-	-	-	-	6.61
	Bay of Plenty	-	-	0.19	2.61	0.03	-	-	-	-	-	-	-	-	-	2.84
	Gisborne	-	-	-	0.03	0.27	0.03	-	-	-	-	-	-	-	-	0.34
	Hawke's Bay	-	-	-	-	0.03	1.16	-	0.13	-	-	-	-	-	-	1.33
	Taranaki	-	-	0.19	-	-	-	0.71	0.09	-	-	-	-	-	-	0.99
	Manawatu	-	-	-	-	-	-	0.09	2.29	0.24	-	-	-	-	-	2.62
	Wellington	-	-	-	-	-	-	-	0.24	2.16	-	-	-	-	-	2.40
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	1.28	0.07	0.07	-	-	1.42
	West Coast	-	-	-	-	-	-	-	-	-	0.07	0.49	-	-	-	0.56
	Canterbury	-	-	-	-	-	-	-	-	-	0.07	-	5.97	0.27	-	6.31
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.27	2.34	0.09	2.70
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	0.09	0.80	0.89
	Total	**1.40**	**12.97**	**3.42**	**2.84**	**0.34**	**1.20**	**0.99**	**2.75**	**2.40**	**1.42**	**0.56**	**6.31**	**2.70**	**0.89**	**40.19**

Source: production data from Crown Minerals and discussions with quarry operators.

Table 3.36
Movements of aggregates by all modes excluding pipelines
(billion tonne-kms in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.04	0.26	-	-	-	-	-	-	-	-	-	-	-	-	0.30
	Auckland	-	0.21	-	-	-	-	-	-	-	-	-	-	-	-	0.21
	Waikato	-	0.40	0.09	0.02	-	-	0.05	-	-	-	-	-	-	-	0.55
	Bay of Plenty	-	-	0.02	0.13	0.01	-	-	-	-	-	-	-	-	-	0.16
	Gisborne	-	-	-	0.01	0.00	0.01	-	-	-	-	-	-	-	-	0.02
	Hawke's Bay	-	-	-	-	0.01	0.03	-	0.02	-	-	-	-	-	-	0.07
	Taranaki	-	-	0.05	-	-	-	0.02	0.02	-	-	-	-	-	-	0.09
	Manawatu	-	-	-	-	-	-	0.02	0.07	0.03	-	-	-	-	-	0.12
	Wellington	-	-	-	-	-	-	-	0.03	0.06	-	-	-	-	-	0.10
	Tasman/ Marlborough	-	-	-	-	-	-	-	-	-	0.03	0.02	0.03	-	-	0.08
	West Coast	-	-	-	-	-	-	-	-	-	0.02	0.01	-	-	-	0.03
	Canterbury	-	-	-	-	-	-	-	-	-	0.03	-	0.18	0.10	-	0.31
	Otago	-	-	-	-	-	-	-	-	-	-	-	0.10	0.07	0.02	0.19
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.02	0.03
	Total	**0.04**	**0.86**	**0.16**	**0.16**	**0.02**	**0.04**	**0.09**	**0.15**	**0.10**	**0.08**	**0.03**	**0.31**	**0.19**	**0.03**	**2.27**

3.10 Coal

3.10.1 Introduction

Coal is mined or used in New Zealand for four main purposes: export, power generation, steel making and cement, plus a range of other industrial applications (such as process heat for the dairy industry, meat industry, brick making and lime manufacture). Over five million tonnes a year is mined and about 0.9m tonnes is imported.

Table 3.37 Coal transported/available for use in New Zealand (000t, 2006-07)	
Coal mined	5,455
Plus imports	944
Total transported	6,399
Less exports	(2,339)
Total available for use in NZ	**4,060**

3.10.2 Information sources

There is good published data on coal production in New Zealand, from both Crown Minerals and the industry. Overall production statistics are available from Crown Minerals (see below), although this data is not entirely consistent with production figures from miners. Solid Energy publishes detailed statistics by mine and destination or end use in its Annual Report 2006-07, including details of the imports for Genesis. These include comments on transport mode. Solid Energy also responded to the questionnaire. Eastern Corporation provided data on its end uses and transport. Some smaller miners also gave information. Toll Rail also provided information on rail transport of coal. Other data was obtained from miners, ports, and other websites, and from Statistics New Zealand port data. This latter does not disclose the exports through Lyttelton. Solid Energy's export data is however available in their Annual Report, and another export miner also provided details.

3.10.3 Industrial structure

There are three principal coal fields in New Zealand, Waikato, West Coast and Southland. In addition there are several minor fields, most of which are not in production. Notable exceptions are the Malvern area in Canterbury and some Otago mines. The West Coast and Huntly produce bituminous and sub-bituminous coal, for metallurgical and thermal uses, including export. Southland has extensive lignite deposits, with some sub-bituminous, all used for thermal purposes.

The industry has one major producer and 15-20 lesser producers. Solid Energy, a state owned enterprise, produces about 4.7 million tonnes per annum. Nearly all the export coal is produced by Solid Energy, from its West Coast mines. In addition it supplies the Huntly Power Station, and New Zealand Steel from its Huntly mines. It also supplies industrial coal, principally in the South Island. It has recently lost the contract to supply the Clandeboye plant, but has acquired the Newvale lignite mine, supplying Edendale, and other industrial users.

The next most important producer is Eastern Corporation, an Australian company mining on the West Coast and in Southland. With the recent contract to supply Clandeboye, this company will produce about 200,000 tonnes per year, and there are a number of other smaller mining companies who between them produce about 0.5 million tonnes per year. These include:

- Francis Mining Company Ltd, and its associate Roa Mining Company Ltd, on the West Coast
- Birchfield Coal Mines Ltd
- The Kai Point Coal Company
- Glencoal, a subsidiary of Fonterra, that produces for three dairy plants, principally Waitoa.

In addition coal is imported for electricity generation and for cement manufacture. Genesis imported 854,000 tonnes of coal from Indonesia through Mt Maunganui in 2006-07 for its Huntly power station. The amount varies from year to year according to power demand, and local supply. In previous years, Genesis has imported as much as 1.2 million tonnes. The current transport system is dimensioned for up to 1.5 million tonnes.

Some 90,000 tonnes is imported from Australia into Portland, Whangarei, for cement manufacture. This is imported via Marsden Point, about 30 km from the cement plant, and is transported there by road from the port. In the past, Huntly has been the source of supply for the plant and it is possible that it could revert to that source, which would impact on the internal system (probably rail).

3.10.4 Production

Production figures are summarised in Table 3.38.

Table 3.38
2006-07 coal production by mining method (tonnes)

Region	Opencast	Underground	Total
Waikato	1,811,488	390,322	2,201,810
North Island	**1,811,488**	**390,322**	**2,201,810**
West Coast	2,225,000	502,000	2,727,000
Canterbury	58,950	0	58,950
Otago	57,000	0	57,000
Southland	410,504	0	410,504
South Island	**2,751,454**	**502,000**	**3,253,454**
New Zealand	**4,562,942**	**892,322**	**5,455,264**

Source: Crown Minerals, MED. West Coast and Otago adjusted (increased) with data from Solid Energy *Annual Report 2006-07*, and from other miners.

3.10.5 Imports

Some coal is imported and this is summarised in Table 3.39

Table 3.39
2006-07 coal imports

Origin	Import Port	Tonnes	Destination and use
Indonesia	Tauranga	854,000	Huntly, power generation
Australia	Marsden Point	90,000	Portland, cement manufacture
Total		**944,000**	

Source: Solid Energy Annual Report 2006-07; Golden Bay Cement.

3.10.6 End uses

The estimated end uses of coal are set out in Table 3.40.

Table 3.40
End uses of coal

Use	Tonnes (2006-07)
Export	2,339,000
Power generation	2,000,000
Steel making	800,000
Cement manufacture	160,000
Dairy (est.)	450,000
Lime	42,000
Other (eg meat, ceramics and hospitals)	608,000
Total	**6,399,000**

Source: Solid Energy *Annual Report 2006-07*; Various websites; Eastern Corporation; other miners.

3.10.7 Transport mode

Rail is used for the movement of 4.1 million tonnes:

- coal from Rotowaro, near Huntly to the steel mill at Glenbrook (778,000 tonnes)
- import coal from Mt Maunganui to Rotowaro for Genesis (854,000 tonnes)
- export coal from the Buller and Grey districts to Lyttelton (2,290,000 tonnes)
- coal from the Ohai area to Clandeboye, for dairy (130,000 tonnes)
- some smaller domestic flows from the West Coast to Christchurch.

Sea freight is used for imports and exports, including 49,000 tonnes by barge to Australia from Westport in 2006-07. It is also used for the 37,600 tonnes from Buller to New Plymouth (from where it is moved to Otorohanga by road.) This latter movement ceased in 2008.

Road is used for all other flows, mostly over short distances.

3.10.8 Overall movements

The total volumes of coal transported are set out in Tables 3.41 and 3.42.

Table 3.41
Coal movements
(million tonnes in 2006/07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Waikato/Bay of Plenty	0.85	2.21	0.00	0.00	0.00	0.00	0.00	3.06
Gisborne/Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tasman/Nelson/ Marlborough/West Coast	0.00	0.04	0.00	0.00	0.17	2.52	0.00	2.73
Canterbury	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.13	0.34	0.47
Total	**0.94**	**2.25**	**0.00**	**0.00**	**0.17**	**2.71**	**0.34**	**6.40**

Source: SE Annual Report 2007, Eastern Corporation, interviews with other miners.

Table 3.42
Coal movements
(billion tonne-kms in 2006/07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waikato/Bay of Plenty	0.07	0.17	0.00	0.00	0.00	0.00	0.00	0.25
Gisborne/Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tasman/Nelson/ Marlborough/West Coast	0.00	0.02	0.00	0.00	0.01	0.89	0.00	0.92
Canterbury	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.08
Total	**0.08**	**0.20**	**0.00**	**0.00**	**0.01**	**0.97**	**0.01**	**1.26**

3.11 Oil and petroleum movements

3.11.1 Introduction

This group of commodities includes petrol and diesel for use in transportation as well as related products such as jet fuel, kerosene, bitumen and other fuel oils. However the market is dominated by petrol and diesel. In this chapter, we use the term 'oil' generically to cover all these products.

All the oil consumed in New Zealand comes from one of two sources:

- the refinery at Marsden Point
- direct imports of refined petrol and diesel.

3.11.2 Information sources

The main sources of information on the movement of petroleum products are derived from:

- Statistics New Zealand
- Silver Fern Shipping
- Marsden Point Refinery.

3.11.3 Industry structure

Production within New Zealand centres on the Marsden Point Refinery (MPR), which uses both imported crude oil and locally produced crude oil and condensate which arrives by ship from Taranaki. The major oil companies are part-owners of the refinery. Of the total crude product used by the refinery, about 5.05 million tonnes is imported and about 0.2 million tonnes is from domestic sources.

The output of the MPR is insufficient to meet total New Zealand demand and refined product is also imported through a number of ports, in particular Tauranga, Wellington and Christchurch.

There are a number of locations, such as Seaview in Wellington, where refined fuel is stored prior to distribution. This is either transported by coastal shipping (Silver Fern) from MPR or imported directly from overseas. It is common practice for oil companies to use each other's storage facilities. While petrol has a shelf life of several months, the frequency of delivery is dictated by the costs of storage. In addition the Auckland area is supplied directly from storage facilities located at Wiri which is served by pipeline from Marsden Point.

The processing capacity of MPR is currently being increased, with completion due late in 2009. This will change the split between refined and unrefined fuel imported into New Zealand, and will also increase the share of coastal shipping as movements from Marsden Point are substituted for direct imports.

3.11.4 Primary distribution

Production from MPR is distributed as follows (using data for calendar 2007):

- export (two percent)
- bunkers (one percent)
- by road for consumption in Northland (six percent)
- pipeline to Wiri (52 percent)
- coastal shipping to North Island (21 percent)
- coastal shipping to South Island (18 percent).

This is shown below in Figure 3.11. The total annual MPR output is around 5.3 million tonnes. A further million tonnes is imported direct.

Fuel which goes to Wiri by pipeline is stored there and distributed by road through Auckland and Waikato. Other parts of New Zealand are served by road from the nearest coastal storage depot.

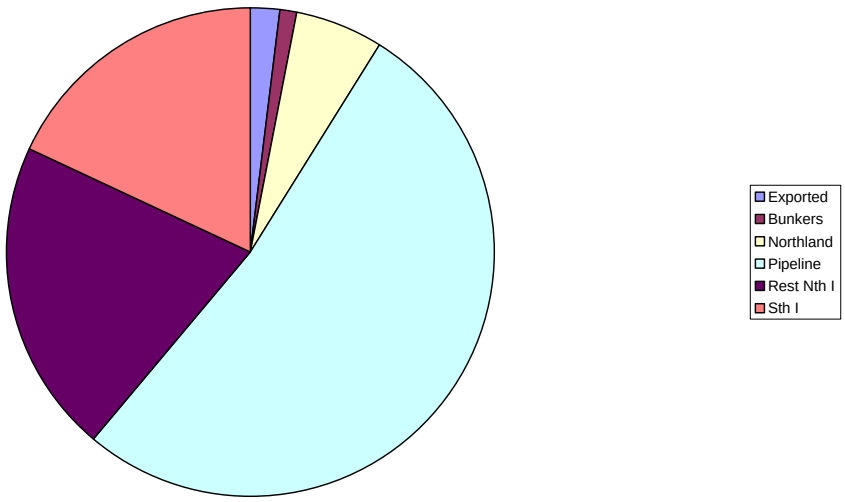


Figure 3.11
Output of the Marsden Point Refinery

Table 3.43 below shows the flow of oil to the local storage facilities such as Wiri and Seaview. Note that to achieve this virtually no road or rail transport is involved.

Table 3.43
Movements of petroleum products by sea in New Zealand (2007)
(000 tonnes)

Port	Exports (1)	Imports from overseas(1)	Movements by S Fern (2), (4)	Movements by pipeline (3)	Petroleum products available: imports plus SF plus pipeline
Whangarei (Marsden Pt Refinery)	104.9	5,048.5	183.3		0.0
Auckland Seaport	17.2	141.2	135.8	2,768.5	3,045.5
Tauranga Seaport	0.3	686.5	318.0		1,004.4
Gisborne	0.0	0.0	0.0		0.0
New Plymouth	584.9	40.8	107.2		148.0
Napier	0.0	7.5	191.9		199.3
Wellington Seaport	0.0	763.4	188.7		952.1
Nelson	0.1	30.0	215.1		245.2
Picton	0				
Westport	0				
Christchurch Seaport (Lyttelton)	0.0	359.4	189.1		548.4
Timaru	0	19.9	50.7		70.6
Dunedin Seaport (Port Chalmers)	1.3	14.3	241.1		255.4
Invercargill Seaport (Bluff)	0	114.8	161.6		276.4
Total	**708.8**	**7,226.1**	**1,982.5**	**2,768.5**	**6,745.3**
Of which refined product		2,177.6			

Sources: (1) Port Statistics, year to 30/06/07.
(2) S Fern data, calendar 2007.
(3) M Pt Annual figures, calendar 2007; includes direct by road to Northland.

Notes: (4) All Silver Fern shipping movements carry refined product from the Marsden Point Refinery except the first, which carries crude oil from New Plymouth to the refinery.

All the product which is imported to ports other than Whangarei for use in the Marsden Point Refinery is either refined diesel or petrol. However some of the output from MPR is other products such as bitumen. Using data from Silver Fern, about 10 percent of the annual consumption of seven million tonnes falls into this category. Petrol and diesel are consumed in roughly equal amounts although the exact split does not affect the transport requirements.

3.11.5 Secondary distribution

It is the distribution of petrol and diesel from the storage depots to filling stations and other users which has the main impact on land transport in New Zealand. As can be seen from the above table, there are major storage facilities at Wiri, Tauranga, Wellington and Christchurch, with smaller ones at New Plymouth, Napier, Nelson, Timaru, Dunedin and Invercargill. With the exception of Northland, all of New Zealand is served from one of these.

Table 3.44 sets out the estimated pattern of distribution of petroleum products from the key storage points. By matching regional population with the total tonnage at the respective storage facilities in the above table (far right column), it is possible to assess which parts of the country ('catchments') are served from each storage facility, as follows. Northland is supplied directly from the refinery.

Table 3.44 Oil storage depots in New Zealand	
Storage depot	Main catchment areas
Wiri	Auckland and Waikato
Tauranga	Bay of Plenty, Gisborne, parts of Waikato (eg Coromandel) and parts of Manawatu–Wanganui (M-W)
New Plymouth	Taranaki
Napier	Hawke's Bay
Wellington	Wellington and parts of Manawatu – Wanganui (M-W)
Nelson	Tasman, Nelson, Marlborough and West Coast
Christchurch and Timaru	Canterbury
Dunedin	Otago and Canterbury
Bluff	Southland and Otago

Clearly there is an element of subjectivity about the matching used to produce the above table, but in general there is a good correspondence between estimated consumption and supply for each of the storage depots

3.11.6 Exports

About 600,000 tonnes of oil and petroleum products are exported annually from New Plymouth.

3.11.7 Use of rail

There is no current use of rail in the transport of oil or petroleum products in New Zealand.

3.11.8 Overall movements

The overall movements of fuel by road and coastal shipping are set out in Table 3.45 and 3.46.

Table 3.45
Movements of petroleum products by all modes excluding pipelines
(million tonnes in 2006-07)

To From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	2.86	0.96	0.19	0.30	0.22	0.23	0.40	5.16
Waikato/Bay of Plenty	0.00	0.55	0.16	0.28	0.00	0.00	0.00	0.99
Gisborne/Hawke's Bay	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.20
Taranaki/Manawatu-Wanganui/Wellington	0.18	0.00	0.00	1.10	0.00	0.00	0.00	1.28
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23
Canterbury	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.62
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.14	0.41	0.55
Total	**3.04**	**1.51**	**0.55**	**1.68**	**0.45**	**0.99**	**0.81**	**9.03**

Notes: excludes pipeline from Marsden Point to Wiri.

Table 3.46
Movements of petroleum products by all modes excluding pipelines
(billion tonne-kms in 2006/07)

From \ To	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.09	0.20	0.11	0.21	0.20	0.27	0.64	1.73
Waikato/Bay of Plenty	0.00	0.03	0.05	0.11	0.00	0.00	0.00	0.19
Gisborne/Hawke's Bay	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Taranaki/Manawatu-Wanganui/Wellington	0.10	0.00	0.00	0.05	0.00	0.00	0.00	0.14
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
Canterbury	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.09
Total	**0.19**	**0.23**	**0.17**	**0.37**	**0.22**	**0.34**	**0.68**	**2.19**

Notes: excludes pipeline from Marsden Point to Wiri

3.12 Steel and aluminium

3.12.1 Introduction

Steel and steel reinforcing is produced in Auckland and distributed nationally and for export. Additionally, substantial quantities are imported. Significant quantities of roading aggregate are produced as a by-product.

Steel is produced by Bluescope Steel (part of BHP Billiton) at Glenbrook in South Auckland, in the form of roofing materials, and export plate and coil, and by Pacific Steel (part of the Fletcher Group) at Otahuhu, as reinforcing rod and wire.

Aluminium is produced at the smelter at Tiwai Point in Southland. The output is mainly exported but about 35,000-40,000 tonnes are distributed in New Zealand directly by road or by coastal shipping (23,000 tonnes) and then by road.

3.12.2 Production

Steel

Bluescope Steel produces 490,000 tonnes of steel coil and plate at its Glenbrook mill, with destinations as follows:

- export - 300,000 tonnes
- Auckland – 70,000 tonnes
- rest of North Island – 90,000 tonnes
- South Island – 20-30,000 tonnes.

In addition, the mill produces 400-450,000 tonnes of by-products including vanadium slag, ferrous scrap, aggregate and other slag.

Pacific Steel uses 280,000 tonnes of scrap (including scrap from Bluescope) to produce 245,000 tonnes of reinforcing bar and steel coil, and 28,000 tonnes of wire.

Aluminium

The aluminium smelter at Tiwai Point uses alumina imported from Australia. Production in 2005 was 350,000 tonnes, of which 90% is exported directly and so has no land transport impact. The remaining 35,000–40,000 tonnes is distributed throughout New Zealand.

3.12.3 International trade

715,000 tonnes of iron and steel are exported, and 399,000 tonnes imported. Bluescope and Pacific Steel only export through Tauranga and Auckland. Most of the remaining export trade is scrap.

Table 3.47 Iron and steel trade, 2006-07 (000 tonnes)						
Port	Scrap exports	Other exports	Total exports	Principal destination	Imports	Principal origins
Auckland	75	111	186	Australia	215	Far East, Aus
Tauranga	40	302	342	North America	106	Australia
New Plymouth	10	-	10	Far East	-	
Napier	4	-	4		8	
Wellington	64	1	65	Far East	9	
Nelson	1	-	1		-	
Lyttelton	89	1	90	SE Asia	31	Australia
Timaru	-	-	-		24	Far East
Dunedin	11	-	11	SE Asia	8	
Invercargill	9	-	9		-	
Total	**304**	**415**	**719**		**403**	

Source: Statistics NZ. Totals may not agree due to rounding within the table.

3.12.4 Principal flows

Steel

The principal flow from the Glenbrook works is the export traffic to Mt Maunganui, 300,000 tonnes per annum. This steel moves 217 km, 90 percent by train, generating some 65m net tonne-kms. 70,000 tonnes of coil and plate goes to Auckland, travelling approximately 50 km. 90,000 tonnes goes to other North Island destinations, say 300 km. All these other North Island destinations are by road. The South Island, assuming Christchurch as a central point, takes 20-30,000 tonnes over a distance of approximately 1,100 km. The South Island traffic goes by rail with onward distribution by road if necessary.

Domestic traffic totals 180-190,000 tonnes, and generates 58 million tonne-kms, making a total steel traffic from Glenbrook of 123 million tonne-kms.

Pacific Steel's output goes mostly to Auckland. An analysis of the export statistics and information from Pacific and Bluescope suggests Pacific Steel uses Auckland for its exports. Significant quantities also move to Canterbury, Wellington and Bay of Plenty

On this basis, the steel industry generates 231 million tonne-kms for its main outputs.

The vanadium from Glenbrook goes to Tauranga for export, by rail (204 km, counted in the 'Other minerals' total). 90,000 tonnes of scrap goes into Auckland and for export (50:50, 45/58 km). Slag goes to Portland for cement manufacture (212 km). Apart from the vanadium, all these by-products move by road, amounting to 14 million tonne-kms. Aggregate slag is covered above.

Aluminium

About 4,000 tonnes of domestic consumption goes by rail, principally to Auckland, Hamilton and Tauranga. About 10,000 tonnes is taken by road to Christchurch and Dunedin and the remainder is shipped to Tauranga for distribution in the North Island. This has been distributed approximately according to population.

Some product is imported through Auckland and primarily for use in Auckland or Waikato in aluminium extrusion plants. Product is also imported via New Plymouth for use in Taranaki.

Table 3.47
Movements of steel, scrap, and slag and aluminium
(million tonnes in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.80	0.34	0.01	0.06	0.01	0.04	0.02	1.28
Waikato/Bay of Plenty	0.08	0.15	0.00	0.01	0.00	0.00	0.00	0.24
Gisborne/Hawke's Bay	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.04
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canterbury	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.14
Otago/Southland	0.00	0.03	0.00	0.00	0.00	0.01	0.03	0.07
Total	**0.91**	**0.52**	**0.02**	**0.16**	**0.01**	**0.19**	**0.05**	**1.85**

Table 3.48
Movements of steel, scrap, and slag and aluminium
(billion tonne-kms in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.03	0.07	0.00	0.04	0.01	0.04	0.02	0.21
Waikato/Bay of Plenty	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Gisborne/Hawke's Bay	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tasman/Nelson/ Marlborough/West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canterbury	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otago/Southland	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.05
Total	**0.05**	**0.12**	**0.01**	**0.04**	**0.01**	**0.05**	**0.03**	**0.30**

3.13 Limestone, fertiliser and cement movements

3.13.1 Introduction

Limestone is the second most mined mineral in New Zealand, after aggregate. It is widely distributed throughout the country, but is not as ubiquitous as aggregate. Principal workings are in Northland, Waikato, Hawke's Bay, Wairarapa, Nelson, Westland, Canterbury and Southland.

Limestone is quarried for agricultural and industrial uses, and to a lesser extent as building stone. Agricultural uses include application as a soil conditioner as well as stock food additives. The principal industrial use is for cement manufacture. Lime has many other uses, including as an agent in steel making and gold refining, as a filler in paints and paper etc, and for water purification, sugar manufacturing and carpet backing. Industrial uses generally require a higher quality stone, so locations producing industrial lime are fewer. Burnt lime is produced in still fewer locations.

Some limestone is imported for industrial lime processing.

Some 13 percent of limestone production is used directly for roading. This is likely to be counted as industrial limestone, but it is not totally clear. Burnt or hydrated lime for road stabilisation is part of the industrial limestone statistics.

Fertiliser is produced by two main companies, Ballance and Ravensdown. These produce phosphate-based fertiliser at six locations: Whangarei, Mt Maunganui, Awatoto (Napier), Hornby (Christchurch), Ravensbourne (Dunedin) and Awarua (Bluff). In addition, the companies have networks of stores for distributing their products. Ballance also produces nitrogen fertilisers from natural gas at Kapuni. Substantial quantities of both types of fertiliser are also imported.

Cement is produced by Golden Bay Cement, part of the Fletchers Group in Northland and by Holcim on the West Coast, and is distributed nationally. Significant amounts are also imported.

Concrete is made throughout the country and travels essentially short distances. Some 3.7 million cubic metres were produced in 2006-07 (or about nine million tonnes).

3.13.2 Information sources

Data on limestone production comes from Crown Minerals from their Industrial Minerals monograph series. As well, the New Zealand Minerals Association and its website were useful sources of information. These were supplemented by interviews with key firms in the industry and their websites.

Fertiliser production and distribution data was obtained from Ballance, and production data from Ravensdown. Ravensdown's distribution was estimated from the total use of fertiliser statistics from Statistics New Zealand (from the 2007 Agricultural Production Census), and from the distribution of their stores. Imports and exports were supplied by Statistics New Zealand.

Information on cement is also derived from data provided by the producers, and their websites. In both cases the information on international trade comes from Statistics New Zealand's port information. Statistics New Zealand also provide data on ready-mix concrete production (taken to be all concrete production of any significant scale).

3.13.3 Industry structure

There are some 120-130 limestone quarries in the country. Volumes produced vary widely, as for aggregate. In general, quarries have become larger and reduced in number as transport has improved. Ownership ranges from individuals to major companies like Holcim and Omya. Apart from the cement plants, McDonalds Lime, a subsidiary of Holcim, with Bluescope Steel as an important shareholder, is the major producer, with quarries and plants in Waikato and Otago. It supplies steel works and gold refining plants, as well as agricultural uses and export to New Guinea. Holcim also mines limestone for cement at Cape Foulwind. Ravensdown, the fertiliser cooperative, also has a major lime operation at 9 sites, principally for agricultural use. Some works are owned by transport firms in order to secure backloads.

Omya, part of a Swiss multinational, produces high-end industrial limestone products at its plant in Te Kuiti.

In fertiliser, Ravensdown and Ballance are both farmer owned cooperatives. These two companies dominate the fertiliser industry, with about 90 percent of total sales.

Two companies, Golden Bay and Holcim, produce all of New Zealand's cement. In the recent past there have been at least two other producers, and four other plants, but the industry has now reduced to two producers and two plants. Golden Bay (part of the Fletcher Group) has a plant at Portland, near Whangarei, and produces about 850,000 tonnes per annum. Holcim (an international firm) operates the Cape Foulwind plant near Westport, producing about 510,000 tonnes per annum. Both plants are located close to raw material supplies, but somewhat distant from their markets, creating a strong transport demand.

Ready mix concrete has a range of firms involved, from small operators, to mid size operators (eg Bridgemans in Hawke's Bay, Waikato, Bay of Plenty and Auckland) to national independent firms like Allied Concrete and integrated major companies like Holcim and Fletchers (Firth). Allied has 45 sites, of which 25 are in a joint venture with Holcim. There are about 183 ready mix sites nationally (including 16 satellite sites).

There is a strong degree of integration in this sector, with major firms like Holcim and Fletchers involved in cement, aggregate, and concrete; and also reinforcing steel in Fletcher's case. Holcim also has a strong presence in the agricultural and industrial lime sectors.

3.13.4 Production

Limestone

In Table 3.49, taken from Crown Minerals statistics for 2006, the following subsectors are included:

- limestone and marl for cement – 1,762,000 tonnes
- limestone for agriculture – 2,326,000 tonnes
- limestone for industry – 948,000 tonnes
- agricultural and industrial dolomite – 16,000 tonnes (14,000 of which is agricultural).

On this basis, the limestone industry produces 5.1 million tonnes annually.

Statistics on limestone as a building stone are not separated from those for all building stone. However, the building and dimension stone figure for Otago, 9,700 tonnes is likely to be a good approximation of the total.

Table 3.49
Limestone production by region, 2006
(000 tonnes)

Region	Cement	Agriculture	Industry	Dolomite	Total
Northland	922	326	99		1347
Auckland		156	1		157
Waikato		395	644		1,039
Bay of Plenty		-	-		-
Gisborne		-	-		-
Taranaki		-	-		-
Hawke's Bay		319	66		385
Manawatu/Wanganui		11	22		33
Wellington		118	26		143
Nelson/Tasman		37	23	16	76
Marlborough		24	3		27
Canterbury		350	8		358
Otago		188	53		241
West Coast	840	77	3		920
Southland		325	-		325
Total	**1,762**	**2,326**	**948**	**16**	**5,053**

Source: Crown Minerals

The regional distribution of limestone production is set out in Figure 3.12.

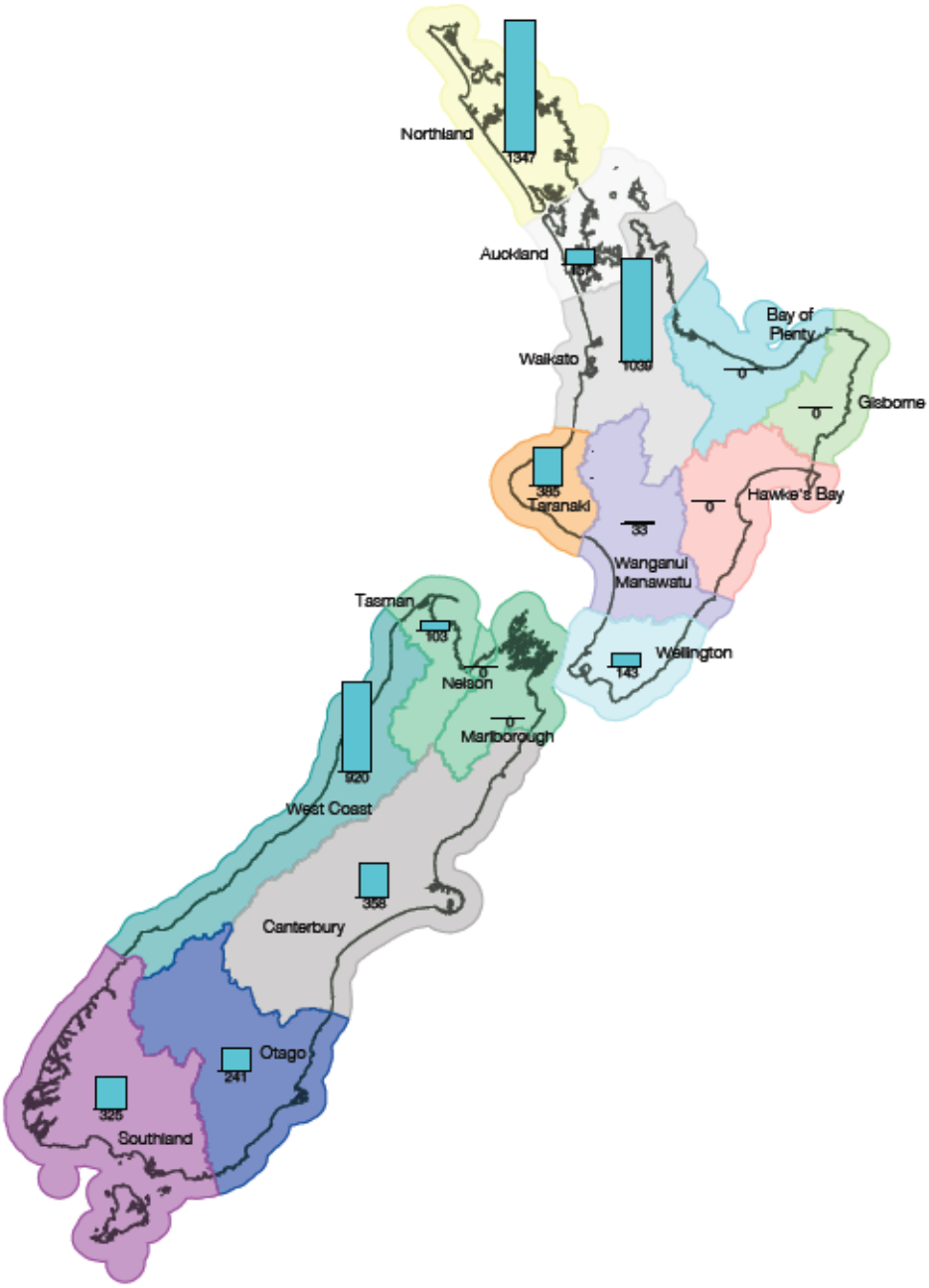


Figure 3.12
Limestone Production by Region 2006
(000 tonnes)

Fertiliser

About 1.4 million tonnes of fertiliser is produced by the six phosphate works, plus 250,000 tonnes from the urea works at Kapuni. Raw materials for the phosphate works (principally phosphate rock and sulphur, in some cases sulphuric acid) are generally freighted over short distances from the adjacent port. These are estimated at 980,000 tonnes. The Ravensbourne works in Dunedin has its own wharf. The longest distances are for Whangarei, from Marsden Point (35 km), and Hornby, from Lyttelton (20 km). Sulphur for the Whangarei works is supplied by the Marsden Point Oil Refinery. Given the short distances, the raw material transport is not included in Tables 3.55 and 3.56.

Table 3.50 Fertiliser production (000t)		
Works	Phosphatic	Nitrogenous
Whangarei	C	
Mt Maunganui	C	
Awatoto	C	
Hornby	C	
Ravensbourne	C	
Awarua	C	
Kapuni	C	250
Total	**1400**	**250**

Source: Balance and Ravensdown. Note: composite table, covers 2006 and 2009 forecast data.

Cement

About 1.4 million tonnes is produced annually at the two plants: 0.85m at Portland and 0.51m at Cape Foulwind. The main raw materials are limestone and marl (generally quarried locally), coal or other fuel, and gypsum. Limestone and coal are dealt with in other chapters. Gypsum is imported into Whangarei and Westport (see 'Other minerals').

Concrete

Concrete production is carried out in all regions, roughly in proportion to their population and GDP. The published statistics are in cubic metres, converted below at 2.4 tonnes per m^3.

Table 3.51 Concrete production by region, 2006-07		
Region	000 Cubic metres	000 Tonnes
Northland	155	371
Auckland	1256	3014
Waikato/BOP	697	1672
Gisborne/Hawke's Bay	162	388
Taranaki/Manawatu-Wanganui/Wellington	552	1324
West Coast/Tasman-Nelson/Marlboro	177	424
Canterbury	511	1228
Otago/Southland	219	526
Total	**3728**	**8947**

Source: Statistics NZ

3.13.5 International trade

There are few significant movements of limestone. Omya imports 10,000 tonnes per annum from Australia through Auckland, and trucks it to Te Kuiti. This replaces a source of marble near Nelson that used to feed the plant.

Some 50,000 tonnes per annum are exported from McDonalds Lime at Otorohanga to New Guinea through Tauranga. This moves internally by rail.

Significant quantities of fertiliser are imported.

Table 3.52 International trade in fertiliser (000 tonnes)		
Port	Imports	Exports
Whangarei	42.3	
Auckland	21.5	2.6
Tauranga	244.2	1.8
Gisborne		
New Plymouth	211.9	
Napier	101.9	0.6
Wellington	0.2	0.4
Nelson	36.0	
Picton		
Westport		
Christchurch	169.4	1.1
Timaru	113.1	
Dunedin	37.9	
Invercargill	91.8	
Total	**1,070.3**	**6.5**

Source: Statistics NZ and fertiliser companies. Statistics 2006-07. Excludes raw materials.

Cement is exported from Whangarei (11,000 tonnes) and Auckland (24,000 tonnes), and imported into Whangarei (85,000 tonnes) and Dunedin (45,000 tonnes). Lesser quantities are imported into Auckland, Tauranga, New Plymouth, Napier, Christchurch, Timaru and Invercargill (17,000 tonnes in total). Overall, 35,000 tonnes were exported to the Pacific Islands and 146,000 tonnes imported, mainly from the Far East.

3.13.6 Main movements

The principal movements are:

Limestone

- For cement, a third of the lime for the Portland works comes by road from the quarry at Waro, 30 km north (nine million tonne-kms). All the rest, and all the Cape Foulwind limestone, is mined adjacent to the works.

- Limestone (and lime flour) for the Bluescope steel works, 80,000 tonnes per annum, is produced by McDonalds at Otorohanga and Hangatiki, and sent by rail to the Glenbrook plant (160 km, 12.8 million tonne-kms).

- McDonald's main quarry is located 22 km from Otorohanga. It produces 750,000 tonnes per annum, of which 300,000 tonnes is carted to Otorohanga (6.6 million tonne-kms).

- McDonald's burnt lime is distributed from South Auckland to Northland for road stabilisation (quantities are not available).

- McDonald's fine lime is used as an asphalt filler from Wellington to Auckland and Mt Maunganui.

- Lime for gold processing at Macraes is produced at Makareao, 20 km away.

- Export traffic from Otorohanga to Tauranga, 50,000 tonnes (145 km, seven million tonne-kms).

- Other industrial lime from Waikato is for a range of industries. This is assumed to travel to Auckland and Tauranga equally 514,000 tonnes (158 km, 81 million tonne - kms).

- Agricultural lime is mainly produced locally but moves into deficient regions – e.g. Waikato to Bay of Plenty and Taranaki and Hawke's Bay into Gisborne and Taranaki. It also moves into Manawatu from Hawke's Bay.

- Small quantities, but some recent use of coastal vessel *Anatoki* for dolomite interisland.

- Total limestone tonne-kms are estimated at 314 million.

Fertiliser

- Fertiliser typically moves from plant to store to farm, usually by road. The two suppliers compete in most areas, so that there are some substantial hauls involved.

- Ballance's transports total 1.48 million tonnes and 342 million tonne-kms. Principal hauls are from their works at Whangarei, Mt Maunganui, Kapuni and Bluff. These figures also include imports into those places. Data for Ravensdown is unavailable, but it is estimated that about 585,000 tonnes (46%) moves outside its region of origin.

- Most of Ballance's traffic moves by road transport, including inter-island. About 35,000 tonnes move on rail from Bluff to Timaru. Movements by ship include about 27,000 tonnes to Canterbury and Southland from the North Island.

- Rail moves bulk phosphate fertiliser to stores at Matawhero (Gisborne), Feilding, Utiku, Wanganui, Manunui (Taumarunui) and New Plymouth.

- Total fertiliser net tonne-kms from Ballance and Ravensdown are estimated at 556 million. These two firms together have about 90% of the total market.

Cement

Cement is produced at Westport and moved by ship to Dunedin, Lyttelton, Nelson, Picton, Wellington, New Plymouth and Onehunga. Some cement is railed from Westport to Christchurch, and some is also sent by road to Christchurch and Nelson. At Napier, Gisborne, Tauranga and Auckland, cement is received by ship for local distribution and output from Golden Bay's plant is moved by road in Northland. All distribution from the ports to the final customer is by road.

Some 35,000 tonnes of fly ash is transported from the Huntly power station to Auckland and then to major terminals for use as a cement additive. This is included in the cement tonnage and net tonne-kms calculations.

The Portland plant is fuelled by 90,000 tonnes of imported coal (counted in the coal chapter), and also by woodchip (20,000 tonnes, 20 km, 0.4 million tonne-kms). Neither is included in the cement tonnage and net tonne-kms calculations.

Golden Bay moves its output by ship and barge to Auckland, Tauranga, Napier, Wellington and Gisborne. From these places it is distributed by road. At New Plymouth, Nelson, and Christchurch, cement is received from Holcim by ship, and distributed from there by road.

Concrete

There are several concrete plants in most centres of population, and many in rural areas as well. Given the short shelf life of the product (90 minutes), their range is likely to be quite short and influenced by congestion and road quality. We estimate 10 km as the average haul, except in Auckland where we have estimated five km. On this basis, this activity generates 74 million tonne-kms.

3.13.7 Overall flows

For confidentiality reasons the flows of the four products have been combined. These are set out in Tables 3.53 and 3.54.

Table 3.53
Movements of limestone, fertiliser, cement and concrete
(million tonnes in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	5.73	0.29	0.06	0.09	0.01	0.01	0.00	6.20
Waikato/Bay of Plenty	0.38	3.00	0.01	0.16	0.00	0.00	0.00	3.56
Gisborne/Hawke's Bay	0.03	0.09	0.90	0.28	0.00	0.00	0.00	1.31
Taranaki/Manawatu-Wanganui/Wellington	0.01	0.16	0.00	1.74	0.01	0.03	0.00	1.95
Tasman/Nelson/ Marlborough/West Coast	0.12	0.00	0.00	0.14	1.55	0.16	0.01	1.98
Canterbury	0.00	0.00	0.00	0.00	0.11	2.03	0.02	2.15
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.06	1.62	1.68
Total	**6.27**	**3.55**	**0.97**	**2.42**	**1.67**	**2.28**	**1.67**	**18.83**

Table 3.54
Movements of limestone, fertiliser, cement and concrete
(billion tonne-kms in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.13	0.08	0.04	0.07	0.01	0.01	0.01	0.35
Waikato/Bay of Plenty	0.06	0.15	0.00	0.05	0.00	0.00	0.01	0.28
Gisborne/Hawke's Bay	0.08	0.03	0.05	0.07	0.00	0.00	0.00	0.22
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.05	0.00	0.05	0.00	0.02	0.01	0.13
Tasman/Nelson/ Marlborough/West Coast	0.11	0.00	0.00	0.06	0.07	0.16	0.01	0.42
Canterbury	0.00	0.00	0.00	0.00	0.04	0.05	0.01	0.10
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.13
Total	**0.40**	**0.30**	**0.09**	**0.30**	**0.13**	**0.28**	**0.13**	**1.63**

3.14 Movements of other minerals

3.14.1 Introduction

As well as the 'big three' (aggregate, limestone and coal) dealt with separately, there is a wide range of minerals mined in New Zealand. Many are only mined in small quantities only, or where the final output (while valuable) is very small by weight, eg gold.

There are some minerals, however, that do impact on transport. They are principally clays and earths, like halloysite, bentonite, brick-making clays, serpentine, perlite and zeolite, and some others like pumice, silica, ironsand and salt. An intermediate stage in gold production also enters the transport chain.

3.14.2 Information sources

Information on production is drawn principally from the Industrial Minerals series on the Crown Minerals website, the NZ Mineral Industry Association website, and interviews with its director, Doug Gordon, Dr Tony Christie of GNS, Dr Richard Barker, Mike Townsend from Imerys Tableware, and other owners and advisers.

3.14.3 Industrial structure

Typically, these 'other' minerals are produced at individual mines, unconnected in ownership. An exception is the gold concentrate, produced at one mine belonging to Oceania Gold and processed at another. Some of the mines are parts of international production chains. Salt is harvested and processed by Dominion Salt Ltd at Lake Grassmere, and imported and processed at Mt Maunganui. Ironsand is mined by Bluescope Steel at Waikato North Head and Glenbrook.

3.14.4 Production

Estimates of current production by commodity are set out in Table 3.55.

Table 3.55 Industrial mineral production 2006 (000 tonnes per annum)			
Mineral	000 t p.a.	Main site/region	End use
Ironsands	1882	North Head, Taharoa	1200 steel, 682 export
Pumice	306	Bay of Plenty	Cattle races etc
Decorative pebbles	131	Waikato, Otago, Southland, West Coast	Paving, building
China Clay (Halloysite)	100 (15 transported)	Matauri Bay, Northland	Ceramics (exported)
Clay for bricks	60	Auckland. Also Waikato	Bricks
Salt	60	Lake Grassmere (Marlborough)	Curing hides, skins; food, animal supplements, water treatment
Silica Sand	59	Auckland	Glass, ceramics
Gold concentrate	57	Reefton	Refining to gold
Serpentine	41	Aria (Waikato)	Fertiliser additive
Building stone	23	Waikato, Otago	Building
Vanadium	15	Mission Bush	Export
Zeolite	9	Rotorua	Fertiliser, stockfood
Amorphous silica	5	Rotorua	Cement additive
Bentonite	4	Gisborne, Canterbury	Drilling, cosmetics
Perlite	4	Atiamuri	Horticulture, industrial uses

Sources: Crown Minerals, MED; Industrial Minerals series, interviews. Salt excludes imported salt.

3.14.5 Trade

Of the minerals produced in New Zealand, the principal exports are ironsand, china clay, and vanadium (a by-product of steel making).

Substantial quantities of minerals are imported. Significant commodities include sulphur for fertiliser, gypsum for cement, silica sand for glass, and salt. Alumina is imported for the Bluff smelter. Most of these commodities are processed at plants close to the import port. These are summarised in Table 3.58

Table 3.56 Other mineral trade			
Port	Tonnes (000) 2006-07	Mineral	End use
Exports			
Taharoa	682	Ironsand	Steel
Auckland	30	China clay (15)	Ceramics
Tauranga	85	Vanadium (15)	
Remainder	22		
Total Exports	818		
Imports			
Whangarei	63	Gypsum, phosphates	Fertiliser, cement
Auckland	250	Sulphur, various	
Tauranga	427	Salt (75), sulphur, phosphates	Salt refining, fertiliser
Napier	228	Sulphur, phosphates	Fertiliser
Westport	24	Gypsum	Cement
Lyttelton	189	Sulphur, phosphates	Fertiliser
Dunedin	56	Sulphur, phosphates	Fertiliser
Invercargill	110	Phosphates	Fertiliser
Remainder	52		
Total Imports	**1399**		

Note: Alumina into Invercargill is classified as 'inorganic chemicals', 745,000t. Other – excludes cement, coal.
Source: Statistics NZ.

3.14.6 Mode

Most of these minerals move by road. The principal exception is the 1.2 million tonnes of ironsand conveyed by pipeline from the Maioro mine to Mission Bush. Other exceptions are rail movements of salt from Lake Grassmere, gold concentrate from Reefton, and vanadium as detailed below.

3.14.7 Main movements

The principal transport flows are:

- **Ironsand:** 1.2 million tonnes p.a. is transported by pipeline from Waikato North Head to Glenbrook, approximately 18 km (22m net tonne-kms, though not on road or rail). 682,200 tonnes are transported by pipeline in slurry for offshore loading at Taharoa, with no impact on the transport network.

- **Salt:** is transported by rail from Lake Grassmere to processing plants in the South Island and Hawke's Bay. From Mt Maunganui the moves are not known, but in addition to being used by the paper making industry, it is likely that the product is used in meat, dairy, tanning and similar industries in the northern half of the North Island and for domestic use. It moves by road from Mt Maunganui.

- **China clay:** 80,000m^3 (100,000 tonnes) per annum is mined at two adjacent sites near Matauri Bay in Northland. About half is transported three km from one site to the processing plant on the other site. The output of the plant, 15,000 tonnes per annum, is loaded into containers, trucked to Whangarei (105 km), and railed from there to Auckland port for export (230 km). Some five million tonne-kms are thus generated.

- **Clay for bricks:** movement of this clay is usually local. The main plant in West Auckland receives 60,000 tonnes per annum of clay and sand from sources north and south of Auckland, all by truck. Principal origins are Helensville, 40 km (12,000 tonnes); Kumeu, 20 km (12,000 tonnes); Maramarua, 120 km (18,000 tonnes); and Port Waikato, 130 km (7,000 tonnes). The total of tonne kilometres is estimated at 3.8 million.

- **Brick output:** production at the West Auckland plant amounts to 50,000 tonnes, 20,000 to Auckland, 20,000 to the rest of the North Island (all by truck) and 10,000 tonnes to the South Island, by sea via Christchurch or Dunedin and then by road. This is counted in the aggregate and building materials chapter.

- **Decorative pebbles:** pebbles sourced on the West Coast are transported by barge to Auckland. MED data shows 9,500 tonnes produced on the West Coast; another source quotes a movement of 20,000 tonnes by barge to Auckland. The MED figures show 69,900 tonnes being produced in the Waikato; it is likely that the market for this is also Auckland, transported by truck.

- **Building stone:** principal production is in the Waikato (11,300 tonnes). It is likely that much of this will be for the Auckland market. The next largest producer is Otago (9,700 tonnes), which is commented on in the limestone chapter.

- **Pumice:** moves from the principal source, Bay of Plenty (near Te Puke) all over the North Island for uses such as stock races and lightweight concrete. 305,700 tonnes were produced in 2006.

- **Amorphous silica:** 4,600 tonnes are mined at Tikitere near Rotorua and is transported to Golden Bay Cement for use as a cement additive. It is assumed that this takes place in Auckland.

- **Zeolite and perlite:** mined near Rotorua, 9,000 tonnes and 3,600 tonnes respectively. Zeolite is processed in Waikato and perlite in West Auckland.

- **Gold concentrate:** gold is mined and processed into a concentrate near Reefton. The concentrate is trucked to rail at Reefton (seven km), railed to Palmerston, north of Dunedin (575 km) and then trucked to the Macraes Flat mine (40 km) for further processing. The system was expected to carry about 65,000 tonnes of concentrate a year but in 2007-08 it carried somewhat less than that. The plant reached planned production in October 2007, so in later years the total will be closer to the target. The production started in early 2007, so the amounts transported in 2006-07 would have been much less. Note that only 11 tonnes of finished gold was produced throughout New Zealand in 2006.

- **Serpentine:** 40,000 tonnes per annum is mined in conjunction with limestone at Aria, south of Te Kuiti. Its principal destinations are the Mt Maunganui (190 km, 75 percent) and Whangarei (395 km, 25 percent) fertiliser works totalling total 9.7 million tonne-kms. Minor amounts also move to Hawke's Bay. Serpentine is also produced near Bluff.

- **Vanadium** is a by-product of steel making, and is railed from Mission Bush for export via Tauranga.

These are summarised in Table 3.57 and 3.58.

Table 3.57
Movements of other minerals
(million tonnes in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	1.29	0.02	0.00	0.00	0.00	0.00	0.00	1.30
Waikato/Bay of Plenty	0.16	0.30	0.00	0.02	0.00	0.01	0.00	0.48
Gisborne/Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
Tasman/Nelson/ Marlborough/West Coast	0.02	0.00	0.01	0.01	0.01	0.02	0.07	0.14
Canterbury	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04
Total	**1.47**	**0.31**	**0.01**	**0.05**	**0.01**	**0.05**	**0.12**	**2.00**

Table 3.58
Movements of other minerals
(billion tonne-kms in 2006-07)

To / From	Northland/ Auckland	Waikato/Bay of Plenty	Gisborne/ Hawke's Bay	Taranaki/ Manawatu-Wanganui/ Wellington	Tasman/ Nelson/ Marlborough/ West Coast	Canterbury	Otago/ Southland	Total
Northland/Auckland	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Waikato/Bay of Plenty	0.03	0.03	0.00	0.01	0.00	0.01	0.00	0.08
Gisborne/Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taranaki/Manawatu-Wanganui/Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tasman/Nelson/ Marlborough/West Coast	0.01	0.00	0.01	0.00	0.00	0.01	0.05	0.07
Canterbury	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otago/Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Total	**0.07**	**0.03**	**0.01**	**0.01**	**0.00**	**0.02**	**0.05**	**0.19**

3.14.8 Future

New Zealand has many other mineral deposits, but apart from oil, coal and gold, there is little activity in terms of exploiting them. As well, many potential sources are tied up in the conservation estate. Little change is expected in overall haulage.

3.15 Retailing

3.15.1 Introduction

There is no currently available information on the volumes of the freight task associated with retailing. Information on the total size of the retail sector in expenditure terms is available from Statistics NZ with some degree of regional disaggregation. This information has been supplemented by interviews with a number of the key organisations within the sector and by further regional disaggregation by the study team.

For the purposes of this analysis, the retail sector has been divided into two main parts: 'supermarkets and food retailing' and 'other retailing', comprising department stores and hardware and other retailing (excluding motor vehicles). Fuel sales are described elsewhere and the majority of motor vehicle sales do not generate any significant freight transport requirements.

3.15.2 Information sources

There is little information available on the size of the retail sector in volume terms. The main sources of information used are:

- Statistics New Zealand
- discussions with key companies including Foodstuffs in Auckland and Wellington, Progressive, The Warehouse, Farmers, Mitre 10 and Fisher & Paykel
- company reports and websites.

3.15.3 Broad patterns of distribution within the sector

The patterns of distribution for the retail sector are very complex, especially for the other retailing group. Typically even within firms there is a mixture of delivery to retail establishments from:

- firms' own centralised distribution centres (DCs)
- third party distribution centres
- suppliers or importers directly.

A variety of transport modes are used although activity is dominated by road transport. Given the numbers of individual players in the industry all of whom probably have different distribution patterns any analysis of freight patterns is essentially very high level and covers the broad picture within the sector rather than a precise indication of the distribution patterns.

Because of the dominance of the two major players, it is not possible to provide a detailed picture of the supermarket sector on its own. It has therefore been combined with results from the food retailing sector to preserve confidentiality.

3.15.4 Total size of the sector

The total size of the retailing sector, as provided by Statistics New Zealand, at different levels of disaggregation for the period July 2006 to June 2007 is set out in Tables 3.59 and 3.60.

Table 3.59
Annual retail data (total sales) at a coarse level of disaggregation (2006-07): supermarkets and other food ($ millions)

Industry group	Auckland region	Waikato region	Taranaki-Manawatu-Wanganui	Wellington region	Rest of North Island	Canterbury region	Rest of South Island	Total NZ
Supermarkets etc	4,135.0	1,106.4	1,317.0	1,525.3	1,955.6	1,452.6	1,555.9	13,047.8
Other food	1,618.2	436.1	313.7	354.5	596.3	391.7	425.6	4,136.1
Total	**5,753.2**	**1,542.5**	**1,630.7**	**1,879.8**	**2,551.9**	**1844.3**	**1981.5**	**17,183.9**

Table 3.60
Annual retail data (total sales) at a higher level of disaggregation (2006-07): department and hardware stores and other retailing excluding motor vehicles ($ millions)

Industry group	Auckland region	Waikato region	Wellington region	Canterbury region	Gisborne-Hawke's Bay	Tasman-Nelson-Marlborough	Bay of Plenty region	Manawatu-Wanganui region	Otago region	West Coast-Southland region	Rest of NZ
Department & hardware stores	5,475.2	1,295.5	1,867.2	2,094.5	867.5	485.1	1,074.1	820.8	988.3	488.6	808.8
Other retailing exc motor vehicles	2,026.6	409.1	574.2	658.3	136.4	127.3	310.8	153.3	308.2	130.1	182.7
Total	**7,501.8**	**1,704.6**	**2,441.4**	**2,752.8**	**1,003.9**	**612.4**	**1,384.9**	**974.1**	**1,296.5**	**618.7**	**991.5**

Analysis of the patterns of expenditure indicates that this is related fairly closely to population and so this has been used to disaggregate the information in the tables above into more comprehensive estimates by region. These are set out in Table 3.61

Table 3.61
Estimated annual expenditure on selected retailing activities by region 2006-07 ($ millions)

Region	Expenditure on supermarkets plus other food retailing	Expenditure on 'Other retail' (1)
Northland	617.3	573.0
Auckland	5,753.2	7,501.8
Waikato	1,542.5	1,704.6
Bay of Plenty	1,105.0	1,384.9
Gisborne	187.9	227.4
Hawke's Bay	641.6	776.5
Taranaki	517.8	418.5
Manawatu	1,112.9	974.1
Wellington	1,879.8	2,441.4
Tasman/Nelson/Marlborough	577.3	612.4
West Coast	138.5	157.3
Canterbury	1,844.3	2,752.8
Otago	859.6	1,296.5
Southland	406.1	461.4
Total	**17,183.9**	**21,282.6**

Notes: (1)Excludes bars and accommodation, fuel and motor vehicles.

3.15.5 Supermarkets and other food retailing

Supermarkets

Information has been supplied on selected activities of the main supermarket groups, Progressive and Foodstuffs who dominate this sector. Using data from annual reports it is estimated that Progressive's sales amount to about $4.3 billion in 2006-07 and that Foodstuffs sales amount to $7.2 billion. Between the two organisations, this represents a large proportion of the total supermarket sector of just over $13 billion and so a reasonable picture of the pattern of activities can be built up. Detailed information has been received from Progressive about their activities. More aggregated information has been received from Foodstuffs (Wellington) which has been used to build up the pattern of activities for the Foodstuffs group as a whole.

In both cases, the groups distribute goods to the stores using a variety of methods including deliveries from their own centralised distribution centres and direct deliveries from suppliers and third party distribution centres. Typically movements from the firms own distribution centres represent about 60-70 percent of all movements, but in both cases the firms were seeking to route a higher proportion of movements though their own distribution centres to allow the consolidation of deliveries and reduce the numbers of vehicle movements to the stores. Of the balance not handled by the main distribution centres, it is estimated that about five percent of deliveries are from the local area and the balance would come from the major manufacturing and distribution hubs in the country: Auckland, Palmerston North, Wellington and Christchurch, each serving defined catchment areas.

From the information supplied by the groups on the volumes transported and the total sales estimates, it was possible to determine an average value per tonne. This was assumed to apply to the whole supermarkets and food retailing sector.

Other food retailing

The other food retailing sector is more dispersed with a larger proportion of smaller shops and chains and more complex distribution patterns. However even in this case it is likely that a substantial proportion of commodities are going to be distributed from the traditional distribution centres, and the more detailed information from the supermarkets sector has been used to assist in identifying likely patterns of distribution.

Given the nature of the product, it is however likely that a relatively high proportion of goods will be obtained from sources within the region itself or from neighbouring areas, and there will be less focus on the longer distance movement of goods. In the absence of any detailed information, it has been assumed that 25 percent of goods are sourced from local points of supply and a further 15 percent are sourced from local supply points in neighbouring regions. The proportions from the main distribution centres are based on those derived for supermarkets with adjustments to allow for the greater purchases of goods from local sources.

No information is available on the modal splits of this traffic, but it is likely that this will be heavily dominated by movement by road.

3.15.6 Total flows

The total estimated patterns of flows of supermarket and food retailing are set out in Table 3.62 and 3.63. As well as flows into the stores themselves, they also include movements between the firms own distribution centres and also the distribution of imported goods

Table 3.62
Estimated distribution of supermarket and other food retailing commodities
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	Auckland	0.20	2.38	0.45	0.32	0.05	0.06	0.06	0.31	0.22	0.04	0.01	0.16	0.07	0.03	4.34
	Waikato	0.00	0.04	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
	Bay of Plenty	0.00	0.29	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
	Gisborne	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.11
	Taranaki	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14
	Manawatu	0.00	0.00	0.01	0.03	0.01	0.12	0.09	0.24	0.34	0.00	0.00	0.00	0.00	0.00	0.85
	Wellington	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.09	0.18	0.00	0.00	0.00	0.00	0.00	0.29
	Tasman/ Marlborough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.03
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02
	Canterbury	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.03	0.56	0.15	0.08	0.98
	Otago	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.03	0.14
	Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
	Total	**0.22**	**2.74**	**0.52**	**0.40**	**0.06**	**0.21**	**0.28**	**0.71**	**0.76**	**0.22**	**0.05**	**0.74**	**0.33**	**0.15**	**7.40**

Table 3.63
Estimated distribution of supermarket and other food retailing commodities
(billion tonne-kms in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Auckland	0.03	0.06	0.06	0.06	0.02	0.02	0.02	0.16	0.14	0.03	0.01	0.16	0.09	0.05	0.92
	Waikato	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Bay of Plenty	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	Gisborne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	Taranaki	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Manawatu	0.00	0.00	0.00	0.01	0.00	0.02	0.02	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.12
	Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	Tasman/ Marlborough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Canterbury	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.02	0.06	0.04	0.19
	Otago	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**0.03**	**0.13**	**0.06**	**0.08**	**0.03**	**0.05**	**0.05**	**0.19**	**0.20**	**0.10**	**0.02**	**0.18**	**0.15**	**0.10**	**1.38**

3.15.7 Other retailing

Current patterns of flows to stores

To cover 'Other retailing', use has been made of detailed material provided by two major chains, together with discussions held with a number of other key organisations and other research. For the major stakeholders in the industry, extensive use is typically made of the firms' own distribution centres and, as in the supermarket sector, there are moves to increase the volumes of traffic through these to facilitate more efficient distribution to shops. There are also moves to ensure that imported goods bound for South Island and Lower North Island distribution centres are delivered to local ports rather than shipping the goods though Auckland or Tauranga with onward transport by road or rail.

To determine the total volumes transported, an average value per tonne has been derived based on discussions and information supplied by the major participants and, as in the case of the supermarket and food sector, this has been used to estimate the total volumes of goods handled by the retail sector. This approach gives a total of about four million tonnes of goods sold.

Goods for sale in the 'Other retail' sector consist of a combination of goods manufactured in New Zealand and goods imported from abroad. Our analysis of the port data supplied by Statistics New Zealand suggests that the total is split broadly 50:50. The volumes sold in each region have been determined using data on retail trade supplied by Statistics New Zealand, further disaggregated to give regional totals as discussed in Section 2 above. The determination of the pattern of distribution for 'Other retailing' as a whole has, therefore, been based on the observed characteristics factored up to reflect the total estimated demands by region and the capacity of the region to meet these demands based on the numbers employed in manufacturing and wholesaling.

Sources of products for distribution centres

The analysis above has considered the pattern of deliveries to stores. However some information is available on the ways in which goods reach the distribution centres. Typically imported goods represent a high proportion of the goods distributed by New Zealand retailers with The Warehouse, for example, having about 85 percent of the goods it sells supplied from overseas.

Of these it is estimated that, for the market as a whole, about 50 percent of goods are imported directly (the great majority through Auckland distribution centres) although there are increasing moves to bring in goods destined for the South Island through Christchurch or Dunedin to reduce transport costs. The distribution of these imports is included in the totals set out below.

Goods imported to the Auckland distribution centres will typically travel through either Auckland or Tauranga Port. Analysis of the port data for imported manufactured goods suggests that Auckland Port carries about 77 percent of the combined totals for the two ports, with the balance of 23 percent from Tauranga. Using this split and assuming that 50 percent of goods are sourced directly from abroad, imported 'Other retail' traffic into Auckland is estimated to be about 0.8 million tonnes via Ports of Auckland and about 0.25 million tonnes via Tauranga. The volumes through the Port of Auckland will all be carried by road whereas the traffic between Tauranga and Auckland will be carried by a mixture of road and rail.

The patterns of demand which result are set out in Tables 3.64 and 3.65.

Table 3.64
Estimated distribution of 'Other retailing' commodities
(million tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
	Auckland	0.08	2.41	0.21	0.16	0.03	0.07	0.05	0.13	0.24	0.05	0.01	0.30	0.11	0.04	3.88
	Waikato	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
	Bay of Plenty	0.00	0.48	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
	Gisborne	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
	Taranaki	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
	Manawatu	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.17
	Wellington	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.38	0.00	0.00	0.00	0.00	0.00	0.43
	Tasman/ Marlborough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.07
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.06	0.03	0.01	0.12
	Canterbury	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.03	0.01	0.47	0.08	0.02	0.72
	Otago	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.14
	Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
	Total	**0.14**	**2.92**	**0.41**	**0.33**	**0.05**	**0.20**	**0.11**	**0.26**	**0.72**	**0.16**	**0.04**	**0.83**	**0.35**	**0.12**	**6.63**

Table 3.65
Estimated distribution of 'Other retailing' commodities
(billion tonne-kms in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Auckland	0.01	0.06	0.03	0.03	0.01	0.03	0.02	0.07	0.15	0.04	0.01	0.29	0.14	0.06	0.96
	Waikato	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Bay of Plenty	0.00	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
	Gisborne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Taranaki	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Manawatu	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	Wellington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	Tasman/ Marlborough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.04
	Canterbury	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.03	0.01	0.13
	Otago	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**0.02**	**0.18**	**0.03**	**0.04**	**0.02**	**0.04**	**0.02**	**0.08**	**0.19**	**0.06**	**0.02**	**0.32**	**0.19**	**0.08**	**1.29**

The estimated pattern of distribution for the 'Other retail' sector is dominated by movements from Auckland, reflecting its position as a major manufacturing area and an import port. From the results of the interviews, distribution centres in Auckland typically serve the whole country although to some extent they are supplemented by distribution centres in the lower North Island typically at Palmerston North or Wellington and in the South Island typically in Christchurch. There are also proposals to develop new distribution centres in the Hawke's Bay area, reflecting lower land and labour costs, although with increasing transport costs these may become less attractive.

3.15.8 Overall assessment of retailing

The retail sector is estimated to generate over 10 million tonnes of freight traffic into stores and between the main companies' own distribution centres. The combined position is set out in Table 3.66. The position is dominated by movements from Auckland, although the effects of other distribution hubs in the lower North Island and South Island are evident.

The majority of this traffic is carried by road although rail and sometimes coastal shipping can be used for movements between the main distribution centres. For supermarket and food retailing, where timing issues may be more important, the use of modes other than road is limited. Although there has been some willingness to increase the volumes by rail and coastal shipping in the past, this has generally not been regarded as successful, mainly due to service deficiencies. There is however a continued willingness to explore this issue.

For 'Other retail' items, there is potentially greater willingness to use alternative modes, possibly driven by the example of The Warehouse. There are however still issues with service quality. An alternative approach which is being considered by at least some firms is to import goods more directly to distribution centres away from Auckland to reduce the costs of land transport.

Table 3.66
Estimated distribution of 'All retail' commodities
(million tonnes pa in 2006/2007)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu Wanganui	Greater Wellington	Nelson Marlborough Tasman	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
	Auckland	0.28	4.78	0.66	0.48	0.08	0.12	0.11	0.44	0.46	0.09	0.02	0.46	0.17	0.07	8.21
	Waikato	0.00	0.04	0.25	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
	Bay of Plenty	0.00	0.77	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98
	Gisborne	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	Hawke's Bay	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.20
	Taranaki	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
	Manawatu Wanganui	0.00	0.00	0.01	0.03	0.01	0.15	0.09	0.34	0.38	0.00	0.00	0.00	0.00	0.00	1.01
	Greater Wellington	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.12	0.57	0.00	0.00	0.00	0.00	0.00	0.72
	Nelson Marlborough Tasman	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.09
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.06	0.03	0.01	0.14
	Canterbury	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.19	0.04	1.03	0.24	0.10	1.69
	Otago	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.24	0.03	0.28
	Southland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07
	Total	**0.36**	**5.65**	**0.93**	**0.73**	**0.12**	**0.41**	**0.39**	**0.97**	**1.48**	**0.38**	**0.09**	**1.57**	**0.68**	**0.27**	**14.03**

3.16 Courier movements

3.16.1 Introduction

Courier companies typically provide a range of services, ranging from direct deliveries of urgent materials within urban areas to full logistical solutions. Their role has been expanding and evolving to encompass broad logistics support for some customers. Although the volumes transported are fairly small in relation to the overall freight task in New Zealand, the courier industry provides important support to the manufacturing and retail sectors. In a recent survey of a major industrial area in Auckland, 80 percent of the firms responding to the survey indicated that they used couriers for inbound and/or outbound movements and one firm reported handling up to 130 courier movements per day, primarily serving retail outlets. This note concentrates on the inter-regional movements of courier packages.

3.16.2 Sources of information

Apart from anecdotal evidence and very limited survey information, there is practically no publicly available information on the scale of the freight task undertaken by courier companies. The only information which is available is reference to the numbers of items delivered and the numbers of couriers employed for selected companies, mainly in company reports. The analysis for this study looking in more detail at the scale and pattern of longer distance courier movements therefore relies heavily on the results of the interview programme.

Interviews were held with four firms with significant courier operations:-

- DHL
- CourierPost (a joint venture between DHL and New Zealand Post)
- Post Haste (a member of the Freightways Group)
- Peter Baker Transport that has a courier operation.

In addition, discussions were also held with New Zealand Post.

The limited information from Company Reports is summarised in Table 3.67. The numbers quoted will in some instances cover local as well as longer distance deliveries so the numbers should be regarded as broadly illustrative.

Table 3.67
Information available on selected courier companies in New Zealand

Company	Number of couriers	Number of items handled
Peter Baker Transport	250	na
Post Haste	240 but with access to 750 in the rest of the Freightways Group	50 millions (Freightways Group)
Courier Post	640	na
Total	1,130-1,880	
New Zealand Post		1 billion

Source: company reports and profiles.

3.16.3 Scale of the domestic courier freight task

Information has been received on the detailed movements for two of the courier firms interviewed. This, together with broad information on the size of the courier industry as a whole, has been used to make estimates of the total size and patterns of the longer distance courier market. Information was also obtained for the inter-regional movements for New Zealand Post. To a large extent, New Zealand Post items are distributed in combination with those for CourierPost.

Estimated courier movements and New Zealand Post movements are summarised in Table 3.68 and 3.69.

Table 3.68
Estimated pattern of inter-regional movements for couriers and New Zealand Post
(000 tonnes in 2006/2007)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu Wanganui	Greater Wellington	Nelson Marlborough Tasman	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3
	Auckland	12	0	28	23	2	8	7	20	31	11	0	45	4	2	193
	Waikato	1	13	0	6	0	0	2	1	2	1	0	3	0	0	29
	Bay of Plenty	0	4	5	0	0	0	0	0	1	0	0	0	0	0	11
	Gisborne	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
	Hawke's Bay	0	4	1	0	0	0	0	3	1	0	0	1	0	0	10
	Taranaki	0	1	1	0	0	0	0	2	0	0	0	0	0	0	5
	Manawatu Wanganui	0	11	3	1	0	2	1	1	3	1	0	3	0	0	25
	Greater Wellington	1	19	5	2	0	2	1	9	2	3	0	7	1	0	52
	Nelson Marlborough Tasman	0	3	1	0	0	0	0	0	2	2	0	3	0	0	11
	West Coast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Canterbury	0	20	4	1	0	0	0	5	8	10	0	2	18	9	79
	Otago	0	2	1	0	0	0	0	0	1	0	0	7	1	2	15
	Southland	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3
	Total	**15**	**78**	**49**	**35**	**3**	**13**	**12**	**41**	**51**	**28**	**0**	**75**	**26**	**13**	**438**

Notes: (1) No separate information is available on deliveries to and from the West Coast but, given the relatively small population, these are likely to be small.

Table 3.69
Estimated pattern of inter-regional movements for couriers and New Zealand Post
(million tonnes in 2006/2007)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu Wanganui	Greater Wellington	Nelson Marlborough Tasman	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	Auckland	2.0	0.0	3.5	4.6	1.0	3.5	2.6	10.5	20.2	8.3	0.0	44.6	5.4	3.1	109.2
	Waikato	0.3	1.6	0.0	0.7	0.0	0.0	0.5	0.4	1.1	0.6	0.0	2.6	0.0	0.0	7.7
	Bay of Plenty	0.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.9
	Gisborne	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.8
	Hawke's Bay	0.0	1.7	0.3	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.7	0.0	0.0	3.5
	Taranaki	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1
	Manawatu Wanganui	0.0	5.8	1.2	0.4	0.0	0.4	0.2	0.0	0.4	0.2	0.0	1.4	0.0	0.0	10.1
	Greater Wellington	0.8	12.4	2.6	1.1	0.0	0.6	0.4	1.3	0.1	0.3	0.0	2.4	0.7	0.0	22.6
	Nelson Marlborough Tasman	0.0	2.3	0.6	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	1.3	0.0	0.0	4.4
	West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Canterbury	0.0	19.8	3.5	0.9	0.0	0.0	0.0	2.4	2.7	4.3	0.0	0.1	6.7	5.2	45.5
	Otago	0.0	2.7	1.2	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	2.6	0.0	0.4	7.7
	Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.0	0.8
	Total	**3.1**	**47.8**	**13.7**	**7.6**	**1.0**	**4.7**	**3.6**	**15.6**	**26.7**	**13.8**	**0.0**	**56.1**	**13.1**	**8.8**	**215.6**

Notes: (1) No separate information is available on deliveries to and from the West Coast but given the relatively small population these are likely to be small.

The results in Tables 3.68 and 3.69 demonstrate the importance of the Auckland region as a source of longer distance courier traffic and post accounting for about 45 percent of the movements identified. Christchurch is another important generator of traffic and, in combination, these two regions account for almost two thirds of all outbound traffic.

Auckland and Christchurch are also the major recipients of longer-distance courier traffic, although their combined share of almost 35 percent is much lower than the proportion they generate. Other important recipients of courier traffic are the Waikato and Wellington areas, in both cases reflecting the relatively high volumes from Auckland.

3.16.4 Modes of transport

The main modes of transport used are road and air. Air is especially used for movements between Auckland and Christchurch, using either dedicated aircraft or space on domestic passenger flights. New Zealand Post also has a fleet of small aircraft to serve more isolated centres. Given the need for rapid delivery, little use is made of other modes, although rail and sometimes coastal shipping has been used for less urgent deliveries of consignments made by other parts of the courier groups where a cheaper but slower alternative is offered.

3.16.5 Importance of courier traffic

On the assumption that movements between Auckland and the middle and lower South Island (amounting to about 50,000 tonnes per year) are primarily made by air, the volumes transported by road would amount to about 260,000 tonnes per year. While this represents a fairly modest flow of traffic, its value is likely to be high. Although no information is available on the value of domestic courier freight, the value of international airfreight amounts to about $66,000 per tonne compared to just $1500 per tonne for sea freight. This suggests that the value of domestic courier traffic is substantially more important than its volume would suggest, with the estimated total of 300,000 tonnes having a value equivalent to about 12-15 million tonnes of general freight traffic.

3.16.6 Potential growth of courier traffic

Because of the lack of any comprehensive data over time for the courier sector, our assessment of the potential growth of the courier market is based largely on the results of the interview programme. Most of the companies interviewed expected growth slightly faster than GDP, anticipating typical growth rates within the range of 3-5 percent for the immediate future up to 2010-2015. No forecasts were available for after this period, but it seems reasonable that the relationship with GDP growth will continue.

The nature of the courier market has been changing with courier firms increasingly involved in logistics operations, not only for transporting goods from point-to-point but also for storing goods. This, however, brings them into competition with other components of the road freight sector and the courier companies' scope for expanding their market shares by expansion into this area may therefore be limited.

3.17 Overall commodity movements identified

Putting together the results for the individual commodities, the total movements are summarised in Table 3.70 and their origin-destination patterns are set out in Tables 3.71 and 3.72

Table 3.70
The freight task for commodity groupings analysed

Product	Tonnes (millions)	Tonne-kms (billions)
Liquid milk	17.1	1.51
Manufactured dairy products	3.8	0.37
Export logs and chips	6.9	0.81
Logs to sawmill	8.2	0.65
Sawn timber to users	4.3	0.54
Inputs to pulp and paper	4.8	0.59
Pulp and paper to users	1.8	0.32
Logs to board manufacturing	1.6	0.23
Boards to customers	2.7	0.68
Livestock	3.6	0.34
Meat	0.9	0.24
Horticultural products	4.2	1.07
Aggregate	40.2	2.27
Coal	6.4	1.26
Petroleum products	9.0	2.19
Aluminium and steel	1.9	0.30
Limestone	5.1	0.31
Fertiliser	2.8	0.56
Cement	2.1	0.68
Concrete	8.9	0.07
Other minerals	2.0	0.19
Food products	7.4	1.38
Other retail products	6.6	1.29
Courier movements	0.4	0.22
Total	**152.7**	**18.07**

The tonnages for the main commodity groupings are displayed in Figure 3.13.

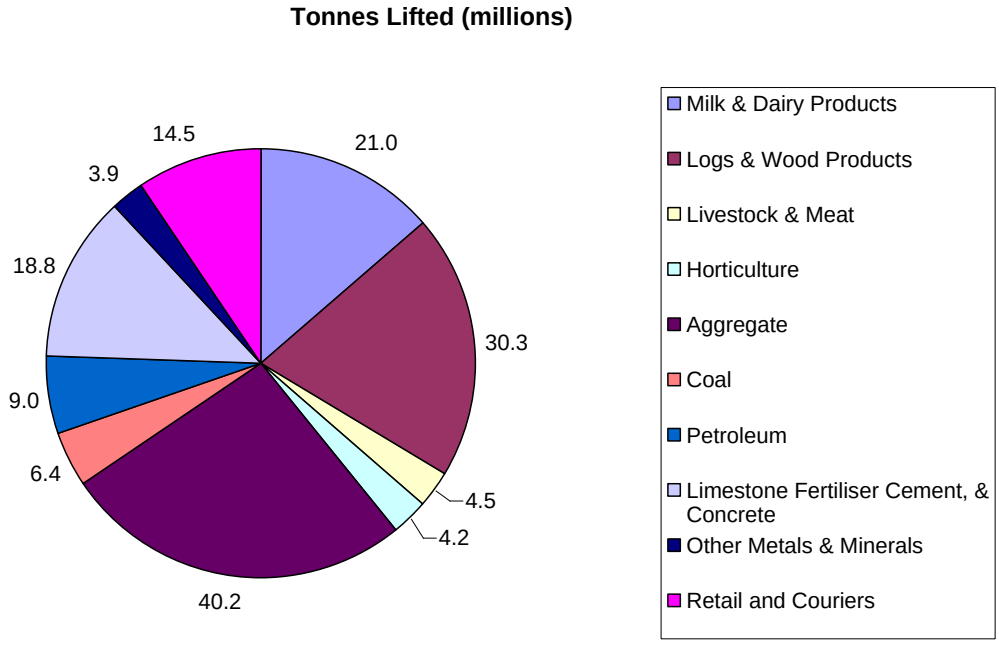


Figure 3.13
Summary of Movements by Commodity – tonnes lifted

Total movements are dominated by aggregates, logs and wood products, and by dairy products, which between them are estimated to account for about 60 per cent of the total movements identified.

Very low value commodities, liquid milk, logs (including inputs to pulp and paper), aggregate, limestone and concrete account for about 93 million tonnes, or again about 60 per cent of the total commodity flows identified.

The tonne-kms by commodity are summarised in Figure 3.14.

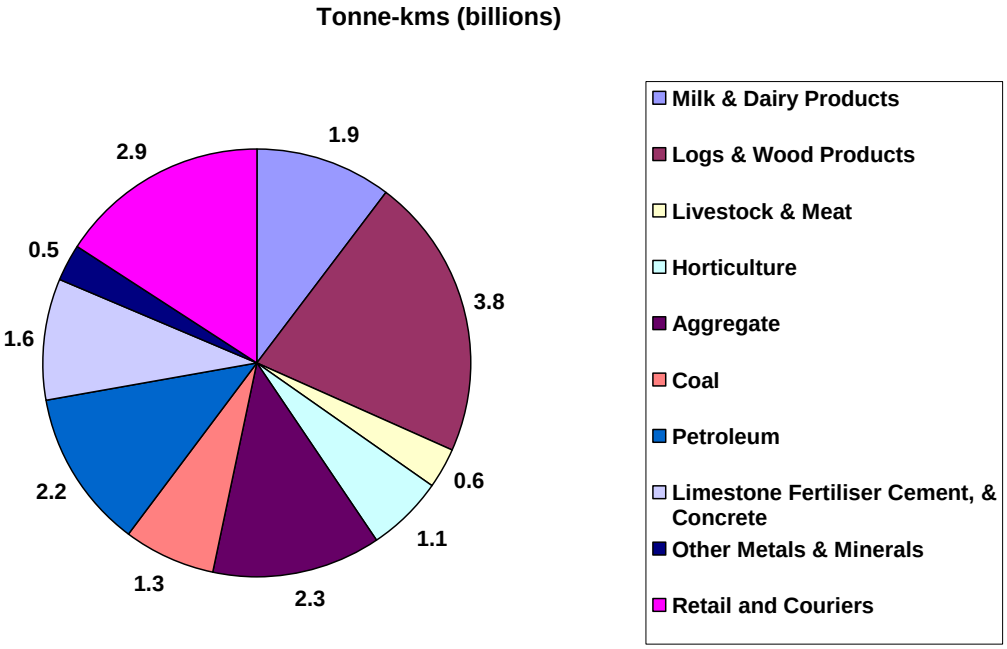


Figure 3.14
Summary of Movements by Commodity – tonne-kms

While the tonne-km summary shows broadly similar patterns to that for the tonnes lifted, the share of aggregates is much smaller. This reflects the limited distances travelled for these low-value products and the share for retail and couriers is much higher.

Table 3.71
Estimated pattern of inter-regional movements: all commodities identified
(million tonnes in 2006/2007)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu Wanganui	Greater Wellington	Nelson Marlborough Tasman	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	7.28	2.79	0.06	0.75	0.00	0.24	0.11	0.00	0.27	0.22	0.00	0.23	0.24	0.16	12.36
	Auckland	0.50	22.70	1.76	0.89	0.08	0.16	0.13	0.48	0.58	0.11	0.03	0.63	0.19	0.08	28.32
	Waikato	0.06	6.04	16.03	3.04	0.00	0.23	0.36	0.04	0.01	0.01	0.00	0.05	0.01	0.00	25.90
	Bay of Plenty	0.01	1.02	1.82	11.70	0.24	0.29	0.05	0.79	0.22	0.00	0.00	0.08	0.01	0.01	16.26
	Gisborne	0.01	0.04	0.03	0.09	1.37	0.47	0.00	0.02	0.05	0.01	0.00	0.00	0.00	0.00	2.08
	Hawke's Bay	0.04	0.16	0.13	0.04	0.13	5.02	0.03	0.54	0.26	0.00	0.00	0.00	0.00	0.00	6.33
	Taranaki	0.19	0.07	0.34	0.12	0.00	0.02	3.94	0.16	0.01	0.00	0.00	0.03	0.00	0.00	4.88
	Manawatu Wanganui	0.00	0.03	0.04	0.04	0.01	0.32	0.89	5.21	1.11	0.00	0.00	0.12	0.00	0.00	7.79
	Greater Wellington	0.00	0.05	0.06	0.05	0.00	0.09	0.03	0.88	5.21	0.03	0.01	0.01	0.00	0.00	6.41
	Nelson Marlborough Tasman	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.05	0.06	5.33	0.12	0.67	0.04	0.03	6.33
	West Coast	0.00	0.16	0.04	0.00	0.00	0.00	0.05	0.00	0.10	0.19	2.44	3.00	0.12	0.02	6.10
	Canterbury	0.01	0.16	0.09	0.08	0.00	0.02	0.06	0.23	0.19	0.40	0.14	15.03	0.85	0.25	17.50
	Otago	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	5.69	0.72	6.94
	Southland	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.27	0.68	4.50	5.54
	Total	8.08	33.25	20.42	16.83	1.83	6.87	5.67	8.42	8.09	6.31	2.74	20.64	7.84	5.76	152.75

Table 3.72
Estimated pattern of inter-regional movements: all commodities identified
(billion tonne-kms in 2006/2007)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu Wanganui	Greater Wellington	Nelson Marlborough Tasman	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.41	0.47	0.02	0.27	0.00	0.15	0.06	0.00	0.22	0.20	0.00	0.27	0.37	0.28	2.71
	Auckland	0.08	0.53	0.22	0.12	0.04	0.06	0.05	0.25	0.35	0.08	0.03	0.59	0.24	0.11	2.73
	Waikato	0.02	0.74	0.79	0.31	0.00	0.07	0.08	0.02	0.01	0.01	0.00	0.05	0.02	0.00	2.11
	Bay of Plenty	0.00	0.21	0.24	0.92	0.07	0.09	0.02	0.31	0.13	0.00	0.00	0.08	0.02	0.01	2.10
	Gisborne	0.00	0.02	0.01	0.02	0.11	0.10	0.00	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.32
	Hawke's Bay	0.09	0.06	0.04	0.01	0.03	0.28	0.01	0.10	0.08	0.00	0.00	0.00	0.00	0.00	0.68
	Taranaki	0.10	0.02	0.09	0.04	0.00	0.01	0.19	0.04	0.00	0.00	0.00	0.02	0.00	0.01	0.52
	Manawatu Wanganui	0.00	0.02	0.02	0.02	0.01	0.05	0.21	0.24	0.16	0.00	0.00	0.06	0.00	0.00	0.77
	Greater Wellington	0.00	0.03	0.03	0.02	0.00	0.03	0.01	0.12	0.17	0.00	0.00	0.00	0.00	0.00	0.43
	Nelson Marlborough Tasman	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.36	0.04	0.35	0.04	0.03	0.88
	West Coast	0.00	0.15	0.03	0.00	0.00	0.00	0.02	0.00	0.04	0.05	0.13	1.07	0.11	0.01	1.61
	Canterbury	0.01	0.16	0.07	0.07	0.00	0.02	0.04	0.11	0.07	0.17	0.04	0.66	0.32	0.14	1.88
	Otago	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.33	0.15	0.70
	Southland	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.15	0.14	0.18	0.53
	Total	0.71	2.44	1.56	1.81	0.26	0.86	0.69	1.21	1.27	0.91	0.24	3.49	1.58	0.93	17.97

3.18 Movements by mode

3.18.1 Introduction

The sections above set out the overall movements for each of the commodity groups we have identified. Where there is reliable data on the modes used to transport these commodities, we have also estimated the volumes by each of these modes and this is set out in Table 3.73.

Estimates of the modal split have been made for the following commodities:

- liquid milk
- dairy products
- logs and chips, taking into account both export logs and those moved to domestic users
- manufactured timber products
- livestock (all by road)
- meat
- horticultural products
- aggregate (all by road)
- coal
- petroleum products
- aluminium and steel
- concrete (all by road)
- fertiliser, limestone, cement and other minerals.

The overall modal split for these commodities is set out in Table 3.73.

Table 3.73
Road share by commodity

Commodity	Total volume identified (000 tonnes)	Share by mode (%)		
		Road	Rail	Coastal shipping
Liquid milk	17,145	96%	4%	
Dairy products	3,816	59%	41%	
Logs and chips	21,600	94%	6%	
Manufactured timber products	8,750	97%	3%	
Livestock (all by road)	3,624	100%		
Meat	889	57%	43%	
Horticultural products	4,192	93%	7%	
Aggregate	40,188	99%		1%
Coal	6,399	36%	64%	
Petroleum products	9,020	75%		25%
Aluminium and steel	1,853	80%	20%	
Limestone, fertiliser, cement and other minerals	12,187	88%	2%	10%
Concrete (all by road)	8,949	100%		

For the commodities identified, the share of road varies from 36 per cent for coal (reflecting the high volumes railed directly from the mines to the export port or from the import port to consumer), to just over 40 per cent for meat, to about 60 per cent for dairy products and meat, to 100 per cent for products like livestock where other modes do not really present a realistic alternative. The share is, however, also low for some basic building materials such as aggregates and minerals which are carried in significant volumes by railways elsewhere and which could therefore, in theory, at least represent a market for which rail or coastal shipping might be attractive.

4 Overall freight movements

4.1 Introduction

This chapter describes how the national matrix of all freight movements has been assembled and then divided between modes, including an analysis of some of the key modal split findings which emerge. It also compares the national picture (as portrayed by this study) with other recent work, including the NFM research reported in 2005 and available data.

4.2 Identified commodity movements by all modes

As described in chapters 2 and 3, a range of key readily identifiable commodities were identified and a national picture was built up for each (using data from a range of published and unpublished sources, such as Statistics New Zealand and key industry stakeholders). Each commodity matrix used the same regional structure for origins and destinations to facilitate the subsequent assembly of data.

It has been clear from the outset, that all the commodities covered in this way would between them not cover the totality of freight movement in New Zealand. In a similar way, the NFM attributed 60% of tonne-km to the 'other' category, those movements relating to commodities that were not identified specifically. It is therefore to be expected that the sum of all the commodity matrices will understate the national situation and, to balance against observed flows, will need to be adjusted upwards in some way.

Nonetheless, much of the variability in data relates to a single mode - road. The rail data which has been supplied by Toll NZ can be considered to be very accurate, although there are issues with associating the flows handled by rail to the specific commodity movements we have identified. We believe the coastal shipping data (which includes the carriage of domestic cargoes on international vessels) also to be reasonably accurate although similar issues apply. These two modes are however the minor players in an industry which is dominated by road.

It should also be pointed out that there are currently no definitive estimates of the total size and dimensions of the freight task and it is therefore difficult to validate our findings against alternative robust data. Both the NFM and the research by Opus [ref] used techniques which are essentially top down and synthetic (such as matrix estimation) from a limited number of observations to estimate a national freight O-D matrix, rather than the bottom up approach we have adopted. It follows therefore that only limited weight can be placed on any comparison of our results with those from this previous work. However there are a number of other studies and data sources which provide some data that may be broadly comparable with ours at least in some respects. Where possible, we have investigated these comparisons.

The result of summing all the commodity matrices is given in Table 4.1, which shows a national total of about 152 million tonnes being moved annually. As discussed above, this will omit road movements which are either of 'other' commodities or which represent more complex distribution movements than we have identified. The dominance of Auckland is apparent, with the other major centres (Waikato, Bay of Plenty, Wellington and Christchurch) also figuring largely. At the other end of the scale, movements to, from and (especially) between the smaller regions are small or zero, especially when these are some distance apart.

The information on commodity flows also shows that a high proportion of the total freight task consists of the movement of relatively low value commodities, such as liquid milk, livestock, many forestry products, aggregates and other building materials. For these goods, transport costs can represent a high proportion of the delivered costs, and minimising the transport costs is therefore an essential part of keeping the overall costs low, and for items which are converted into exports ensuring that these are competitive on world markets.

Reflecting this, the tendency for major freight movements to be concentrated either within a region or between adjacent regions can also be seen in Table 4.1. As discussed above, it makes particular economic sense to export low value goods through the nearest port or to establish a sawmill in an area of forestry to minimise transport costs, and in general we have assumed that these movements take place within regional boundaries. It is to be expected that higher value goods however will not display this tendency to the same extent, since transport costs are a smaller proportion of the total.

4.3 Rail movements

Table 4.1 shows the national matrix of rail movements, which can be taken to be accurate, as it has been supplied by the operator. The annual total tonnage is just short of 14 million, with the dominant movements being:

- coal from the West Coast to Canterbury (almost 20 per cent of the total)
- forestry movements within Bay of Plenty (10 per cent)
- movements between Bay of Plenty and Auckland (both directions together account for 10 per cent, much of which will be related to Metroport)
- Waikato to Auckland (nine per cent)
- between Waikato and Bay of Plenty, due in part to the import of coal for steel making and export of the finished product.

The total tonne-kms moved annually by rail is almost four billion, giving an average trip length of 280 km. This is consistent with the role of rail as a carrier of large volumes over long distances.

4.4 Coastal shipping movements

The detailed analysis of coastal shipping movements is given below in Section 5, but the matrix of coastal shipping patterns is given in Table 4.3. From this analysis, we estimate total movements by coastal shipping amount to about 4.2 million tonnes annually, of which almost half is the movement of fuel from the refinery at Marsden Point. The equivalent tonne-km figure is similar to rail, around four billion annually, indicating an average trip length approaching 1,000 km. Some of the movements shown in the matrix are carried by international shipping travelling between different ports in New Zealand operating under 'cabotage' rules.

4.5 Domestic movements by air

While we have made some assessment of the total volume of domestic movements by air, these are very small and have not been broken down into a detailed origin-destination matrix. They are therefore not considered further in this section of the report.

Table 4.1
Estimated total movements of all commodities identified 2006-2007
(million tonnes)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	7.28	2.79	0.06	0.75	0.00	0.24	0.11	0.00	0.27	0.22	0.00	0.23	0.24	0.16	12.36
	Auckland	0.50	22.70	1.76	0.89	0.08	0.16	0.13	0.48	0.58	0.11	0.03	0.63	0.19	0.08	28.32
	Waikato	0.06	6.04	16.03	3.04	0.00	0.23	0.36	0.04	0.01	0.01	0.00	0.05	0.01	0.00	25.90
	Bay of Plenty	0.01	1.02	1.82	11.70	0.24	0.29	0.05	0.79	0.22	0.00	0.00	0.08	0.01	0.01	16.26
	Gisborne	0.01	0.04	0.03	0.09	1.37	0.47	0.00	0.02	0.05	0.01	0.00	0.00	0.00	0.00	2.08
	Hawke's Bay	0.04	0.16	0.13	0.04	0.13	5.02	0.03	0.54	0.26	0.00	0.00	0.00	0.00	0.00	6.33
	Taranaki	0.19	0.07	0.34	0.12	0.00	0.02	3.94	0.16	0.01	0.00	0.00	0.03	0.00	0.00	4.88
	Manawatu	0.00	0.03	0.04	0.04	0.01	0.32	0.89	5.21	1.11	0.00	0.00	0.12	0.00	0.00	7.79
	Wellington	0.00	0.05	0.06	0.05	0.00	0.09	0.03	0.88	5.21	0.03	0.01	0.01	0.00	0.00	6.41
	Tasman/ Marlborough	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.05	0.06	5.33	0.12	0.67	0.04	0.03	6.33
	West Coast	0.00	0.16	0.04	0.00	0.00	0.00	0.05	0.00	0.10	0.19	2.44	3.00	0.12	0.02	6.10
	Canterbury	0.01	0.16	0.09	0.08	0.00	0.02	0.06	0.23	0.19	0.40	0.14	15.03	0.85	0.25	17.50
	Otago	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	5.69	0.72	6.94
	Southland	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.27	0.68	4.50	5.54
	Total	8.08	33.25	20.42	16.83	1.83	6.87	5.67	8.42	8.09	6.31	2.74	20.64	7.84	5.76	152.75

Table 4.2
Total movements by rail 2006-2007
(000 tonnes)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	77	122	0	23	0	0	1	0	0	0	0	1	0	1	226
	Auckland	16	46	39	666	0	9	16	125	94	18	2	368	36	12	1,447
	Waikato	3	1,185	148	915	0	1	12	6	1	1	0	13	2	3	2,290
	Bay of Plenty	3	817	864	1,362	0	1	5	3	8	0	0	20	1	1	3,086
	Gisborne	0	0	0	0	0	13	0	0	0	0	0	1	0	0	15
	Hawke's Bay	0	20	0	9	23	152	26	49	23	1	0	50	1	1	356
	Taranaki	0	36	1	47	0	7	279	11	11	0	0	8	5	1	406
	Manawatu	0	59	6	18	0	55	617	42	199	2	0	28	1	1	1,028
	Wellington	0	24	0	9	0	12	6	52	58	3	0	13	2	1	181
	Tasman/ Marlborough	0	46	1	4	0	12	2	8	5	24	0	48	26	7	182
	West Coast	0	2	1	2	0	0	0	0	0	0	69	2,415	17	1	2,507
	Canterbury	0	173	19	33	0	20	12	69	33	22	5	355	237	84	1,063
	Otago	0	43	10	11	0	2	3	2	6	1	1	83	57	64	284
	Southland	0	10	5	6	0	2	1	2	2	1	0	148	413	76	668
	Total	99	2,584	1,095	3,106	24	287	981	368	442	73	78	3,551	800	251	13,741

Table 4.3
Estimated total movements 2006-2007 – coastal shipping
(000 tonnes)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	0	561		463	2	244	110		271	215	0	240	241	162	2508
	Auckland	0	0		0	0	3	0		0	17	0	365	78	1	464
	Waikato															0
	Bay of Plenty	0	3		0	0	1	0		4	2	0	124	35	0	169
	Gisborne	0	0		0	0	0	0		0	0	0	0	0	0	0
	Hawke's Bay	0	3		5	0	0	0		0	3	0	1	0	0	12
	Taranaki	210	0		0	0	0	0		0	0	0	0	0	0	210
	Manawatu															0
	Wellington	0	0		1	0	0	0		0	7	0	83	0	0	91
	Tasman/ Marlborough	0	63		0	0	15	0		12	0	0	0	0	0	90
	West Coast	0	124		0	0	0	82		98	53	0	158	13	0	528
	Canterbury	0	70		2	0	0	0		40	19	0	0	0	0	130
	Otago	0	3		0	0	0	0		0	0	0	0	0	0	3
	Southland	0	0		23	0	0	0		0	0	0	0	0	0	23
	Total	210	825		494	2	263	191	0	424	317	0	970	367	163	4,228

4.6 Implied movements by road

By starting with the total commodity matrix and deducting both the ship and rail matrices, the resulting matrix is the road matrix for all the commodities which have been analysed. However, for the reasons given above it would not be the total road matrix since a range of movements would not be included.

The question then arises, how should this 'base' road matrix be adjusted to an 'expanded' matrix which notionally includes all commodities and movements? A relatively simple approach has been adopted, in which the shape of the base matrix is retained but the number of trips is increased by a factor, the value of which has been derived as follows.

The total freight tonne-km by road has been given by MoT as 18.8 billion tonne-kms (and our analysis has confirmed that this is consistent with recorded sales of RUC). Adding this to 7.93 billion tonne-kms for rail and shipping gives a total of 26.7 billion tonne-kms by all modes. However the total from the commodity analysis is 17.97 billion tonne-kms. To reach the level necessary to match this total, the all-mode matrix must therefore be factored by 1.5 (=26.72/17.97). This is illustrated in Table 4.4. This implies that the commodity analysis has identified about two-thirds of total movements, which compares favourably with the 40 per cent identified by the NFM.

Table 4.4: National freight tonne-km

Item	Tonne-km, billion	Source
All road freight	18.8	MOT
Rail & coastal shipping	7.93	NFDS
Total, all modes	**26.7**	
Commodity analysis	17.97	NFDS
Expansion factor	1.5	

The expanded total matrix is set out in Table 4.5.

Starting with the expanded all-mode matrix and deducting rail and sea gives an expanded road matrix. This is the final road matrix and is shown in Table 4.6. The implied average trip length is around 90 km, which seems intuitively reasonable given the high volumes of primary products moved over relatively short distances.

It can be seen that the road matrix set out in Table 4.6 contains a very small number of entries which are slightly negative (three out of 196 matrix cells), an inevitable consequence of the subtraction process which has been used, the ways in which the data has been collected and the application of a single adjustment factor. However, all the negatives are small and are between origin-destination pairs in different islands where overall movements are likely to be relatively small.

Table 4.5
Estimated total movements 2006-2007 – expanded matrix
(million tonnes)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	10.80	4.15	0.09	1.12	0.00	0.36	0.17	0.00	0.40	0.33	0.00	0.34	0.36	0.24	**18.36**
	Auckland	0.74	33.71	2.62	1.32	0.12	0.23	0.20	0.72	0.85	0.16	0.05	0.94	0.28	0.11	**42.05**
	Waikato	0.09	8.97	23.81	4.52	0.00	0.34	0.53	0.06	0.02	0.02	0.00	0.08	0.02	0.00	**38.46**
	Bay of Plenty	0.01	1.51	2.70	17.38	0.36	0.43	0.08	1.18	0.33	0.00	0.00	0.12	0.02	0.01	**24.14**
	Gisborne	0.01	0.06	0.04	0.13	2.03	0.70	0.00	0.03	0.07	0.02	0.00	0.00	0.00	0.00	**3.09**
	Hawke's Bay	0.05	0.23	0.19	0.06	0.19	7.45	0.05	0.79	0.38	0.00	0.00	0.00	0.00	0.00	**9.40**
	Taranaki	0.28	0.10	0.51	0.18	0.00	0.02	5.85	0.24	0.01	0.01	0.00	0.04	0.00	0.01	**7.25**
	Manawatu	0.00	0.05	0.06	0.06	0.02	0.48	1.33	7.74	1.65	0.00	0.00	0.18	0.00	0.00	**11.57**
	Wellington	0.00	0.07	0.09	0.07	0.00	0.14	0.04	1.30	7.74	0.05	0.01	0.01	0.00	0.00	**9.52**
	Tasman/ Marlborough	0.00	0.02	0.01	0.00	0.00	0.02	0.01	0.08	0.09	7.91	0.18	0.99	0.06	0.04	**9.40**
	West Coast	0.00	0.23	0.06	0.00	0.00	0.00	0.07	0.00	0.15	0.28	3.62	4.45	0.18	0.02	**9.06**
	Canterbury	0.01	0.24	0.13	0.13	0.00	0.03	0.08	0.34	0.29	0.59	0.21	22.32	1.26	0.36	**25.99**
	Otago	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	8.45	1.07	**10.30**
	Southland	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.41	1.01	6.69	**8.23**
	Total	**12.00**	**49.38**	**30.32**	**24.99**	**2.72**	**10.20**	**8.42**	**12.50**	**12.02**	**9.37**	**4.06**	**30.65**	**11.64**	**8.55**	**226.83**

Table 4.6
Estimated total movements by road 2006-07 – adjusted matrix
(million tonnes)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	10.7	3.5	0.1	0.6	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	**15.6**
	Auckland	0.7	33.7	2.6	0.7	0.1	0.2	0.2	0.6	0.8	0.1	0.0	0.2	0.2	0.1	**40.1**
	Waikato	0.1	7.8	23.7	3.6	0.0	0.3	0.5	0.1	0.0	0.0	0.0	0.1	0.0	0.0	**36.2**
	Bay of Plenty	0.0	0.7	1.8	16.0	0.4	0.4	0.1	1.2	0.3	0.0	0.0	0.0	0.0	0.0	**20.9**
	Gisborne	0.0	0.1	0.0	0.1	2.0	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**3.1**
	Hawke's Bay	0.1	0.2	0.2	0.0	0.2	7.3	0.0	0.7	0.4	0.0	0.0	-0.1	0.0	0.0	**9.0**
	Taranaki	0.1	0.1	0.5	0.1	0.0	0.0	5.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	**6.6**
	Manawatu	0.0	0.0	0.1	0.0	0.0	0.4	0.7	7.7	1.4	0.0	0.0	0.2	0.0	0.0	**10.5**
	Wellington	0.0	0.1	0.1	0.1	0.0	0.1	0.0	1.3	7.7	0.0	0.0	-0.1	0.0	0.0	**9.3**
	Tasman/ Marlborough	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	7.9	0.2	0.9	0.0	0.0	**9.1**
	West Coast	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	3.5	1.9	0.2	0.0	**6.0**
	Canterbury	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.2	0.5	0.2	22.0	1.0	0.3	**24.8**
	Otago	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	8.4	1.0	**10.0**
	Southland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	6.6	**7.5**
	Total	**11.7**	**46.0**	**29.2**	**21.4**	**2.7**	**9.7**	**7.2**	**12.1**	**11.2**	**9.0**	**4.0**	**26.1**	**10.5**	**8.1**	**208.9**

4.7 Comparison with other data and studies

4.7.1 Transit traffic counts

There are a number of key sites on the State highway network where flow data is available that can be used to estimate freight flows across regional boundaries. This in turn can be compared with the flows implied by the expanded road matrix described above. For example, effectively all freight between Northland/Auckland and the rest of New Zealand will pass the site on SH1 at the Bombay Hills south of Auckland.

However, the physical count data, as recorded by Transit, will include many shorter-distance movements which will not be in our matrix. We would therefore expect the flow implied by our matrix to be less than the actual count. In addition, the Transit counts of heavy vehicles will also include vehicles carrying passengers and plant, rather than point-to-point movements of commodities. These movements of plant and passengers are outside the scope of our commodity analysis. Although we have not investigated this issue in detail, spot checks have revealed that this traffic could be up to about 15 percent of all heavy vehicle traffic.

Table 4.7 shows the comparison of the freight flows as implied by the State highway traffic counts with those resulting from the expanded road matrix. The ratio shown, of the Transit count to the matrix count, can be expected to be greater than 1 for the reasons given above; it can be seen that, in general, this is the case. While there are a few exceptions, this is not surprising given the inexact nature of the process being used; for example, the need to make general assumptions about average loads. We have also had to make assumptions about the routing of the main traffic flows and, where options exist, it is possible that alternative routes are followed for at least some of the traffic. In addition, the tonnages associated with the Transit State highway counts are based on an average load of 12.1 tonnes per heavy vehicle, derived from estimates from 4 Weigh-in-Motion sites on the State highway network. The average payloads on particular roads may vary significantly from this average.

4.7.2 Cook Strait traffic

The combined volumes of road freight carried in both directions between Wellington and Picton by the two ferry operators are known (with a reasonable degree of confidence) to be in the region of 2.0 to 2.5 million tonnes per annum - with slightly more southbound traffic. These are included in Table 4.7. The expanded road matrix gives an equivalent figure of 2.3 million tonnes, which is comfortably within the range of these estimates of flows on the ferries.

Table 4.7
Comparison of State highway traffic counts with flows from expanded matrix

From	To	Annual million tonnes (Transit State highway count)	Annual million tonnes (expanded NFDS Road Matrix)	Ratio Transit: NFDS
Northland	Auckland	3.9	5.9	0.7
Auckland	Waikato	12.8	16.3	0.8
Waikato	BOP	13.9	9.3	1.5
Waikato	Hawke's Bay	3.0	1.6	1.9
Waikato	Manawatu-Wanganui	5.8	4.8	1.2
Waikato	Taranaki	1.9	1.6	1.2
BOP	Gisborne	1.0	0.7	1.4
Gisborne	Hawke's Bay	1.1	1.0	1.1
Hawke's Bay	Manawatu-Wanganui	2.4	1.8	1.4
Wellington	Manawatu-Wanganui	7.7	6.7	1.2
Taranaki	Manawatu-Wanganui	2.3	1.2	1.9
Wellington	Tasman/ Marlborough	2.0-2.5 (from ferry operators)	2.3	0.9-1.1
Tasman/ Marlborough	Canterbury	1.2	3.2	0.4
Tasman/ Marlborough	West Coast	1.1	0.7	1.7
West Coast	Canterbury /Otago	1.6	2.3	0.7
Canterbury	Otago	4.4	2.2	2.0
Otago	Southland	4.3	1.6	2.7

The results from this table indicate a few key points that are worthy of note:

- The approach we have used, factoring up the matrix by a common factor tends to overestimate movements between Auckland and areas immediately to the north and south. A possible explanation may be that the overall approach used in this study, and the particular mix of commodities transported, means that our commodity-based estimates capture a particularly large part of the total goods moved on these routes, and the residual component not directly estimated is low.

- While our analysis of the expanded road matrix has suggested that our forecasts of traffic into Canterbury from the other major centres may be low, the comparison of the predicted flows into the Canterbury region from the north with those observed suggests that this is not the case in total, although there may be some under-estimation of the very long-distance flows into the area.

Overall, the results indicate a mixture of under and overestimation on an individual link basis, although for many of the key movements, the differences between the observed counts and those estimated by our study are relatively small. This suggests that, while the application of a blanket factor does raise some issues about particular movements and resulting flows, the overall adjustment appears to be reasonable, and we are not aware of a more appropriate way of adjusting the data while retaining the underlying commodity-based forecasts.

4.7.3 Comparison with the National Freight Matrix

The matrix given by the NFM study is synthetic, being the product of matrix estimation, although some aspects are constrained to match traffic counts or trip end totals. However, the matrix estimation process makes a number of simplifying assumptions, for example, in relation to the distribution of trip lengths. We should not therefore take the matrix as being definitive. Nonetheless, a comparison of our matrix with that from the NFM shows that the two are of the same general shape, with a prevalence of movements on or close to the diagonal, and high numbers of trips associated with the main centres, particularly the 'golden triangle'. This should not be taken as a validation but does give some confidence in our results.

Aside from the matrix, it has also been possible to compare some of the overall tonne-km figures from our study with those from the NFM and the results are shown in Table 4.8. Clearly, there are some issues of consistency of definition between the two studies and coverage in the NFM but, in general, the agreement is reasonable, especially for the predominant commodities. For example, all timber-related activities amount to between 14 percent and 16 percent in both studies. The major difference in petroleum products is due to coastal shipping being included in our study but not in the NFM. There are also many commodities covered in our study but not in the NFM, which accounts for the difference in size of the 'Other' category.

Table 4.8
Commodity breakdown by tonne-km:
comparison of NFDS with NFM
(percent of total flows identified)

Product	NFDS	NFM
Liquid milk	5.7%	6.6%
Manufactured dairy products	1.4%	0.2%
Logs and wood products	14.4%	16.1%
Livestock and meat	2.1%	6.5%
Horticultural products	4.1%	Inc in other
Aggregate	8.6%	Inc in other
Coal	4.7%	1.9%
Petroleum products	8.3%	2.6%
Aluminium and steel	1.1%	0.2%
Limestone	1.2%	Inc in other
Fertiliser	2.1%	2.1%
Cement	2.6%	1.0%
Concrete	0.3%	Inc in other
Other minerals	0.7%	0.5%
Food products	3.6%	Inc in other
Other retail products	4.9%	Inc in other
Courier movements	0.8%	Inc in other
Other	33.4%	62.3%

4.8 Overall assessment of the estimation of the matrices

The rail and coastal shipping matrices which have been derived can be considered accurate in respect of the detail of data supplied for rail and the relatively small market for shipping. It is inevitable that the much larger road matrix is less accurate but we believe the approach which has been adopted is as robust as possible with the data available.

We have deliberately not attempted to make specific adjustments to the road matrix. It could be argued that parts of it appear anomalous – for example, the number of trips between Auckland and Christchurch appears low. However, while we may have underestimated the volumes of very long-distance freight movements, with the information currently available there is no reliable basis on which to adjust the numbers. In any case, further *ad hoc* adjustments could make the good aspects of the validation (such as freight flows across Cook Strait) worse. A considerable effort would be required to obtain the data necessary to make adjustments to the matrix on a reasoned basis and we return to this in Section 10.

The overall assessment described above suggests that, while there are inevitably some areas where we have been unable to capture all movements, we have identified reasonably accurately the key flows in 2006-07. The results obtained therefore represent a robust base for the development of proposals and policies for the freight sector, which was not previously available.

4.9 Estimates of modal split by movement

Using the information set out in Tables 4.1, 4.2 and 4.4, it is possible to estimate the rail and coastal shipping share of the total estimated movements between regions and this is set out in Table 4.9.

Because of the way in which the matrices were constructed, some of the modal share results for some of the smaller movements are subject to error, and the instances of these are noted in the table without modal split estimates being prepared. In just three cases (out of a possible 196) the estimates for coastal shipping and rail, which include elements that we have not been able to specifically associate with the detailed commodities examined, exceed the totals estimated for the particular flows, even after the adjustment of the matrices. This affects mainly longer-distances movements between the two islands.

While there are some issues with the contents of this matrix it is useful for considering the modal splits for the high-volume movements to and from the major centres where the results are likely to be most reliable.

Table 4.9
Estimated movements by rail and coastal shipping as percent of total adjusted matrix 2006-2007

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	**Total**
Origin	Northland	0.7%	16.3%	0.4%	43.1%	[1]	67.2%	65.7%	[1]	66.3%	65.2%	[1]	69.4%	67.0%	67.4%	14.7%
	Auckland	2.2%	0.1%	1.5%	50.1%	0.1%	4.9%	7.8%	17.2%	10.9%	21.5%	[1]	77.1%	40.0%	11.8%	4.5%
	Waikato	3.1%	13.1%	0.6%	20.1%	[1]	0.3%	2.3%	9.8%	[1]	[1]	[1]	16.6%	[1]	[1]	5.9%
	Bay of Plenty	[1]	53.6%	31.6%	7.8%	0.0%	0.6%	6.5%	0.3%	3.7%	[1]	[1]	117.3%	[1]	[1]	13.3%
	Gisborne	[1]	0.0%	[1]	0.0%	0.0%	1.9%	[1]	[1]	0.2%	[1]	[1]	[1]	[1]	[1]	0.5%
	Hawke's Bay	0.2%	9.4%	0.1%	25.0%	12.1%	2.0%	51.5%	6.1%	5.9%	[1]	[1]	[1]	[1]	[1]	3.9%
	Taranaki	74.5%	36.2%	0.3%	26.2%	[1]	[1]	4.7%	4.4%	[1]	[1]	[1]	[1]	[1]	[1]	8.4%
	Manawatu	[1]	[1]	11.3%	30.0%	[1]	11.2%	46.0%	0.5%	12.0%	[1]	[1]	15.3%	[1]	[1]	8.8%
	Wellington	[1]	32.1%	0.5%	15.5%	[1]	8.8%	[1]	3.9%	0.7%	[1]	[1]	[1]	[1]	[1]	2.8%
	Tasman/ Marlborough	[1]	[1]	[1]	[1]	[1]	[1]	[1]	10.0%	18.1%	0.3%	0.1%	4.8%	41.3%	[1]	2.9%
	West Coast	[1]	53.4%	0.9%	[1]	[1]	[1]	119.4%	[1]	63.8%	19.1%	1.9%	57.2%	16.5%	[1]	33.1%
	Canterbury	[1]	100.6%	14.4%	27.2%	[1]	[1]	14.8%	20.3%	25.3%	6.8%	2.3%	1.6%	18.7%	22.9%	4.5%
	Otago	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	10.8%	0.7%	6.0%	2.8%
	Southland	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	36.1%	40.4%	1.1%	8.3%
	Total	2.5%	6.8%	3.6%	14.3%	1.0%	5.3%	13.8%	2.9%	7.1%	4.1%	1.9%	14.6%	9.9%	4.8%	7.8%

Notes: (1)The flows on these routes are low and, because of the way in which they have been constructed, estimates of the modal split are probably unreliable.

The key points which emerge from Table 4.9 include:

- Rail and coastal shipping have a relatively high share of trips **originating** in Northland, Bay of Plenty and the West Coast. This results from:
    - Northland – sea-borne movements of cement and petroleum
    - Bay of Plenty – high volumes of manufactured freight by rail to Auckland
    - West Coast – coastal shipping of cement and rail movements of coal.

- Rail and coastal shipping have relatively high shares in the volumes of traffic **destined** for Bay of Plenty, Taranaki, Canterbury and Otago. While these tend to reflect a more complex pattern of movements than those discussed above, they result from:
    - Bay of Plenty – high volumes of rail movements of forestry products, dairy products, steel and containerised exports from Auckland
    - Taranaki – movements of petroleum and cement products by coastal shipping and high volumes of liquid milk transported by rail from Manawatu
    - Canterbury – high volumes of coastal shipping of general cargo from Auckland as well as substantial volumes of coal and dairy products hauled by rail primarily for the export market
    - Otago – movements of petroleum and cement by sea as well as dairy and meat products by rail, mainly from within Otago and from the surrounding regions.

5 Infrastructural and sectoral issues

5.1 Introduction

In this section we deal with the current and proposed provision of infrastructure and associated services which are particularly relevant to the movement of freight in New Zealand. This covers:

- highway provision and use
- railways
- ports and international shipping
- coastal shipping
- air freight.

Each of these is considered in turn.

5.2 Developments in highway provision and use

5.2.1 Current freight use of the highway network

The majority of freight movements in the country are carried by road, with road freight having an estimated modal share of about 67 percent. This traffic makes substantial use of the State highway network managed by the NZ Transport Agency (formerly Transit New Zealand) particularly for longer-distance movements, which are the focus of this study. The importance of the road network in promoting and supporting economic growth has been encapsulated in the recent National State Highway Strategy, which has as one of its objectives: "To improve infrastructure to accommodate planned growth and development". It should be noted that this was prepared prior to the establishment of the NZ Transport Agency and the recent changes to the Land Transport Management Act.

The estimated flows of longer-distance freight on the State highway network in 2006 are set out in Figure 5.1. Table 5.1 sets out the estimated road freight flows at regional boundaries. Together, these demonstrate the importance of SH1 as a key freight route throughout almost the entire country, with flows of over 2 million tonnes per year over much of its length and with even higher flows through the Auckland region. Other key freight routes include a number of the links in the 'golden triangle' of Auckland, Hamilton and Tauranga, with many of the high flows between Waikato and the Bay of Plenty reflecting the volumes of logging traffic. Further south there are also substantial flows between Manawatu, Hawke's Bay and Taranaki, again feeding into SH1.

Table 5.1
Road freight flows across inter-regional boundaries, 2006

		Individual routes				Total inter-regional flows		
		Route	% Heavy	Total heavy traffic		HVs per day	Annual traffic (000s)	Annual tonnes (millions)
				vehs/day	M tonnes pa			
Northland	Auckland	SH1	9.7%	888	3.92	888	324	3.92
Auckland	Waikato	SH1	8.6%	2889	12.76	2889	1054	12.76
Waikato	BOP	SH2	9.8%	735	3.25			
		SH29	14.0%	1223	5.40			
		SH5	10.5%	370	1.64			
		SH30	15.8%	315	1.39			
		SH5	11.6%	499	2.20	3143	1147	13.88
Waikato	Hawke's Bay	SH5	18.2%	683	3.02	683	249	3.02
Waikato	Manawatu-Wanganui	SH1	21.9%	842	3.72			
		SH47	7.3%	102	0.45			
		SH4	17.9%	360	1.59	1303	476	5.76
Waikato	Taranaki	SH3	20.1%	428	1.89	428	156	1.89
BOP	Gisborne	SH2	11.9%	176	0.78	234	85	1.03
		SH35	7.4%	57	0.25			
Gisborne	Hawke's Bay	SH2	12.2%	246	1.09	246	90	1.09
Hawke's Bay	Manawatu-Wanganui	SH2	13.6%	552	2.44	552	202	2.44
Wellington	Manawatu-Wanganui	SH2	12.8%	397	0.00 1.75			
		SH1	9.0%	1337	5.91	1734	633	7.66
Taranaki	Manawatu-Wanganui	SH3	14.8%	499	2.20			
		SH43	11.2%	22	0.10	521	190	2.30
Wellington	Tasman/ Marlborough	SH1	4.7%	281	1.24	281	103	1.24
Tasman/ Marlborough	Canterbury	SH1	11.0%	277	1.22	277	101	1.22
Tasman/ Marlborough	West Coast	SH65	14.4%	158	0.70			
		SH6	14.3%	91	0.40	249	91	1.10
West Coast	Canterbury	SH7	14.1%	164	0.73			
		SH73	10.2%	148	0.65	313	114	1.38
Canterbury	Otago	SH1	16.0%	696	3.07			
		SH8	15.3%	228	1.01			
		SH83	10.5%	80	0.35	1004	367	4.44
West Coast	Otago	SH6	15.4%	50	0.22	50	18	0.22
Otago	Southland	SH6	11.3%	335	1.48			
		SH90	9.4%	175	0.77			
		SH1	15.7%	246	1.09			
		SH93	19.7%	223	0.98	979	357	4.33

Notes:(1) Heavy-vehicle flows have been converted to tonnage figures on the assumption of an average payload of 12.1 tonnes per vehicle. This has been derived from data from Weigh-in-Motion (WIM) sites initially analysed by TERNZ and subsequently further analysed by the consultants.

Source: Transit

Figure 5.1
Freight Flows by Weight on State Highways 2006

5.2.2 Prioritisation of the State highway network and its relationship to road freight traffic

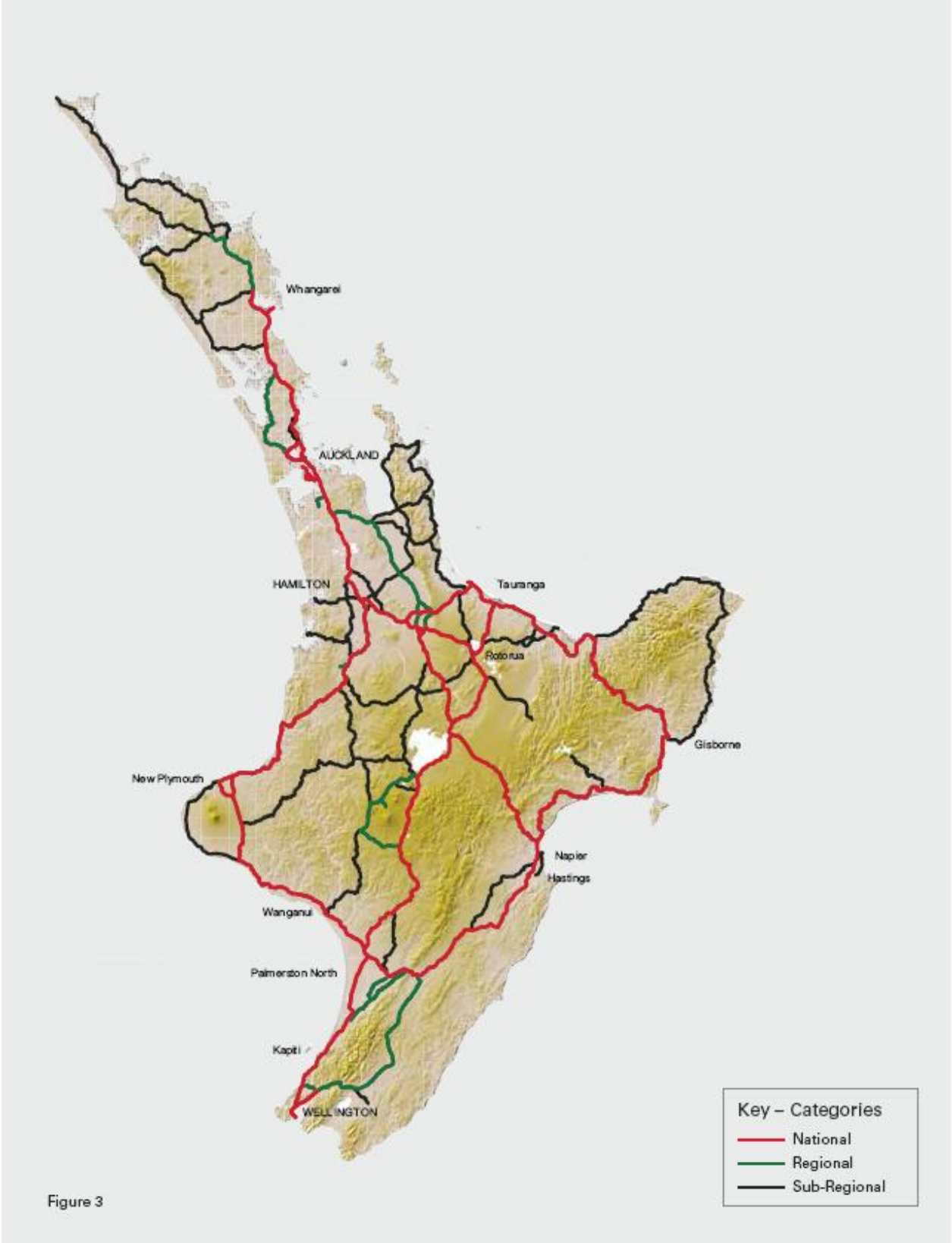
To assist in the management of the State highway network and in the prioritisation of future investment, roads have been divided into three main categories, according to their functions. The categories are defined as follows:

- **National State highways** connect places of national significance, including the major cities and international ports and airports. They are important components of the longer-distance, inter-regional network and would typically carry over 400 heavy commercial movements per day.

- **Regional State highways** connect locations of regional significance and key tourist destinations. They would typically carry between 100 and 400 heavy commercial movements per day.

- **Sub-regional State highways** connect places of district significance and serve as feeder routes to the main State highway network.

The categorisation of the State highway network is set out in Figures 5.2 and 5.3.



Source : Transit

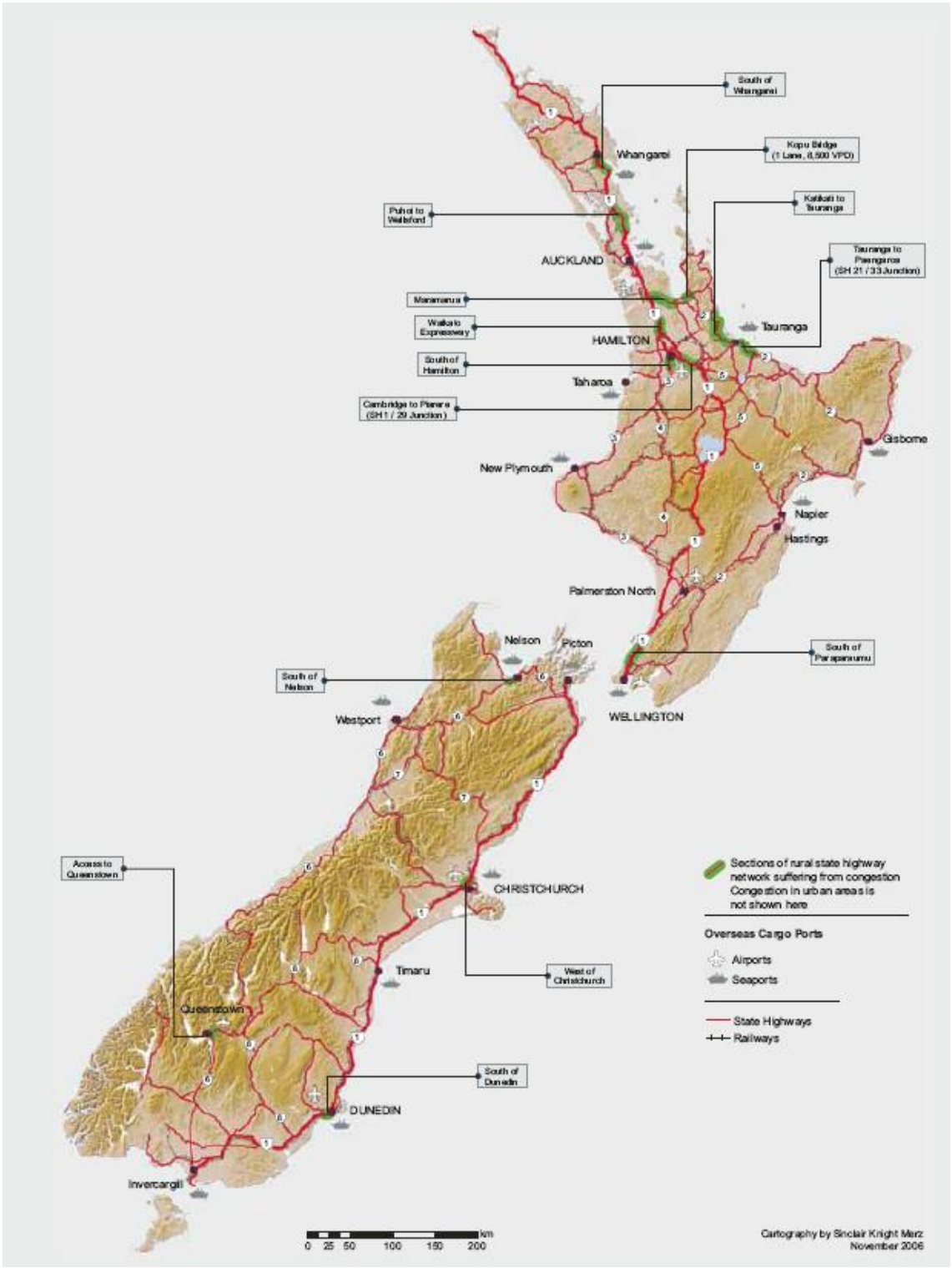
Figure 5.2
Transit Categorisation of the State Highway Network – North Island

Source : Transit

Figure 5.3
Transit Categorisation of the State Highway Network – South Island

Comparison of the freight flows set out in Figure 5.1 with the categorisation of the State highway network set out in Figures 5.2 and 5.3 show the close match between the key freight routes and the national State highway network.

Significant parts of the rural State highway network suffer from congestion, even at current traffic levels, and the extent of this is set out in Figure 5.4. While this largely reflects high flows of passenger-car traffic, goods vehicles are typically part of the overall traffic flows on these routes and are also affected by congestion.



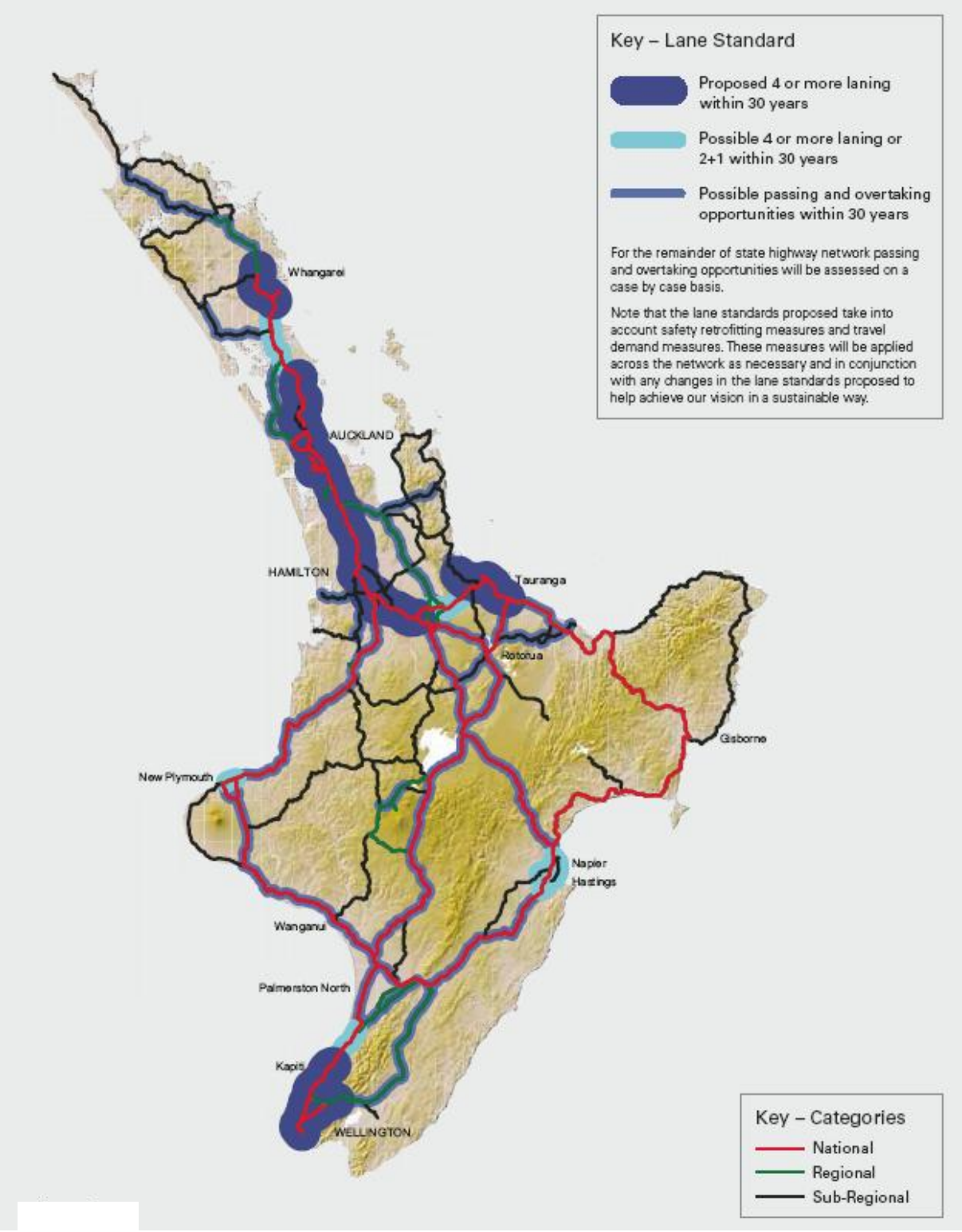
Source : Transit

Figure 5.4
Rural State Highway Sections Experiencing Congestion

Many of these congested sections lie along the major freight routes, particularly along SH1 and in the Tauranga area and the links between it and Auckland.

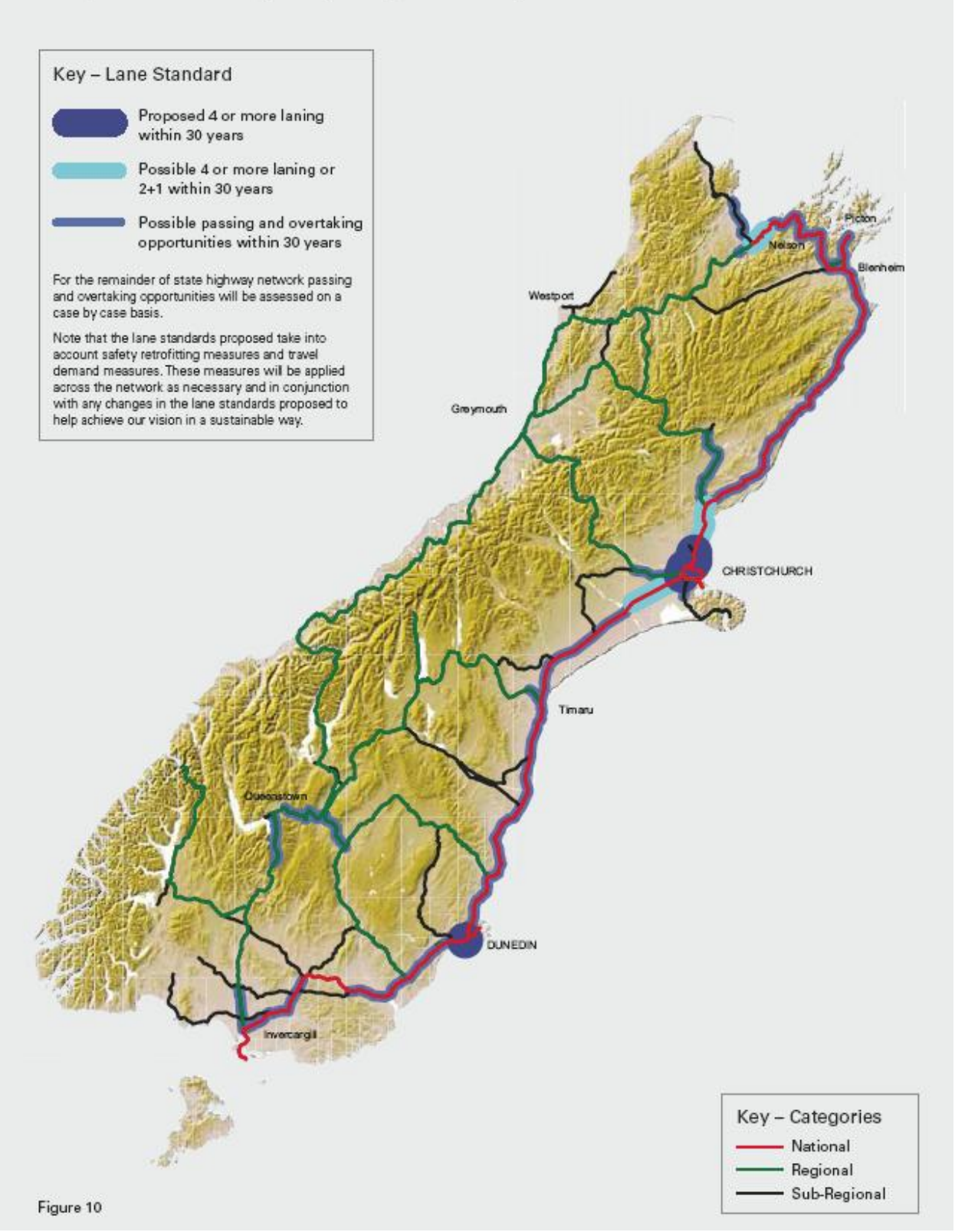
5.2.3 Proposals for the longer-term development of the State highway network

The longer-term outline proposals for the State highway network are set out in Figures 5.5 and 5.6.



Source : Transit

Figure 5.5
Proposals for the Longer Term Development of the State Highway Network
North Island



Source : Transit

Figure 5.6
Proposals for the Longer Term Development of the State Highway Network
South Island

The broad proposals set out in Figures 5.5 and 5.6 demonstrate the priority to be given to improving the National components of the State highway network where freight traffic is likely to be concentrated. SH1 will be improved over almost its entire length on both the North and South Island, including the possibility of almost continuous dual carriageway between Whangarei and Tirau, and improvements to SH29 connecting to Tauranga. While freight is only one component of the overall demands for the State highway network, the proposed level of road building does recognise the continuing development of the 'golden triangle' and the growing volumes of freight traffic that are likely to result. The key longer-distance routes into Manawatu from Hawke's Bay in the east and Taranaki in the west are also included in the proposals.

5.2.4 Proposals for urban areas

The discussion above has concentrated mainly on the longer-distance movement of freight outside the main urban areas. However, with growing general traffic levels within the urban areas, congestion affecting both general traffic and freight vehicles is likely to become more acute.

Within Auckland, congestion levels are having a significant impact on the efficiency of freight operations. Anecdotal evidence suggests that the time taken for the movement of freight has typically grown by 20 percent in recent years, and one of the courier firms interviewed indicated that, whereas 10 years ago a courier could achieve 7 round trips within a working day, in current conditions this had now fallen to 4 trips per day, with a consequent impact on both the costs of the operation and the level of service available to clients.

Within many of the urban areas the scope for new road construction is considered to be limited and the NZ Transport Agency is placing increasing emphasis on improved traffic management. In the short term it is intended that this would be achieved through measures such as ramp signalling and improved facilities for modes other than private cars, to encourage users to switch and relieve pressure on the road network.

Within this, some recognition is being given to the needs of freight. For the ramp signalling currently being introduced in Auckland, lanes for freight vehicles to bypass the signals and gain better access to the motorway are being provided at selected locations along the motorway. In total it is planned that priority lanes, which can also be used by public transport vehicles, will be provided at 11 locations on the motorways within the Auckland Region.

Over the longer term, the NZ Transport Agency is considering the provision of managed lanes on which freight vehicles could travel on parts of the motorway network in Auckland, and preliminary work is being undertaken on the development of options for SH16 west of the Waterview Connection. It is proposed that alternative locations may also be investigated at some future date and Transit have included a Freight Priority Study in their 10-year programme for the Auckland Region.

Within many urban areas the local road network also plays an important role in the movement of freight, providing linkages to the State highway network from major freight generators and attractors, and also providing alternative routes. Within these areas the freight issues are typically dominated by general congestion levels and the desire to move freight away from road. However, in reality, much local freight traffic within urban areas has no alternative to road, and may have limited ability to change the times of travel. In fact, users of private cars have a greater choice of mode as they are able to switch to public transport, walking or cycling.

Within the Auckland Region, there have been several initiatives to start addressing freight issues and improve the performance of the freight network.

- Auckland City Council has developed a Freight Strategy which recognises the importance of freight to the city and it is in the process of implementing its recommendations. Progress has been made on three elements of the Freight Strategy, the establishment of a freight forum, the development of a local freight network and the development of a local-area, freight-management plan for the Rosebank industrial area.

- Waitakere City is in the process of developing a freight strategy, including the development of a local freight network and the identification of suitable freight facilities in the new development areas planned for the Massey West/Westgate area.

- The Regional Council has published a Regional Freight Strategy, again recognising the importance of an efficient freight sector in the ongoing development of the regional economy, and is starting to implement some of the strategy's proposals.

Christchurch and Wellington are also in the process of developing freight strategies and components of the freight sector have been considered at a regional level, including Southland, West Coast, Waikato, Gisborne, Taranaki and Northland.

Despite the moves outlined above, the limited resources both financial and human which are in practice available for measures to improve the movement of freight, mean that progress on the ground is often limited and measures to improve the movement of freight have to be combined with those for better funded activities, such as road safety. The timescale and priorities for freight improvements are therefore dependent on those for the activities with which they are paired, and do not therefore necessarily represent the best approach for the freight sector itself.

The overall conclusion from this is, therefore, that while steps are being undertaken which will improve conditions for the movement of freight between urban areas and possibly through urban areas on the State highway network, conditions for the movement of freight on local-road networks are likely to deteriorate without substantial measures to improve the position.

5.3 Developments in rail infrastructure and operating practices

5.3.1 Current traffic flows

The volumes carried by the rail network in recent years are set out in Table 5.2.

Table 5.2
Rail freight movements 1993-2007: year ending 30 June

Year	Rail		
	Tonnes 000s	Net tonne-kms (millions)	Average length of haul (km)
1993	8,514	2,468	290
1994	9,444	2,835	300
1995	9,584	3,202	334
1996	10,305	3,260	316
1997	11,525	3,505	304
1998	11,706	3,547	303
1999	12,900	3,671	285
2000	14,699	4,078	277
2001	14,461	3,942	273
2002	14,330	3,766	263
NFM 2002 (2)	*13,600*	*3,463*	*263*
2003	13,702	3,692	269
2004	13,350	3,880	291
2005	13,156	3,881	295
2006	13,505	3,872	287
2007	13,741	3,893	283

Sources: TranzRail Annual Reports for rail figures from 1993-2002.

Toll NZ for rail figures from 2003 to 2007.

Rail figures for 2003 onwards are determined in a slightly different fashion to those for earlier years, with the change probably reducing the totals by about 5 percent. The NFM figures are therefore more directly comparable with the figures for 2003.

Over the past few years, total rail-freight flows in terms of both tonnes and tonne-kms have been broadly stable.

The breakdown of the tonnage carried by commodity is set out in Table 5.3.

Table 5.3 Rail flows by commodity group (2006-07)			
	000 tonnes	Million tonne-kms	Average length of haul (kms)
Dairy products, inc milk	2196.1	382.6	174
Meat	479.7	165.3	344
Wool	98.6	32.8	333
Horticultural products	133.2	80.7	605
Fish	66.1	20.8	314
Logs and woodchips	1287.3	184.5	143
Timber, wood products and paper	1406.6	223.9	159
Coal	4069.1	1087.1	267
Aluminium and steel	363.4	131.5	362
Chemicals, fertiliser and minerals	205.7	85.2	414
Food	167.8	82.3	491
Other manufactured products	2908.2	1295.6	446
Not elsewhere specified	205.9	77.9	378
Total	**13587.8**	**3850.1**	**283**

Source: KiwiRail

The tonnage carried is dominated by agricultural products (especially logs and wood products and milk and dairy products) and coal. These account for about 75 percent of all goods carried and about 60 percent of the total tonne-kms

5.3.2 Current rail infrastructure

The rail network in New Zealand is set out in Figures 5.7 and 5.8.

Figure 5.7
Rail Network, North Island

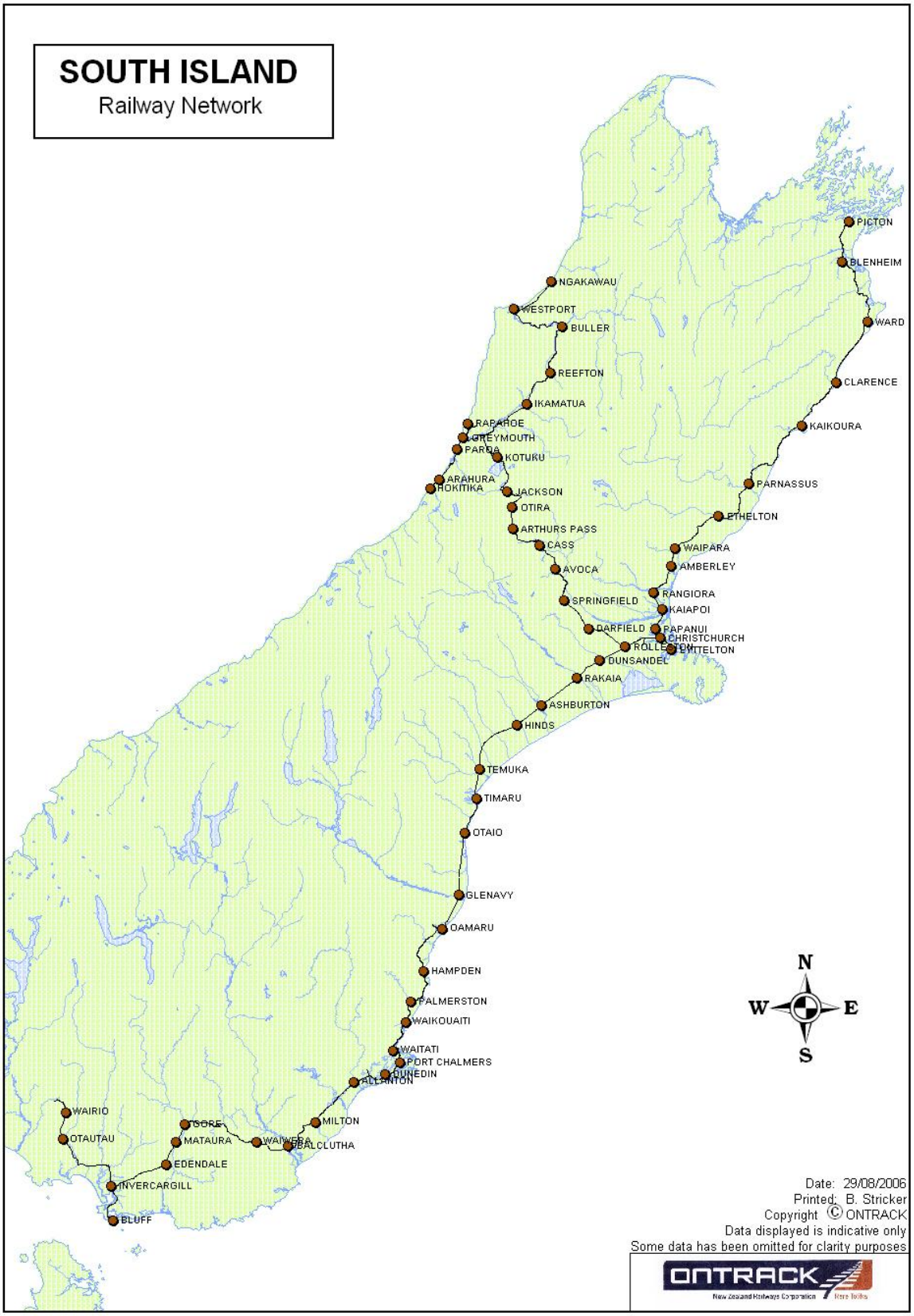


Figure 5.8
Rail Network, South Island

Developments in improving the infrastructure can be grouped as follows:

- transit time reliability
- clearances
- load capacity (axle loads)
- line capacity
- extensions.

5.3.3 Transit time and reliability

A large number of the maintenance-risk issues are managed by reducing speeds (temporary speed restrictions). As a result, required work on track, sleepers and formation and structures (bridges and tunnels) may build up as limited funds are prioritised elsewhere, and overall transit time on a particular line may then increase. Increased expenditure by ONTRACK on maintenance on key lines is reducing speed restrictions and improving transit times. Further investment in formation maintenance and bridge upgrading is planned. ONTRACK has also invested in new major, rail-maintenance machinery, including 40 new ballast wagons, a 'dynamic track stabiliser', a ballast cleaner and a tamper, which will increase the length of line maintained in a year and speed its return to normal traffic transit times.

Much of the country's rail network runs on its original alignment. Some routes were realigned throughout the last century (eg, in the 1930s, 1950s and 1980s) but nowhere near as much as has been done on the highway network. Many lines still suffer from speed restrictions on tight curves and steep grades. Improvements to many of these are quite feasible, given funding. Current thinking includes improvements on the alignment of the Otaki-Manakau section, a deviation from Kakariki to Porewa to avoid the steep grades into Marton, and easing a sharp, slow-speed curve north of Taihape. Longer term, and on a larger scale, grades on the coal route between the West Coast and Canterbury at Reefton, Cass and near Springfield could be eased, as could other curves on the Taihape - Taumarunui section.

Transit time also interacts with line capacity in terms of signalling and crossing loops. Signalling on the Rolleston - Arthur's Pass route is currently planned for upgrading to centralised traffic control and motorised points, which will improve speed, capacity and safety.

5.3.4 Clearances

A legacy of the nineteenth century construction is limited clearances, mainly through tunnels. The principal restriction is height rather than width, although height and width interact in the area of the curved roof of tight tunnels. Some usually less-used lines cannot take 9ft 6in-high containers, the modern 'hi-cube' standard. Most principal lines can take these containers, albeit in some cases with limitations on the wagons that can be used, or with speed restrictions. The most important exceptions are Greymouth - Christchurch and North Auckland.

Currently, the line through the Manawatu Gorge to Napier, and the Marton-New Plymouth line are also restricted. A major project to remove the restrictive tunnel on the New Plymouth line has just been completed, and removal of the restrictive tunnels in the Manawatu Gorge will be completed this year.

On the Auckland-Tauranga and Invercargill-Port Chalmers routes, even higher containers, up to 10ft (3.05m), are allowed,. These are special containers for internal use only, as they are also too large for export use. They are used mainly for dairy products as their size permits double stacking of product on pallets, and thus greater efficiency. Double-stacking of standard pallet sizes is not possible in a 9ft 6in international container, a problem overcome for that journey by using slipsheets. Further work to extend the use of 3.05m containers throughout the network is feasible but is not currently planned.

In the longer term, clearances on the North Auckland line would need to be improved if Marsden Point becomes a major container port, but would require significant expenditure on a replacement for the Makarau tunnel, and as much again to improve many of the other 12 tunnels on the route between Auckland and Whangarei.

There are also plans to remove the first tunnel on the Rolleston - Arthur's Pass route, which is part of the Midland Line between Christchurch and the West Coast. This will improve speeds over that section but, because there are other restrictive tunnels further west, it will not improve clearances on the route as a whole.

5.3.5 Load capacity

Most of the network is capable of carrying 18-tonne axle loads. A 6-axle locomotive can therefore weigh a maximum of 108 tonnes and a 4-axle wagon a maximum of 72 tonnes. The most efficiently constructed wagon on the system at present has a tare weight of 15.5 tonnes, which means that it can carry 56.5 tonnes of freight (including containers).

Modern diesel-electric locomotives including most locomotives built for New Zealand's 1067mm gauge, weigh much more than 108 tonnes. Examples include Queensland's newest diesel-electrics at 119 and 120 tonnes. Given that the hauling power of a locomotive is at least partly related to the weight available for adhesion, an 18-tonne axle load is a limiting factor.

A target for the New Zealand rail network is therefore a 25-tonne axle load, a 39 percent increase on the 18-tonne load.

Both track and bridges are impacted by axle loads, and current track and bridges limit the ability to improve beyond 18 tonnes. It costs relatively little to design and build bridges for heavier loads, so code reviews are currently taking place so that new bridges will be built to carry 25-tonne axle loads. For some years, track has been built for a 22.5-tonne capability. But many bridges and much track remain from times before these standards were introduced, so a focused investment plan for a particular route is necessary before more than 18 tonnes is allowed. Bridges are the critical issue. An accelerated programme to replace the 2,900 wooden piers (521 bridges) is underway and 562m of bridge were replaced or upgraded in 2006-07.

Much of what is carried on New Zealand's rail and road networks is not dense enough to use more than 18-tonne axle loads and relatively few commodities would benefit from heavier axle loads. These include steel, coal, limestone, cement and bulk liquids such as wine in containers. International containers of some exports, such as some dairy products, may also benefit. Import containers are usually lighter. Note though, that the trend to using 40-ft containers limits the usefulness of higher axle loads – the weight in a 40-ft container is limited by the structural strength of the container and the lifting capability of wharf cranes, which is usually less than 40 tonnes. This is well within the current 18-tonne axle load. Twenty-foot containers could well weigh in excess of 18.8 tonnes each; the practical limit for three of them on a wagon with an 18-tonne axle load. If 20-ft containers continue to be in common use, heavier axle loads may be beneficial.

KiwiRail is buying 100 new container wagons, mainly for Metroport traffic between Tauranga and Auckland. These are capable of an 80-tonne gross weight or 20-tonne axle load. With the tare weight of the wagon subtracted, it can carry nearly 62 tonnes of freight or three 20.5-tonne, 20-ft containers. Some older wagons could also have bogies upgraded to 20-tonne axle load. These are both interim solutions, and further new container wagons could carry up to 65-tonne loads, still with a 20-tonne axle load. ONTRACK is actively looking at improving the Auckland-Hamilton line to carry 20-tonne axle loads as an early step on the way to 22.5 tonnes. Hamilton-Tauranga will be the next to follow.

Extending this to other routes would require significant expenditure.

5.3.6 Line capacity

Double-track sections of track have very high capacity in terms of the number of trains, depending on signal spacing. The main double-tracked routes outside suburban passenger areas are Papakura-Hamilton (90 km) and Heathcote-Islington in Christchurch (18km). The effective capacity of the Papakura-Hamilton line is limited by two single-tracked sections (13km) from Auckland to Te Kauwhata and across the Waikato river at Ngaruawahia between Huntly and Hamilton. At present, they pose no real restriction on capacity.

Double track is being extended in West Auckland and Wellington, primarily for passenger trains. The freight network outside these routes is single tracked. The capacity of single-track routes is influenced by the number and length of crossing (passing) loops, and signalling systems. In much of the country these are appropriate to the traffic demands on them. Most routes have relatively low-density traffic in terms of number of trains that are run.

When traffic is denser, lines can reach capacity constraints. On the Hamilton-Tauranga route the extension of crossing loops to 900 metres long and the construction of two new crossing loops, is underway at a cost of about $10 million. With the extension of a further loop east of the Kaimai tunnel, this expenditure will double the capacity of the line.

Replacing the signalling on the Midland line between Christchurch and the West Coast, noted above, will also increase the capacity of that line.

Further improvements to crossing loops would benefit the North Island Main Trunk line (NIMT) in the central North Island and between Palmerston North and Waikanae.

5.3.7 Line extensions

The rail freight network reaches all significant parts of New Zealand, except Nelson. It also reaches all ports except Nelson and Marsden Point. A line is planned to connect Marsden Point to the network and work is underway to designate the route.

Further short extensions are likely to connect particular industrial plants directly to the network. The three currently under consideration are to a proposed cement works at Weston, near Oamaru (under action for designation), to a coal-loading facility (to be built this year) at Ikamatua, and a line to the dairy plant at Clandeboye.

The Onehunga branch is being reopened for passenger use. Part of the Rotorua branch near Putaruru is being reopened to serve a water-bottling plant. The remainder of the Rotorua branch may be reopened for passenger use if local plans to run passenger trains come to fruition.

While a number of parts of the network carry very light traffic, there are no current plans to close any of them.

5.3.8 Operations

Rail use is hampered by a lack of wagons and locomotives. As noted above, new container wagons have been purchased and a number of moth-balled wagons have been restored to service. With the return of rail freight to the government, the purchase of further new wagons is now being planned.

At present, there is heavy demand on the locomotive fleet at certain times of the year and the needs of freight have to compete with the growing demands for locomotives for passenger services, particularly in Auckland. Consequently, at these times there are no spare locomotives available for freight. Previously spare lower-powered locomotives have been refurbished and put into passenger service in Auckland. The purchase of new locomotives has been planned for some time, but not proceeded with because of the issues between Toll and ONTRACK. These issues have been resolved with the repurchase of the transport system, and the purchase of locomotives is now also planned. Meanwhile, some of the existing locomotive fleet has been improved, with larger engines and traction-control systems, significantly increasing the load the locomotives can haul up grades.

In recent years, container-transfer centres have been developed to expedite the movement of freight from road to rail. These are confined largely to main and secondary centres. Some expansion of this concept to other places is possible. Previous management linked the development of these sites to a reduction in direct access to industry via private sidings. This has reversed recently, but there are still issues with the availability of local train services to serve private sidings.

A similar concept ('inland ports') has been developed with the Metroport operation between Tauranga and South Auckland. The government is reported as having offered to contribute $6 million to the cost of providing rail access to the terminal[14], allowing the operation of shuttle trains from the port and taking heavy-vehicle traffic off the Auckland motorway network. This proposal is likely to go ahead.

[14] New Zealand Herald 27 June 2008.

5.4 Developments in ports and international shipping patterns

5.4.1 Current patterns of port and airport operations

New Zealand ports and airports currently handle a total of about 41.5 million tonnes of international trade per year. The breakdown of this by port is set out in Table 5.4.

Table 5.4
Gross weight of international trade cargoes handled by New Zealand ports and airports, million tonnes in the year ending June 2007

	Exports	Imports	Totals
Whangarei	1.16	5.24	6.40
Auckland	2.52	3.88	6.39
Tauranga	6.02	3.88	9.90
Taharoa	0.68	0.00	0.68
Gisborne	0.59	0.01	0.60
New Plymouth	1.37	0.49	1.86
Napier	2.08	0.48	2.56
Wellington	0.82	1.22	2.04
Nelson	1.24	0.12	1.37
Picton	0.38	0.00	0.38
Christchurch (Lyttelton)	3.27	1.34	4.62
Timaru	0.52	0.31	0.83
Dunedin (Port Chalmers)	1.53	0.26	1.79
Invercargill (Bluff)	0.65	1.13	1.77
New Zealand various (sea)	0.05	0.02	0.07
All seaports	**22.88**	**18.39**	**41.28**
Auckland Airport	0.09	0.09	0.18
Hamilton Airport	0.00	0.00	0.00
Wellington Airport	0.00	0.00	0.00
Christchurch Airport	0.02	0.01	0.03
Dunedin Airport	0.00	0.00	0.00
New Zealand various (air)	0.00	0.00	0.00
All airports	**0.10**	**0.10**	**0.21**
Total	**22.99**	**18.50**	**41.49**

Source : Statistics NZ

In terms of volume, the largest ports are Tauranga, Whangarei (Marsden Point) and Auckland; high volumes of bulk products affect many of these. The high volume through Tauranga includes almost four million tonnes of exports of logs and timber products and imports of a million tonnes of coal for the Genesis power station at Huntly. The volume through Whangarei reflects the high volumes of imported crude oil, about five million tonnes, for the refinery at Marsden Point. The volume of traffic through Lyttelton (the fourth-largest port) also reflects high volumes of exported coal, mainly from mines on the West Coast of the South Island.

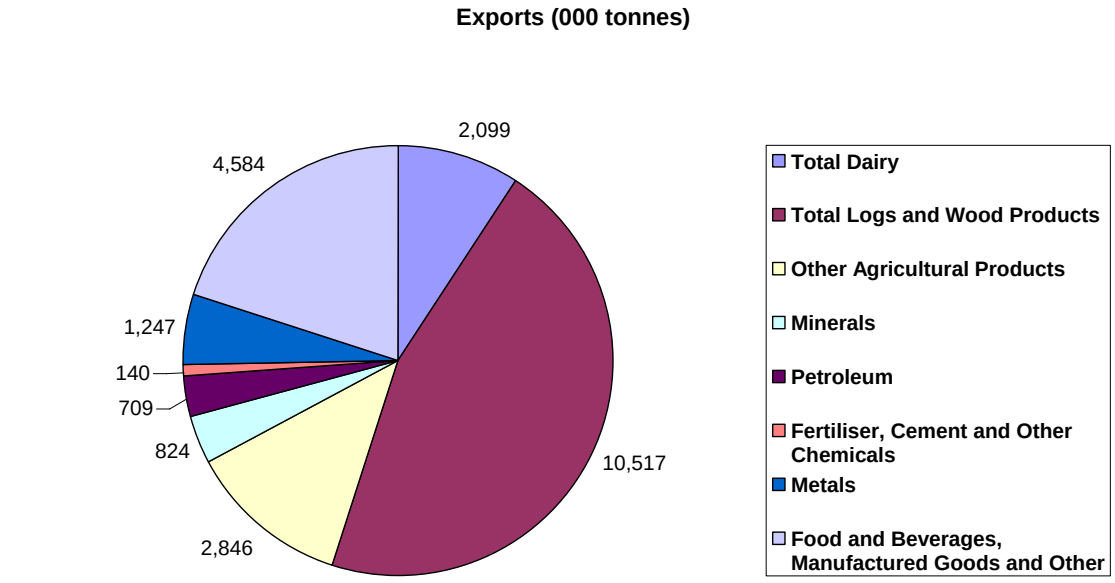
There is also a certain amount of freight carried by air, although, in relation to the total, the volume is low. International air freight is dominated by movements through Auckland, which account for about 90 percent of all movements.

The breakdown of imports and exports by broad commodity grouping is set out in Table 5.5 and Figures 5.9 and 5.10.

Table 5.5 Breakdown of international trade by commodity group (000 tonnes) for year ending June 2007		
Commodity group	**Exports**	**Imports**
Total dairy	2,099	31
Total logs and wood products	10,517	665
Other agricultural products	2,846	1,002
Minerals (1)	824	2,335
Petroleum	709	7,226
Fertiliser, cement and other chemicals	140	2,596
Metals	1,247	752
Food and beverages, manufactured goods and other (1)	4,584	3,893
Total	**22,966**	**18,499**

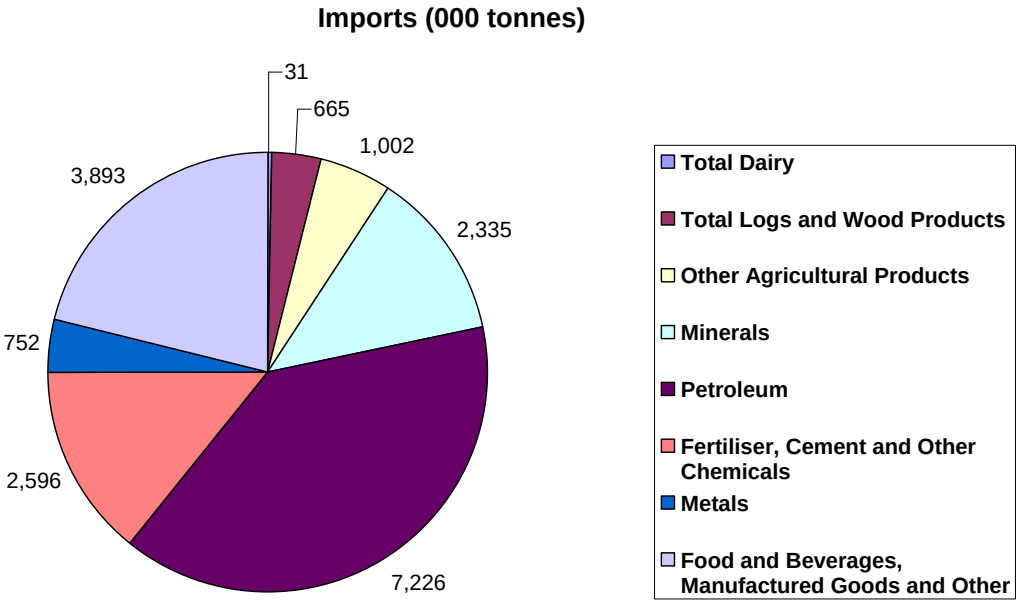
Source: Statistics New Zealand

Notes:(1) In the Statistics NZ port data, coal exports through Lyttelton are treated as 'other'. These amount to about 4.2 million tonnes and would constitute the majority of this category. Imports of coal are, however, recognised implicitly in the data and are included under 'Minerals'.



Source : Statistics New Zealand

Figure 5.9
Breakdown of International Trade by Commodity 2006/2007 - Exports



Source : Statistics New Zealand

Figure 5.10
Breakdown of International Trade by Commodity 2006/2007 - Imports

Outbound trade is dominated by agricultural products, logs and other wood products, dairy products and other agricultural products, including meat. Imports are dominated by petroleum, manufactured goods, and fertiliser, cement and other chemicals.

5.4.2 Background and development in the port sector to the late 1980s

Historically, the ports of New Zealand evolved as a result of the physical restrictions of the geographical structure of the country. Much of the country is covered by fairly rugged terrain and is split into two main islands, and the early road and rail routes were limited in their ability to overcome these barriers. While the North Island rail system was linked throughout the island in 1908, it was not until 1945 that the same was achieved in the South Island.

As a result, ports proliferated, initially as landing points for immigrants from (mainly) Great Britain, and then as a means of aiding the movements of goods and passengers between regions and to and from overseas destinations. The governance structure for these ports was very much in the traditional Local Body style, with elected members and Board decisions often along political party lines. Management responsibilities for the ports were provided by people who often did not have appropriate technical skills. Profit, in the modern accounting sense, was not normally seen as a necessity, and transparency of charges was very simple – there was a single, non-discountable tariff.

The governance bodies, known as Harbour Boards, had defined boundaries and paid little attention to products that were sourced from, or destined for, areas outside those boundaries. Little effort was put into marketing, and a 'take it or leave it' attitude prevailed. Furthermore, the Harbour Boards' trade union structure at some ports saw the advent of a union separate from that working the ships, which became involved in demarcation arguments and, in some cases, different working hours. Working practices were typically inefficient but the nature and structure of the shipping and port industries meant that taking action to deal with this was difficult.

The ports of Auckland, Wellington, Lyttelton and Dunedin became, by virtue of their population bases, the key discharge ports for consumer goods, machinery and vehicles that arrived, mainly, from Europe, Australia, the USA and, latterly, Japan. Outward cargoes requiring ports physically close to meat works, dairy plants or wool stores contributed to the growth of Bluff, Timaru, Nelson, New Plymouth, Napier and Tauranga. The development of Tauranga benefited from a much later, mid-1950s start, when finger-type piers were replaced by long, continual berths and associated back-up land. These allowed export cargoes to be gathered together in a handy location prior to loading, resulting in cheaper and faster loading.

The beginning of USA-driven container initiatives inevitably affected New Zealand by the mid-1960s. While Northland loudly proclaimed the need for a single container port for the whole country, the 1967 Molyneux Report recommended three ports. However, political pressures meant that the structure and control proposed by the NZ Ports Authority would be undermined, as the introduction of container cranes at Mount Maunganui in Tauranga showed in the late 1970s.

The increasing use of containerisation meant that changes in working practices were essential if the benefits were to be achieved. Some initial steps were undertaken in the 1970s with the formation of container-terminal workforce groups. Although an improvement on existing methods these did not allow the full benefits of containerisation to be achieved. By the 1980s, container shipping had become the major force in shipping, and some form of waterfront reform had to be seriously considered. A number of initiatives took place whereby the Port Employers' Association, The Harbour Boards' Association and the Waterside Workers' Union jointly agreed to, and undertook, a process of labour reform. Due to the coincidental timing of the Port Companies Act of 1988, this was all combined as Port Reform but one should not lose sight of the fact that there was a radical and permanent change to the manner in which waterfront labour was to be employed. Helped by the Waterfront Industry Reform Act of 1989, the plurality of unions and their restrictive practices disappeared, and 365-days-a-year work became possible.

Container shipping, while embracing a number of trades and cargoes, was not the only answer to modernisation. For a number of years, trade to areas other than Europe supported the continued use of break-bulk shipping in a more modern era. This enabled ports like Napier, Nelson, Timaru, New Plymouth and Bluff to maintain steady throughputs by loading homogenous products on vessels which also carried a few containers on deck. Meanwhile, a number of smaller, historic ports, including Oamaru, Kaiapoi, Patea and Opua, closed, thus continuing the gradual decline in port numbers as road, rail and Cook Strait ferry competition sped up the process of intra-New Zealand freight movement and improved access to the larger and more efficient ports. Coincidental with this port-closure programme was a marked downturn in the number of dedicated coastal ships and a greater concentration on international routes.

The structure of the port industry was concurrently changed with the passing of the 1988 Port Companies Act. This, together with other associated legislation, saw the removal of the government-controlled Waterfront Industry Commission and the emergence of ports as stand-alone entities, with shares held by the appropriate regional government bodies. Some environmental responsibilities passed from the ports to the regional government organisations.

A key factor of the legislation was that port companies had to strive to make profits for their shareholders and there was a tacit understanding that a proportion of the shares should be made available for public purchase. This led to a change in attitude of the port companies, with commercially-minded managers supporting the growth of a new breed (for New Zealand) of professional managers and technical staff running the ports.

5.4.3 Developments after the late 1980s

The greater commercial freedom thrust upon the ports had some interesting effects on the way in which port authorities perceived themselves and the ways in which their shareholders tried to understand their business practices. Typically, revenues from ports became important sources of finance for their shareholders (mainly regional and territorial authorities) and were used to supplement more conventional sources of revenues for public expenditure. At times this led to greater interest in the development of port property, especially in desirable central urban locations.

Several ports, regardless of the geographical boundaries of the shareholders, entered into marketing drives seeking cargoes from much wider catchment areas than previously. A case in point was the port of Napier which, with determination and a high level of service, captured some of the cargoes that passed through the port of Wellington. The latter reacted too late and the container throughput at Napier increased dramatically at the expense of the capital's port.

The numbers of containers handled at the major ports is set out in Table 5.6.

Table 5.6
International container movements through New Zealand ports 2006-07

Port	TEU equivalent	
Northport	NA	
Auckland	686,077	
Tauranga	466,235	
of which Metroport accounts for		*138,000*
Gisborne	NA	
Napier	153,732	
New Plymouth	59,000	
Wellington	84,000	
Nelson	71,815	
Lyttelton	228,000	
Timaru	77,100	
Dunedin	171,000	
Bluff	4,000	

Source: Ports' statistics and interviews.

Notes: TEU = Twenty Foot Equivalent Unit, a common measure of container size.

Competition between Auckland and Tauranga was also in full swing at this time, with the latter setting up a container-transfer operation in the industrial heart of its competitor city. The growth in the use of this service has been substantial with an effective front gate for Tauranga in the centre of industrial Penrose. The Metroport facility now handles about 140,000 TEUs per year. This compares with about 470,000 TEUs handled by the Port of Tauranga in total and 690,000 TEUs handled by the Port of Auckland.

In the South Island, competition was very much alive too. Restrictive labour practices at the Port of Lyttelton saw a major gain for Timaru in the late 1980s when a major, innovative shipping company wanted to merge roll-on roll-off activities with lift-on lift-off on the same ship. These gains were sustained for a number of years and it is only with the recent severe shake-up and rationalisation of shipping services that this advantage seems to be disappearing and Timaru has had to declare redundancies among its staff.

Wellington, however, continued to be sustained by the almost-guaranteed trade of the rail ferries and other competing ferry operators. Relationships between the port and their major rail-owned customer were often difficult and attempts by the ferry operators to bring the larger passenger ferries close to the transport heart of the capital failed.

Lately, Northport, once vying to be the sole container interchange in the country, has moved from the heavily-silted, up-river port of Whangarei to take advantage of deeper water and the shorter, harbour-steaming distances afforded by a new development at Marsden Point. The port is still trying to be accepted as a regular service, container port, but this may be inhibited by its remoteness from the main population and producing areas within the country, the lack of a direct rail link to the port and the limited capacity of the rail system north of Auckland, unless major expenditure is committed. In addition, the major rationalisation of shipping services may also impede its development.

As an alternative to capturing general cargo traffic, several ports have looked to specialisation as the appropriate way forward, often based on cargoes generated locally. Specialisation of business has been evident at, for instance, the port of New Plymouth which is concentrating on hydrocarbon cargo support while still maintaining a weather eye on the container trades – partly because of its close proximity to a very large dairy-processing site and partly because it faces the Tasman Sea and Australia. However, the concentration on hydrocarbons does pose risks because of the vagaries of the oil and gas-based businesses, a factor which could apply to any specialised trade.

Specialisation of cargo tonnage throughput demands, in addition to the necessary marine facilities of deep-water channels, strong tugs and safe berthage, as well as the availability of suitable areas of land upon which to hold cargoes prior to export. This may be a particular issue with handling logs and related products for which export volumes are forecast to grow strongly and which require substantial storage areas. Given the central urban location of many ports, achieving this additional storage space may be difficult.

This is currently an issue for the port of Napier in relation to increased log traffic from the East Cape. The port wishes to reclaim more land from the sea, but finds itself in opposition to local residents. The alternative would be to route the logs through Gisborne, closer to their source. However, considerable expenditure would be required to upgrade the port at Gisborne in order to accommodate the shipping of what is a relatively low-value product with fluctuating, but probably large, flows over a number of years.

Growing container traffic also raises issues of the availability of space. For ports affected by this, particularly where easy space for expansion is not readily available, such as Auckland and Lyttelton, there has been increasing development of inland port and storage areas. In Auckland a new, potentially rail-served inland port has been developed at Wiri, with the added advantage of not only removing containers from the quayside at the port but also by potentially employing a rail shuttle service, reducing the volumes of road traffic on central Auckland roads and motorways. The port is, however, under pressure to relinquish some of its land holdings in central Auckland and this may inhibit the development of general cargo services.

5.4.4 Particular developments at ports

Northport: while the port company at Northport has sought to encourage the development of new trades taking advantage of deep water, ample land at Marsden Point and its location at the top of New Zealand, which gives it the shortest steaming distance for ships, its success has been limited by its remoteness from key markets and the poor quality of the internal transport system. There is pressure to construct a rail connection to the port, but this is probably focused primarily on serving locally generated traffic especially logs within Northland. The capacity to serve the key freight-generating and attracting areas further south would require further substantial upgrades of the rail transport system.

Auckland: Auckland is the major container port in New Zealand. It is located in the centre of the city and at the northern end of the 'golden triangle' of Auckland, Waikato and the Bay of Plenty. It has recently been selected as the premier New Zealand call for Maersk ships and the growth of container volumes resulting from this has put considerable pressure on the storage space available within the port boundaries. Given its central location, the scope for expansion is limited, and the situation is being exacerbated by the need to relocate facilities into the main port area from the Western Reclamation, which is proposed for development for housing and commercial activities as an extension of the CBD.

The port has just concluded a contract with Golden Bay Cement for a new in-port handling and production facility to replace their current unit at the Tank Farm to the west. The company has also been innovative in assisting with the continuing removal of Western Reclamation facilities by entering into a joint venture for the handling by barge of ships' bunker fuels when the on-land storage transfers to Marsden Point. However, other bulk liquid operations in the area, which the port is seeking to relocate, are hoping to be provided with 'eastern' land in due course as they will still require deep-draft-vessel supply.

Ports of Auckland, having noted Tauranga's success with its Metroport at Penrose, have expanded to include two 'inland port' operations. One sits in the heart of a major industrial area at East Tamaki and, although it almost certainly will never be rail-fed, provides opportunities for off-port storage of containers and also for the transfer of cargo to and from the port at times when traffic congestion is relatively low. The second inland port at Wiri is very well positioned close to the main rail line and to the SH20 motorway which forms part of the Western Ring Route round Auckland. It has recently been reported[15] that agreement has been reached on the funding of the connections necessary to allow rail shuttles to haul containers to and from the port. Despite these developments, the port will soon need to consider using higher container stacks with the aid of rubber-tyred gantries or suchlike.

[15] New Zealand Herald 27 June 2008

Ports of Auckland have just completed a dredging operation on its approach channel and container-terminal swinging area to allow the use of the new container vessels.

Tauranga: Tauranga is one of the ports in New Zealand with public shareholders. Having being developed as a specialised port focused on the log and timber industry it has now expanded to include a major container terminal. In addition, the construction of the Kaimai tunnel and availability of port land saw the transfer of the export of NZ Steels' products to Tauranga instead of Auckland.

A feature of the port is the rail-served Metroport inland port in South Auckland, which allows it to serve customers in the main industrial heartland. The port has also been successful in attracting other container traffic from much of New Zealand.

In the recent past, the changes in shipping patterns have affected the port's activities, particularly with the transfer of the major Maersk service to call predominantly at Auckland only, in the North Island. However, the spare capacity created by this switch has made the port more attractive for other users and these have helped to fill the gaps and keep traffic volumes high. Tauranga has also been affected by large-scale fluctuations in the volumes of coal imported for the Genesis power station at Huntly. At their peak these amounted to up to about 1.2 million tonnes per year, and the port constructed an enclosed coal discharger for this traffic. However, with the expansion of coal mining at Huntly, the demand for imported coal has now fallen and is currently running at about 0.5 million tonnes per year.

The peaks and troughs of log movements have seen the port using land well away from the ships' berths, necessitating longer ship-side feed, and running the risk of deteriorating log condition. However, given the uncertainties of this trade, it probably represents a more cost-effective solution than the use of dedicated areas within the port itself.

Napier: Napier Port combines a mixture of 'finger' and 'alongside' berths where it is difficult to admit, turn and safely berth the longer ships that cargo growth demands. It still suffers from a minor ocean-driven surge within the harbour and has a shortage of land to handle sufficient rail exchanges in a safe manner. There may be the opportunity to develop an inland port at nearby Ahuriri in alliance with the rail operator to provide more innovative and cost-effective cargo movements. The port is under constant pressure from residents on Napier's Bluff Hill who are resisting any water's-edge 'creep' for extra cargo-handling land.

New Plymouth: New Plymouth has a strong specialisation in hydrocarbons, reflecting its location close to oil and gas reserves. It also benefits from being the only formal, truly international cargo port on the west coast of New Zealand, which makes it attractive for trans-Tasman movements.

Having specialised in hydrocarbons, the port has suffered from the peaks and troughs of the carbon-based and gas industries but has also a viable container terminal. It is also in the process of constructing large storage facilities for palm kernels used for animal feed, the demand for which is likely to increase with the expansion of dairy farms, particularly in South Waikato, and New Plymouth port is rationalising and expanding the land it controls. Within the timeframe of this study the port gained and then lost a trans-Tasman service, resulting in the possibility that Taranaki exports to Australia would have to return to Auckland or Tauranga. However, the proposed Maersk coastal and trans-Tasman service may adequately fill the gap. This highlights the risk to which the smaller ports are exposed when shipping companies change or rationalise their services at short notice.

One issue that could affect the port is a change in Fonterra's transport pattern, with the output of the very large plant at Hawera being redirected to Auckland via the Crawford Street facility at Hamilton. Dairy products make up about a third of total exports, excluding petroleum products, and the loss of this traffic could have a significant impact. A further indication of this possibility is the recent realignment of the rail line at Kai Iwi, allowing the use of large containers, and the decision by Fonterra to build a very large cold store at Hamilton's Crawford Street.

Wellington: for the last 46 years Wellington has depended heavily on Cook Strait income that not only upset the balance of their cargo tariff but also fostered the belief that a centrally-positioned terminal would give the port the opportunity to be at the centre of the national logistics picture. However, the port suffered considerably from the decline of industry in the area, with overseas-made decisions that saw the closing or major reduction in throughput from three car plants, one transformer manufacturer and a large match-making company. It was also affected by fluctuations in the production of tobacco, soaps and cosmetics as well as the soon-to-terminate movement of 2,000 40-foot containers from a local tyre manufacturer. On the other hand, the port has gained some timber-related activity from nearby Wairarapa. While the port has achieved some short-term improvements in container traffic this has come off a very low base, leaving their container terminal well under-utilised.

Conflict between port operations and development activities has been acute, and there has been considerable development of water's-edge land for commercial operations and government departments. On the positive side, the harbour provides a magnificent safe haven for ships, with minimal dredging needs due to positive tidal 'sweeps' around the harbour. There is also the possibility that a revived industrial base at Seaview could well see a move away from the city in due course, although this may attract local opposition.

Nelson: Nelson is reliant on three base products – timber, fruit and car distribution. However, as in the case of Wellington, the last is always very vulnerable to the diversion of production to lower-cost countries in the Asia-Pacific area.

The main entrance channel has both a right-angle bend and a major rock formation, the removal of which would be so costly as to necessitate ongoing levying of ships and cargoes. To avoid this position, the port has elected to concentrate on being a 'hub' port and taking shorter, deep-sea vessels as an extra activity. By default, the decision to concentrate on coastal cargoes sees Nelson withdraw as a 'west coast' deep-sea alternative.

The land area adjacent to the port is somewhat cluttered for major cargo handling and the port has recently been trying to buy adjacent land where industry changes have provided opportunities for investment.

Picton: Picton has a two-wharf operation and ferry-type terminal facilities which are well supported by rail and road. The adjacent deep-draft Shakespeare Bay was initially planned for the handling of logs and would also be suitable for the loading of coal. The area has ample land for homogenous cargo marshalling. However, resistance by local residents has prevented any real progress.

Lyttelton: Lyttelton suffers from a shortage of good cargo-handling space, which is restricting its growth and flexibility. It has attracted large volumes of coal mined in the West Coast, but this is a low-value product with considerable storage requirements that uses up to 40 percent of the port's useable land area. This has consequently forced the port to invest in more costly land on the city side of the Port Hills.

Perceptions and concerns about the relationships between governance, management and labour at the port have played a part in discouraging some shipping companies from using the port. This has provided opportunities for other ports serving the central and southern South Island, especially Timaru and Port Chalmers.

Timaru: in the days before containerisation, Timaru was the home of one of the two semi-automatic, all-weather loaders in the country (the other was Bluff) where these mid-60s units radically improved ship turn-round time. However, the arrival of containers in the 1970s dispensed with the need for this operation. The port remained fairly quiet for many years, supporting the dwindling, deep-sea, conventional vessels on trades that eventually succumbed to containerisation.

However, good labour relations possibly contributed to Timaru's gaining of the multi-operational NedLloyd 'ro-ro' ships which switched from Lyttelton in the late 70s. The port maintained a reputation as a potential alternative to the more restrictive Lyttelton. Timaru has gained materially from the decision that the nearby huge Clandeboye dairy facility be a road-only fed operation, although proposals to construct a rail connection to the plant may threaten this traffic.

Although the port has in the past been successful in attracting new services, as container shipping amalgamations and voluntary service agreements grow, ports like Timaru can be 'switched off' just as easily as NedLloyd switched on several years ago.

In the meantime, buoyed by the high throughputs of the current decade, the port is in the process of lengthening the inward end of its container-handling area to permit extra ships on the berth. Nearby port land has been put to very good use in the past 20 years as a large handler of cold storage products, including dairy and fish. However, the major review and reshape of multi-company container services has seen shipping calls markedly reduced, and the port may face difficulties in servicing its increased costs.

Port Chalmers: Port Chalmers has emerged as the dominant handler of international cargoes for areas south of Christchurch and has gained materially from a recent sizeable increase in the number of container trans-shipments which never touch the road or rail in Otago. The traditional port area of up-river Dunedin has been transformed into the operational area at Port Chalmers, closer to the sea, having developed from a single pier that could take just two large ships in the 1960s.

The port is handy to deep water with an easy-to-dredge sand bottom. It has quietly and very effectively grown into a major container-handling and timber-related operation, mainly for exports. The container terminal can accommodate two reasonable-sized vessels simultaneously, with four cranes handling a traditional, straddle-carrier-fed interchange. The ample area of land opposite provides for timber-related products and cruise ships. Up-river traditional berths still handle fertiliser, petroleum products and a large fisheries throughput. The port company also has land that is well utilised for the handling of a very large, dry-dairy tonnage (transferring from road and rail-fed in-flows) for a container-loading operation. Spare land is also held and currently unutilised, at nearby Sawyers Bay. The port's plans for deepening the approach channel at Port Chalmers are well on track.

Bluff: Bluff is another port where the future cargo and ship charges associated with high-cost channel dredging preclude it from being considered as a full deep-sea operator. The cost of removing the granite from the channel floor would be prohibitive.

Land use is a mixture of 'finger' and 'alongside' operations, with areas clearly defined for certain cargoes. Like Timaru, it used to operate a successful and efficient all-weather meat-handling facility in the 60s and 70s but the subsequent advent of shipping containers negated the need for this.

In its current format and expectations, Bluff does not have to create further cargo handling and marshalling land. Its major bulk-handling work is either of fertiliser for the nearby large Ballance processing plant or across the channel to the wharf at Tiwai Point. This wharf is owned by the port company but the smelter operator manages all cargo-handling aspects.

5.4.5 Pressures from outside New Zealand

Since the dawn of the new millennium, the global shipping scene has been in turmoil. A marked swing towards containerisation has seen pallet-friendly reefer ships decline in popularity. This change affected New Zealand's secondary ports which relied on handling the products of the local meat, fruit and seafood processors.

The huge growth in East-West trades specific to the Northern Hemisphere has brought with it a corresponding growth in both the size and numbers of ships. New Zealand's first dedicated international container ships in the early 1970s averaged about 1,000-container capacity. These are very small compared with the 13,200 box vessels that now serve the Europe - Asia - North America routes. The arrival of large vessels to Northern Hemisphere trades typically results in a downstream cascade of relatively young ships onto other trades, of which South Africa, Australasia and South America comprise the North - South trades. These cascaded vessels are usually short of refrigeration-generating capacity and container plugs, and are not suitable for the types of cargo carried. Some dedicated newly built vessels have been placed on the routes. The P&O-NedLloyd (P&ONL) 4,100 TEU class was the first serious attempt to satisfy the particular conditions and seasonal peaks of the Australasian trade routes although, as they came into service, they revealed major problems with average cargo weights.

In the latter days of P&ONL in a stand-alone capacity, the company made it very clear that a whole-of-New Zealand approach was needed to meet the needs of the major container lines if the country was to continue to be served at a level well beyond its population base and remoteness. The challenge laid down by the company was that, with the large and expensive ships required for the trade, serving a multitude of regional ports was not cost effective. The number of port calls had to be rationalised and cargoes assembled in a limited number of hubs.

Clearly, such a major change cannot be introduced overnight. The limited operating capability of the rail system (see earlier comments in the Rail section in Section 5.3.8) combined with a lack of coastal ships and growing congestion on the roads, acts to limit the speed of response. This, together with increasing fuel prices, counters the pressures to collect and deliver cargoes closer to their New Zealand origins or destinations. These possible changes are emerging, as documented elsewhere in this report.

Notwithstanding the takeover of P&ONL by the world's largest container-shipping operator (Maersk), there has not been a lessening in the drive towards northern hub-type operations. With Auckland and Tauranga vying to become the most favoured waterside interface, both ports have taken major strides to ensure that they can maximise their all-tides, maximum-depth capability in their shipping channels and alongside the berths.

5.4.6 The response of ports

In general, ports are caught in a dilemma when talking with container-shipping lines because, in order to attract the trades, they may need to spend large amounts of money on highly specialised handling equipment for services which may not ultimately arrive or might be transferred to other ports after short periods of operation. This is exacerbated by the fragmented nature of the port industry, with a large number of entities vying for the traffic available. This provides the opportunity for the larger shipping companies to drive down handling charges. In an attempt to resist these pressures, Auckland and Tauranga Ports began talks on some form of amalgamation. However, for reasons that have never been fully disclosed, Auckland Regional Holdings, the owner of Ports of Auckland, resolved not to support the merger and withdrew from the negotiations with Port of Tauranga.[16]

Amalgamation of ports (in both the legal and operating sense) is not peculiar to the North Island. There has been continued speculation about some form of merger between Port Chalmers and Lyttelton,[17] with Port Otago Limited having a 15 percent shareholding in Lyttelton. This could be extended to include Timaru.

The combination of ports into groups would allow a more rational allocation of cargo and services and reduce the need for competing investments for the same trades, in terms of land space, cargo handling equipment and tugs.

Throughout New Zealand, mainly south of Napier, the average throughput of containers per crane is significantly lower than those experienced in the Northern Hemisphere. Achievement of high container-per-hour throughputs contribute to the financial return required for those units only if they are sustained over considerable portions of the day or year.

Whatever transpires, it appears timely to seriously react to the fact that there is a high possibility of container vessels of up to 6,000 TEU capacity becoming the main international first leg of the country's exports. These vessels will be draft and length restricted in the majority of ports and will therefore force the rationalisation of the routes on which they operate. To provide a high level of accessibility to other locations that these vessels will no longer be possible to serve directly, they will need to be supported by inland and coastal feeder services and possible specialisation at the smaller ports.

5.5 Coastal shipping

5.5.1 Introduction

Coastal shipping services in New Zealand are provided by three main groups of operators:

- specialised vessels carrying fuel and cement
- dedicated general cargo vessels operating solely between New Zealand ports – Pacifica Shipping is the main operator of these services, with some limited services provided by Strait Shipping
- international operators providing domestic services between port calls in New Zealand.

The approximate breakdown of this by commodity is set out in Table 5.7.

[16] Letter from ARH to John Parker, Chairman, Port of Tauranga, 4 July 2007
[17] Otago Daily Times, 15 November 2007

Table 5.7 Coastal shipping by commodity (2007)		
Commodity	**Volume (million tonnes)**	**Percent of total**
General cargo	1.0	24%
Fuel	2.0	47%
Cement	1.2	28%
Total	4.2	100%

Source: interviews and consultant's estimates.

The traffic is dominated by the movement of bulk products, which account for about three quarters of the total moved by coastal shipping.

5.5.2 Cook Strait traffic

For the sake of completeness the volumes of cargo on the Cook Strait ferries are set out in Table 5.8, although the volumes handled are included in the totals for road and rail haulage.

Table 5.8 Volumes transported on Cook Strait ferries 2006-07 (million tonnes)		
Mode	**Volume (million tonnes)**	**Percent of total**
Road	2.0-2.5	60-70%
Rail	1.1-1.2	30-40%
Total	3.1-3.7	100%

Source: interviews and consultant's estimates.

5.5.3 Development and decline of coastal-shipping services

In the previous section on Ports we indicated that the proliferation of coastal ports was combined with a number of dedicated coastal-shipping services. Mostly small vessels, many of them had to be built and operated to handle bar-type restrictions at harbour entrances, especially on the West Coast. Since the 1870s many such shipping companies have come and gone, with a number of takeovers and amalgamations taking place along the way.

Some well-respected companies lasted for only short periods and others for more than a century. These companies included Union Steam, Northern Steam, Levin & Co, Richardsons, Anchor Shipping, Holm Shipping, Canterbury Steam and the New Zealand Shipping Corporation. The last ran their large 'ro-ro' vessel COASTAL TRADER for 12 years (1974-86) on weekly services linking Auckland, Lyttelton and Dunedin and (for a shorter period) included Timaru. This ship undertook more than 600 such coastal voyages and was in direct competition with the railway operator. Important to this commercial enterprise was a significant link with freight forwarders. It was the demise of the Shipping Corporation that led to Pacifica filling the gap, with a dedicated service from Lyttelton to Auckland. This service was changed in 1991 to serve Onehunga because of shorter steaming distances and the adjacent industrial complex in South Auckland.

Meanwhile, the advent of the Railway's *Aramoana* began the real demise of the bulk of the coastal-shipping industry. Commencing in 1962, this dedicated rail-wagon carrier linked Wellington with Picton, initially with six round trips weekly, although this soon increased. More and larger vessels joined the operation to cater for passengers, their vehicles and freight trucks. The latter, supported by improvements to the transport network on land, encroached on the opportunities for dedicated coastal shipping, causing not only the demise of other carriers but also the closing of smaller ports. Part of a major up-turn for the Cook Strait ferries was the 1983 de-regulation of the trucking industry which permitted unfettered competition between road and rail. At this stage Pacifica, with the same freedom, commenced their Lyttelton to Wellington service.

In 1992 a new demand for increased movement of livestock across the Cook Strait saw the emergence of Strait Shipping, with a single, livestock-friendly vessel, which eliminated the need for road-carrying vehicles to travel on the vessel. In addition, the opportunity to compete against the Cook Strait rail-ferry monopoly encouraged the operator to carry roll-on, roll-off vehicular freight traffic. By 1995 a now two-ship service offered 15 Wellington-Picton return crossings per week and three similar voyages linking Wellington and Nelson. Today, the operation is in two distinct parts: two sizeable vessels carry passengers and freight between Wellington and Picton and a third 'ro-ro' vessel links Wellington with Nelson and Napier. Once again, improvements to the Cook Strait services encroached on the market for longer-distance coastal services.

Competition between the services linking the two main islands is very much the key to the choice given to shippers. Several years ago the rail ferries' operators linked with their rail counterparts to announce a 24-hour guarantee service linking Auckland with Christchurch. Although this move was just an improvement in journey times on the existing connections, especially between Onehunga and Lyttelton, it was at this stage that shippers generally started to realise that the tightening of timeliness could be factored into their supply-chain planning, for both road and rail movements. This has resulted in an even stronger road-operated 'through' service, with trucks either undertaking the whole journey or changing drivers, and powered units in Wellington and Picton with the freight being transported on the ferries unaccompanied. This latter method allows more efficient use of resources, but does require an integrated operation to ensure that the freight is not delayed.

It is in this environment that coastal shipping, which inevitably has longer transit times than the all-road mode, is operating. While it can offer relatively low costs, transit times are long and the goods still have to be transferred to and from road vehicles at each end, as is the case with the majority of through-rail movements. It is therefore in the market for less-urgent cargoes, against the ethos of urgent delivery which dominates much of the freight market.

5.5.4 Current patterns of services

The table below sets out the geographical routing and tonnages for coastal shipping. These exclude the flows on the ferries between Wellington and Picton, which are considered to be part of a through journey by road or rail. The ferry flows are estimated at about 2.0 to 2.5 million tonnes. However, journeys by sea between Wellington, Nelson and Napier are included, as these are not regarded as ferry operations.

Table 5.8
Coastal shipping movements by origin and destination
(000 tonnes in 2006-07)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.0	560.8		463.0	2.2	244.0	109.5		271.0	215.1	0.0	239.8	241.1	161.6	**2508.1**
	Auckland	0.0	0.0		0.2	0.0	2.9	0.0		0.0	17.4	0.0	364.5	77.8	1.4	**464.3**
	Waikato															**0.0**
	Bay of Plenty	0.0	2.5		0.0	0.0	1.1	0.0		4.2	1.8	0.0	123.8	35.4	0.0	**168.7**
	Gisborne	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Hawke's Bay	0.0	2.6		4.9	0.0	0.0	0.0		0.0	3.3	0.0	1.5	0.0	0.0	**12.4**
	Taranaki	209.5	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	**209.5**
	Manawatu															**0.0**
	Wellington	0.0	0.1		1.3	0.0	0.0	0.0		0.0	7.3	0.0	82.6	0.0	0.0	**91.2**
	Tasman/ Marlborough	0.0	63.0		0.0	0.0	15.1	0.0		12.0	0.0	0.0	0.0	0.0	0.0	**90.1**
	West Coast	0.0	124.2		0.0	0.0	0.0	81.8		97.5	53.1	0.0	158.1	13.1	0.0	**527.9**
	Canterbury	0.0	69.7		2.0	0.0	0.2	0.0		39.6	18.6	0.0	0.0	0.0	0.0	**130.1**
	Otago	0.0	2.5		0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	**2.6**
	Southland	0.0	0.0		23.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	**23.0**
	Total	**209.5**	**825.4**		**494.5**	**2.2**	**263.3**	**191.3**	**0.0**	**424.3**	**316.6**	**0.0**	**970.3**	**367.5**	**163.0**	**4227.9**

The figures in Table 5.8 include domestic cargoes that move on international vessels during their coastal passages. These movements are the result of the removal of restrictive cabotage rules by maritime legislation enacted in 1994. Cargo for these movements is solicited mainly by six groupage organisations and there has been marked growth over recent years. Overseas shipping companies themselves do not wish to become directly involved with the marketing of the movement of these cargoes, preferring instead to be simply lenders or lessors of their containers that become available as ex-import units (mainly in the northern part of the North Island) and then for export use in the South Island. Essentially, this is a situation of mutual gain, with the winner being the 'coastal' shipper or consignee, as rates for these moves are generally much cheaper than other movements between similar geographical points. This trade has grown and is now estimated to be about 50,000 TEU equivalents annually. It does, however, affect the viability of purely coastal operators and has contributed to the decline of these operations and some diversion from road and rail.

We have also not included international cargoes that land at mainly Auckland and Tauranga and are trans-shipped using international vessels of the same or another international shipping company. The paucity of information made available by these shipping lines makes it impossible identify these movements with any accuracy but they would in any case not qualify as coastal domestic cargo. However, if these were transported on domestic vessels this trade would count as domestic and the possible change of description needs to be considered when looking at the possible future position.

While barging traffic has been around New Zealand for many years there is scant evidence of dedicated, frequent and scheduled services. The main operator with many years of service experience has tended to carry very low-value bulk cargoes (eg, sand for Auckland glass manufacture, coal from Westport to Port Kembla NSW). They also become involved from time to time in moving special one-off cargoes, a case in point being the warship units originally manufactured in Whangarei and moved to Melbourne.

The Chathams experimented with tug and barge approximately 18 years ago but this was not workable, especially given the heavy weather that regularly disrupts cargo operations at Waitangi. The only regular commercial exception to this is the current dedicated cement-carrying operation between Portland and Auckland. This will be supplemented by similar trips with ships' bunkers from Whangarei to Auckland from 2009. Several exercises in the coastal movement of logs by barge have been undertaken but the double handling and berthage requirements have rendered this unsustainable. The Alternative to Roading (ATR) operation carrying aggregate from Kopu (near Thames) to Te Atatu is subsidised by the government; another indication that low-value products and barging have mixed success in New Zealand.

During 2007, it was reported that coal was carried by ship from Westport to New Plymouth for on-carriage to a lime-manufacturing facility in Waikato. The volume amounted to 38,000 tonnes but we are informed that this maritime flow has now ceased.

5.5.5 Main domestic movements

Fuel oil figures were provided by Silver Fern Shipping which, now working under Australian shipping managers, moves bulk coastal oil in two twin-skinned tankers. These are totally New Zealand manned vessels and carried, in 2007, approximately two million tonnes. During part of that year the fleet was down to one ship while awaiting a new, second vessel and some supplementary carriage was undertaken by overseas vessels. Their tonnage carried is included in the two million tonnes. The highest individual load to a single port was 37,000 tonnes but the majority of sailings discharge at multiple ports.

In addition to the movement of refined products, there are regular sailings from New Plymouth to Marsden Point, carrying condensate which amounted to approximately 210,000 tonnes in 2006-07 over nine sailings. This is processed at the refinery and distributed with other refined products. The volume of condensate moved is included in the total above.

Approximately 1.1 million tonnes of bulk cement are moved by sea from the two production sources in Northland and the West Coast. Both experience logistics difficulties from time to time; Northland because of the need to maintain large flows to Auckland in order to meet changing demands associated with building and infrastructure projects, and the West Coast because of the vagaries of inclement weather and the bar at the entrance to Westport Harbour.

Prior to 2007, the movement of bulk cement to Auckland from Northland was undertaken by their single ship and also by road. For the year under review the Northland production plant supplemented its shipping movements with a tug and barge, retaining almost total sea movement for their inter-regional products. The barge is generally dedicated to feeding Auckland and the ship services mainly Auckland and other North Island ports.

The Westport operation, based at an ageing production site, not only has the fickle weather to contend with, but one of their two vessels is approaching the end of its useful life. Therefore they are faced with a decision about a replacement vessel and we believe that initial plans have been drawn up. For some time the West Coast operator has also been seeking an alternative (and possibly replacement) manufacturing site in both islands and seems to have decided on a site at Weston in North Otago. If this goes ahead it appears that the loading port for the movement of cement by sea would be at Timaru. However, the link from the plant to the port would switch from road to rail and this may encourage the operator to distribute more product by rail.

Carriage of general cargo by domestic operators (outside the sphere of the dedicated ferries) rests with one main operator, Pacifica Shipping, which has been in operation since 1983. It has reduced from a four-ship to a two-ship service, possibly reflecting more competition from international vessels which offered very low rates because much of the domestic freight capacity can be costed on a marginal basis. Three round trips per week link Lyttelton with Wellington and a single round trip joins Lyttelton with Nelson and Auckland using the Onehunga entrance. This latter port has a regular draft restriction with a frequently moving coastal bar and large amounts of drifting sediment adjacent to the berths requiring costly maintenance dredging which because of RMA restrictions, is becoming more expensive. In addition to movement by sea (for which details are confidential) the company makes regular and significant use of both rail and road modes to supplement their sea-freight movement and warehousing operations.

A low tonnage operation links both main islands (Napier and Timaru) with the Chathams, with main port discharges at Waitangi and two-monthly visits to nearby Pitt Island. The vagaries of the Chathams trade are well known – high subsidies were in place for many years until 1992 and few shipping companies are willing to take the high commercial risks of servicing a low-tonnage and weather-dependent trade. For several years two companies were involved, but one pulled out in 2005 after making large financial losses. While tonnage of inwards goods, consumables, hardware and fuel are fairly steady, the return movements of livestock fluctuate considerably and make efficient planning of shipping activities difficult. The static, or even slightly declining, population will see a nil increase in the inwards movement of goods to the islands unless there is a marked and sustainable increase in tourism and farming.

One new and very small shipping operator brought a vessel onto the New Zealand coast after the close-off date for the current report. This small vessel aims (reportedly) to move bulk dry goods, such as dolomite and fertiliser, between the North and South Islands. Ownership of this company is linked to a large quarrying operation in the Tasman district. The volumes carried are small and have not been included in the tables above.

5.5.6 The future

The 2008, the arrival of the government's *Sea Change* document brings new hope for coastal shipping operators. This document, which recognises a number of factors that have adversely affected coastal freight carriers, now offers opportunities for a more systematic look at the state of the trade, and positive changes that could result. Among these opportunities are a desire by government to utilise a greater number of modes for the overall inter-regional transport tasks, and recognition of the limited state of the human resources capabilities of the New Zealand maritime industry. The New Zealand Transport Strategy 2008 has targeted an increase in the share of coastal shipping from its present level of 15 percent to a share of 30 percent of an increased market by 2040.

In recognition of these factors, the government has set aside a sum of up to $36 million in its Domestic Sea Freight Development Fund with the aim of rejuvenating the coastal shipping industry and reducing the tonnages transported by road. These funds, spread over four years, will allow government to accept submissions from interested parties who show capability and willingness to address the perceived modal gaps and provide solutions to the problems identified in *Sea Change*.

It is made very clear that the sum of money is not guaranteed purely for coastal shipping operators, nor will all the funds necessarily be restricted to the direct sea-carriage mode. Clearly, the degree to which any new proposal becomes sustainable, and the time taken to reach that point, will be matters of close interest to the government agency charged with reviewing applications. It has also been made clear that existing operators may apply for use of the funds. However, if it is shown that they could obtain funds through normal commercial channels, then support will not necessarily be forthcoming from the Domestic Sea Freight Development Fund. Note should be taken that the administration of the fund will be under the auspices of the new NZ Transport Agency.

The recent government acquisition of Toll Holdings freight and passenger equipment and operations may also have an effect on coastal shipping in the future. Meanwhile, Maersk Line have placed three, approximately 1,100 TEU, vessels on a trans-Tasman service which will double as a coastal operational unit to feed their own overseas-destined containers for onward carriage to Port Chalmers in their deep-sea units. The routing of these weekly serviced ships sees New Plymouth and Timaru (two ports with recent down-turns in international services) supplying Maersk's units to Port Chalmers then moving into a trans-Tasman service. The trans-Tasman scheduling of these ships will benefit exporters in Lyttelton, Wellington and Nelson, and importers in Auckland. While the service is supposedly for the movement of Maersk-related cargoes, it is likely that the operator will be approached by shippers wishing to use them for intra-New Zealand movements. The Maersk ships will satisfy Section 198 of the Maritime Transport Act 1994, and are qualified to accept such cargoes.

The government has recently produced a draft document to provide guidance on the Domestic Sea Freight Development Fund. Through the interview process for this study it was ascertained that several coastal-shipping operators are considering obtaining additional vessels to supplement their services and may seek funding from the government. While one would focus on a dedicated route to serve the Chathams, the other two may have identified the opportunities offered by the new Maersk trans-Tasman service which will allow new 'hubbing-type' services to move containers towards the larger northern ports. Ports such as Bluff, Lyttelton, Nelson, Timaru, Wellington, Napier and New Plymouth could well be suppliers of cargo to such services.

5.6 Air freight

Air freight represents a very small proportion of the overall international and domestic freight carriage in New Zealand and has not therefore been considered in detail in this report.

The volume of international airfreight has been considered above in the context of overall international trade movements but the figures are repeated here in Table 5.9.

Table 5.9
International air freight movements 2006-07 (million tonnes)

Airport	Exports	Import	Total
Auckland Airport	0.09	0.09	0.18
Hamilton Airport	0.00	0.00	0.00
Wellington Airport	0.00	0.00	0.00
Christchurch Airport	0.02	0.01	0.03
Dunedin Airport	0.00	0.00	0.00
New Zealand various (air)	0.00	0.00	0.00
All airports	**0.10**	**0.10**	**0.21**
Total international movements – all modes	**22.99**	**18.50**	**41.49**
Airfreight as percent of total	**0.4%**	**0.5%**	**0.5%**

Source: Statistics NZ

The majority of international airfreight traffic is routed through Auckland. Over recent years the volumes of air cargo have remained largely constant.

There is no published information on the volumes of domestic airfreight, although, from our interviews with the courier companies, we estimate that this might amount to about 0.1 million tonnes per year, much of it representing NZ Post traffic which is despatched using a fleet of aircraft, of various sizes, between regional centres. The main courier companies either operate their own aircraft on the main routes between Auckland and Christchurch or use space on domestic passenger flights.

Some air freight is carried on domestic services as part of an overall international journey to and from airports not served directly by international flights.

6 Other identified constraints

6.1 Introduction

As part of the interview programme, respondents were asked about the key constraints which affected their operations and were asked to give their ideas as to how these might be overcome.

The constraints identified can be grouped into a number of main categories as below:

- shortages of trained staff
- costs of road haulage
- congestion levels in the urban centres, particularly Auckland
- need to meet specific delivery times for goods
- vehicle dimensions and weights
- problems with service reliability for alternative modes
- costs and facilities for coastal shipping
- availability of rail rolling stock
- hours of operation of ports and container storage yards
- perceived unfair competition between modes.

6.2 Issues affecting road-haulage services

Road-haulage operations are currently facing a number of pressures although, to some extent, with the slowdown of the economy, these may have abated somewhat since the interviews were undertaken.

The main concern of road-haulage operators operating in urban areas, particularly in Auckland, is the high level of congestion on much of the major road network. This prevents efficient use being made of transport vehicles and drivers and has a consequent impact on costs and quality of service. There is a need for progress towards the completion of the Western Ring Route to bypass the central parts of Auckland, and also a perceived need to ensure that road works and road construction projects are completed in a timely fashion.

The effects of congestion, and consequent slow and unreliable journey times, are in conflict with the effects of an increasing number of 'just-in-time' and urgent delivery requirements, where goods need to be delivered with short lead times in precise and often short time windows.

Another key issue reported on a number of occasions was the difficulty of attracting and retaining staff in what is perceived to be a tight labour market. The average age of the workforce is reported to be relatively high many drivers are in their fifties and it is perceived to be difficult to attract younger drivers. In part, this reflects the nature of the task with the need to work long and often unsocial hours to meet customer requirements, but this is often compounded with the stress involved in meeting tight delivery windows in congested urban conditions when travel times may be very variable.

As reported above to some extent haulage operators are attempting to relieve the problems by seeking to transfer goods movements to other modes. While this may be feasible in some cases, the scope for significant transfer of freight is probably limited in the current environment of more and more tightly controlled collection and delivery requirements.

Some operators are seeking to achieve better utilisation of their vehicle fleet and workforce by concentrating on evening and night-time deliveries. While this does give some benefits, it may compound the problem of working unsocial hours and its effectiveness is likely be limited both by the reluctance of customers to receive goods out of normal working times and by the environmental and community problems caused by the operation of heavy goods vehicles during quiet hours.

The costs faced by road-freight operations were also considered to be a major constraint on developing cost-effective services. Comparisons have been made with Australian operations for which the cost of moving freight is generally less. Since Australian wage rates tend to be higher than those in New Zealand, the difference arises from the different approaches to road funding, and is often attributed to high Road User Charges (RUC) in New Zealand. However, the issues of the methodology behind RUC, and the appropriateness of their levels, are being considered by the Ministry of Transport.

The issue of vehicle size, in terms of both payload and dimension, was also considered to be a constraint. Several operators indicated that the current limits on size prevent the most efficient loading of vehicles, and that marginal increases in dimensions could give significant productivity benefits. Proposals to increase vehicle payloads within existing dimensions were also welcomed but there was concern that any productivity benefits would be offset by significant increases in road user charges.

6.3 Issues affecting rail operations

The main issues affecting rail operations are the perceived general lack of service quality and reliability, possibly largely reflecting shortages of rolling stock, although many of the firms interviewed were seeking to expand their use of rail.

One of the constraints that may be compounding issues of service reliability for rail is the shortage of rolling stock, which impacts on the ability to carry the traffic available. This issue appears to have been recognised in the work to establish the new national rail service and the need for additional wagons and locomotives has been accepted. In fact, Toll had already ordered 100 new container wagons before the changeover. This may be an opportunity for involving the private sector in the financing and construction of these, either as a stand-alone operation (as happens in a number of overseas countries) or by firms which use rail providing their own rolling stock (although this may impose operational constraints for non-specialised vehicles).

The position of service unreliability is likely to be more pronounced for new users wishing to sample rail services. These are currently marginal users and at times of particular rolling stock shortages, rail is likely to favour its existing customers, especially if they are high-volume users. However, even high-volume users reported experiencing problems although, generally, channels of communication were available for the discussion and resolution of problems.

If there is to be a major switch of traffic to rail, with the attraction of cargoes which are not typically carried today, a means of giving customers confidence that their needs are understood and respected will need to be set up. There would, however, be a need to ensure that this did not detract from the service offered to existing users. The provision of the additional rolling stock, either on order or planned, is likely to alleviate current problems which, to a large extent, arise from rolling-stock shortages.

Some concerns were raised about the physical integrity of the track. Speed restrictions caused by poor track or bridges are an important reliability issue. However, this appears to have been recognised by ONTRACK who are reported to be seeking $400 million of additional funding from the government to cover deferred maintenance.

In the longer term, rail's load constraints in terms of clearances will need attention to enable larger loads on more lines than at present, and in terms of axles loads, to enable heavier wagons on selected lines.

An issue which was not mentioned but which may be a constraint on operations is the possible need to develop new intermodal terminals to accommodate additional freight traffic. If the railways are to achieve the significant increase in their modal share, as targeted in the *New Zealand Transport Strategy 2008*, this will involve increasing their traffic flows by about 130 percent or 15-20 million tonnes during the period to 2040. A large proportion of this traffic is likely to be attracted from routes on which neither (or at best one) end of the journey is currently rail served, particularly in and around the main urban areas. Since the potential for the construction of new rail lines is likely to be limited, the rail leg of the journey will have to be supported by road transport for collection and delivery to and from customers' premises, and some form of intermodal terminal will be required.

We have not investigated the nature of these terminals or the space that would be required. However, the scale of the increase in traffic which might need to be accommodated would suggest that considerable development would be required. While there may be space within the railways' existing designation for some of these, they may generate substantial flows of heavy vehicle traffic and as a result there may be community resistance to their development. Where new sites are required outside the designation, experience from overseas has indicated that the issues of obtaining consent for these can be formidable. It may therefore be appropriate for the government to consider whether this process can be facilitated, especially given the benefits of the switch away from road transport and also to ensure that, where suitable space is available within the railway designation, this is retained.

6.4 Issues affecting coastal shipping

Coastal shipping is very dependent on the provision of port facilities by other parties who may be more focused on the larger international shipping market. Domestic operators are competing with the same international operators who can provide space on their vessels between New Zealand calls at marginal cost. The key issues constraining the development of coastal shipping services as perceived by operators include:

- The high costs of local port infrastructure, where ports charge domestic shipping operators wharfage and handling fees to uplift or deliver cargo through the ports. With the evolution of the ports sectors, ports are now keen to maximise their returns on assets, and coastal shipping services therefore tend to be charged high rates for their use of the facilities provided. Given that coastal services tend to use fairly small vessels with limited amounts of cargo, they may be contributing towards facilities such as deeper dredged channels and storage facilities which they neither require nor use. Lack of transparency in port charging is an important issue for coastal operators.

- The interaction between purely domestic operations and international shipping lines. Although the international operators form a part of the overall domestic shipping market and are able to provide services at attractive marginal costs, their commitment to purely domestic movements is limited. Overseas operators will, if time is short, give priority to their deep-sea cargo. As a result, at times, they may not provide the level of service required to meet local transport requirements with a consequent impact on the perceived quality of the sector as a whole.

- In addition, because the international operators handle large volumes of freight, they are able to achieve discounted rates from the ports.

- Coastal shipping services do not receive any subsidies from central government, either in total or, except in very limited circumstances, for particular movements.

- Another major growth constraint facing coastal ship operators is the high cost of introducing a new ship under charter to New Zealand waters. To bring an optimal sized coastal vessel with a 1000 TEU capacity to New Zealand would require an outlay of around $1,000,000 in total – even before the vessel begins commercial operations and starts to earn revenue. The severe shortage of trained and experienced sea staff also restricts local coastal operators from expanding their services. This was recognised in the recent *Sea Change* document.

Users of coastal shipping also raised concerns about the ability of some ports to receive cargoes outside normal working hours. A broader concern, which also affects the road transport industry, is the limited number of hours when container storage areas are open, and operators and often forced to find space to store containers on their own premises, which involves their double handling and additional costs. The issue of poorly remunerated, off-wharf container-storage facilities leads to restrictive hours and poorly paved, unlit, premises with attendant danger factors.

7 Trends in freight handling and logistics

7.1 Introduction

Information on developments in the way in which freight is handled was collected from a number of sources during the course of the study. In the interviews that were undertaken, respondents were asked about the changes that they anticipated and this was supported by a literature review.

From our analysis, and from the results of the interviews, it is clear that the freight industry is in a state of change. This reflects a number of factors, many of which are inter-related, including:

- increases in costs of fuel
- increasing congestion in urban areas
- shortages of road-transport drivers
- government purchase of the railways
- changes in patterns of shipping movements, both international and domestic
- changes in patterns of distribution with many major firms seeking to centralise their distribution activities with a higher proportion of goods delivered from their own distribution centres
- development of specialist logistics firms which manage distribution activities for smaller companies
- the current slow-down in the economy.

7.2 Increases in the cost of fuel

Increases in the costs of fuel have the potential to result in significant changes in freight patterns. A recent study has suggested that on a global scale, these are likely to result in more regional rather than global patterns of movement, especially for goods where the basic cost differences between different sources of supply are limited and where transport costs form a high proportion of overall delivered costs. At a more local level within New Zealand, this is likely to result in changes in distribution patterns to reduce the distances that goods are transported, in the substitution of fuel efficient modes, (particularly rail and coastal shipping) for less efficient road transport and also in moves to make road transport more efficient by improving backloading and by the switch to larger and more fuel efficient vehicles in terms of tonne-kms per litre.

7.3 Changes in logistics patterns

7.3.1 Increasing use of distribution centres (DCs)

Modern retail stores are increasingly reducing the amount of storage space to allow a greater proportion of their space to be available for the selling of goods. As a result, stock control and management is becoming more critical to avoid shops and stores running out of particular commodities and thereby not being able to meet the needs of customers who may divert their trade elsewhere.

To maintain desired stock levels in these conditions goods must be delivered to stores frequently. If a large number of suppliers are involved, difficulties arise when many vehicles have to make their deliveries during the limited time slots when stores are prepared to accept goods. In response to this, many of the major retail firms interviewed were proposing to increase their use of their own distribution centres, with suppliers delivering to these rather than providing direct deliveries to stores. This would reduce the number of deliveries to individual stores, possibly reducing overall transport costs and, more importantly, reducing pressure on facilities at the final destination. In addition, where stores are located in residential areas, this approach allows heavy vehicle movements to be reduced and improves environmental conditions in the vicinity of the store and on its approaches.

Because distribution centres are usually manned around the clock, they are able to receive deliveries at night when there is less traffic. As a result, freight operators can make more efficient use of their vehicles by delivering directly from the port distribution centres or suppliers. Delivery direct to stores is often not accepted outside the normal working day because of the environmental and social problems which can result.

7.3.2 Changes in importing patterns

At present there are substantial volumes of goods imported via Auckland and Tauranga ports and handled by DCs or warehouses in the Auckland region before being sent to lower North Island or South Island customers. Because of this pattern of movement, the goods have to bear the land transport costs associated with the movement between Auckland and other centres, such as Wellington and Christchurch. These costs are increasing with rising fuel prices and other increases in the costs of road transport. To avoid these costs, a number of firms are aiming to have goods delivered directly to Wellington or the major ports in the South Island, to be nearer to their final markets. Some balancing will be needed between the factors designed to improve transport efficiency; the concentration of activity through a limited number of distribution centres, often with a strong Auckland focus, and the desire to import goods as close as possible to customers.

7.4 Changes in costs of road transport and the availability of services

The recent rapid increase in the cost of fuel and a desire to achieve improved sustainability, are reported to be having an impact on the patterns of road haulage in particular. A large number of the firms we interviewed, including several road-haulage firms, reported investigating the potential for using modes such as rail or coastal shipping. For the road-haulage firms, this was seen as a way of reducing the costs of transport for their customers, while other firms wished to be seen to be improving the sustainability of their operations as well as managing the costs of transport.

The road-transport industry is also suffering from a shortage of drivers, although the effects of this may be relieved, at least temporarily, with the current downturn in the economy. Many drivers are approaching retirement age and, with full employment in the economy, many operators are having difficulty attracting new staff. The anti-social hours of work makes the task of recruitment more difficult. Moves to shift longer-distance deliveries to rail and concentrate on more local collection and delivery, with drivers working more normal hours and being able to return to their homes at night, may make the job more attractive. Shortages of staff may limit the range of services which haulers are able to provide and may result in some shortages of supply and increases in costs which may, in turn, impact on the business for which the goods are moved.

The problem of staff shortages is exacerbated by growing congestion in the main urban areas, particularly Auckland. Although, as discussed in Section 5.2, some measures are being undertaken to improve the movement of freight in the key urban centres, the impacts of these are likely to be fairly limited, and congestion is likely to remain a fact of life for the road-haulage industry for the foreseeable future.

To overcome the problem of congestion there are moves to increase the volume of freight movements within the urban area at night. The scope for this is limited, however, because of the environmental problems caused by the movement of heavy goods vehicles in residential areas, and because of receivers' reluctance to accept deliveries out of normal business hours, which may entail additional staffing costs. The potential for night-time deliveries to operations which are manned out of normal working hours has been discussed above. There is also some scope for the delivery of containers to premises which do not require the presence of staff to receive the goods but, again, this requires the provision of secure facilities and arrangements for drivers to access them.

There are also moves to allow the introduction of larger vehicles on some, or all of, the network and trials are currently being initiated. From the point of view of the hauler this would be an advantage. Drivers would be more productive and, in many instances, increased loads could be accommodated either on existing vehicles or on new vehicles purchased as part of the general maintenance of the vehicle fleet. Given the potential shortages of drivers, the wider benefits could be significant. There could also be benefits to the community if the number of heavy vehicle movements was reduced.

However, offsetting these benefits would be the additional costs imposed on the road network with the need for upgrading to accommodate the larger vehicles, and the increased maintenance required. This would need to be reflected in increased road user charges which would offset some or all of the benefits to the haulers of the larger vehicles.

Increasing the carrying capacity of road vehicles would also improve the competitive position of road transport in relation to rail or coastal shipping, and encourage the use of less-sustainable forms of transport.

7.5 Changes in the position for rail and possible effects of the government purchase of the rail network

As indicated above, there is general enthusiasm for the use of rail and, to a lesser extent, coastal shipping, to achieve cost reductions and also to improve environmental sustainability. However, in many of the interviews, it was reported that, although shippers had tried to use rail and coastal, there had been a number of difficulties with the use of these services. To some extent this may reflect the fact that new customers of rail and coastal shipping were given a lower priority than existing customers and so were more susceptible to the effects of operational difficulties.

Concerns were also expressed by several of those interviewed about the condition of the track, the age of key bridges and the track formation in general. ONTRACK have recently requested an additional $400 million from the government to make up for previous maintenance shortfalls and if this is forthcoming it should reduce the risk of difficulties resulting from poor track conditions. In addition, the discussion on the rail network (set out above in Section 5.2) suggested that the rail network as a whole is capable of handling significantly more freight than at present, provided that limited measures are undertaken to overcome the key bottlenecks. Shortage of track capacity should not therefore be a major constraint on rail freight movements.

It is not clear what impact the purchase of the railways by the government will have on this position or whether this will facilitate increased investment in the rail network. It is anticipated it this will permit more operators to offer new or improved types of service and new rolling stock to enter the market, although the extent to which this will be achieved will depend on the particular conditions and cost regime under which they will be required to operate. A major problem with using the rail network at present is a shortage of rolling stock, and increases in the availability of this could have a major impact on the demand for rail services.

7.6 Changes in shipping patterns

To some extent the enthusiasm for the use of rail to reduce transport and environmental costs and improve transport sustainability is mirrored in coastal shipping. However, the use of coastal shipping to date has been more limited, possibly because of the greater limitations of the services provided in terms of speed and coverage and more reported difficulties with their use.

The use of coastal shipping services also needs to be seen in the context of changes in international shipping services. Even before the recent increase in fuel costs there were moves to rationalise international shipping services by reducing the number of port calls in New Zealand and this in itself could generate a requirement for coastal feeder services as an adjunct to longer-distance international routes. Increases in fuel costs are likely to result in pressure to reduce steaming speeds, and thus consumption, which may, in turn, provide additional impetus to rationalise shipping routes as shipping lines try to maintain sailing times between key locations.

With these changes there are likely to be increased shipping services round the coast of New Zealand to act as feeders to the international services and provide capacity for domestic movements. To some extent, this capacity is provided by vessels travelling international routes and also serving multiple New Zealand ports, but for these the needs of the international services are paramount. A pattern of services with greater focus on domestic movements would possibly be more attractive for those moving cargoes within New Zealand and so may attract additional trade.

However, in this form, coastal shipping is likely to act as a more direct competitor to rail rather than road transport. Its use will involve multiple handling of most cargoes, with the accompanying problems of interfaces between different operators and the costs associated with that – issues which are also faced by rail transport where direct access to the rail network is not available. In addition, coastal shipping, if based on the provision of feeder services to international services, will concentrate on the movement of containers and may not be suitable for the movement of bulk or semi-bulk products for which shipping services are particularly useful.

The development of coastal shipping services may also be heavily constrained by a lack of trained personnel, especially considering the skeletal nature of the industry at present and the current shortage of training facilities. However, in the *Sea Change* proposals, the government has started to recognise this issue and has proposed the development of new training facilities which may begin to address this problem.

7.7 Growth in specialist logistics firms

There has been a growth in the number of firms offering logistics services for third parties, with many of the major road haulage and courier companies increasingly moving into this area. As well as an increase in number of firms, the existing major specialised operators are recording strong growth rates, reflecting increases in market share at the expense of more traditional operators. In principle, this trend towards more sophisticated logistics operations should allow better use of storage and transport facilities since a number of firms can share warehouse space and delivery vehicles, and the increased scale of operations may allow the introduction of advanced management and handling techniques. By their nature these facilities are likely to be concentrated in and around the main urban areas where large markets for suppliers and customers are at hand.

Use of specialised logistics companies may also encourage the use of rail and coastal shipping because of the volumes handled and consolidated and, also, because the expertise of the companies allows them to undertake a degree of forward planning for the movement of goods. One major road haulage/logistics firm interviewed indicated that they transported 5 percent of goods by rail and 5 percent by coastal shipping mainly between Auckland and Christchurch and that others were considering expanding the use made of these other modes (provided a satisfactory level of service can be achieved).

7.8 Overall impacts of the changes

The main overall impacts of the changes in logistics and distribution patterns discussed above are likely to include:

- Some shift of longer-distance freight movements from road to rail or coastal shipping to reflect desires for greater environmental sustainability and in response to increased fuel costs and possible driver shortages for road freight vehicles. However, the extent of this will depend on the degree to which rail and coastal shipping operators can effectively develop and market service packages and quality which meet the needs of users.

- More direct delivery of imported goods closer to their destinations in the lower North Island and South Island, minimising land transport costs at little increase in shipping costs and reducing the dependency on Auckland and Tauranga.

- Increasing use of centralised DCs to manage more efficiently the flows of goods to sales outlets by minimising vehicle movements and allowing more effective loading of the vehicles used. This may also provide better opportunities for the shift of some cargoes to modes such as rail or coastal shipping.

- Increased transport costs may also change the balance between patterns of distribution and storage. In the retail sector, for instance, stores are increasingly reducing their storage space to maximise their sales areas and relying on frequent deliveries from DCs or suppliers to meet demands. With increasing transport costs it may become more economical to increase the allocation of storage space within shops to allow for less frequent deliveries. This type of change may not be confined to the retail sector. In the dairy sector, for example, there are significant movements of material between locations at various stages of manufacture to take advantage of storage opportunities or to keep plants running at efficient manufacturing levels, and with increasing transport costs the viability of such movements may be reduced.

8 Drivers of freight mode choice

8.1 Introduction

When considering the way in which the freight sector might develop in the future, a key factor will be to understand the main drivers of freight mode choice and how they will affect the response to the changes in the environment within which the freight sector operates. As part of our work we have explored in our interviews and discussions the main issues which influence the choice of mode for the consignor of the goods, and these findings, supplemented by our own background knowledge, are set out below.

It must be stressed that the discussion below is qualitative only, highlighting the key factors which affect the choice of one mode compared to another. Mode choice is a complex issue involving the trade-off of the range of the attributes of particular modes in terms of price and the components of service quality. It must also be stressed that the choice is ultimately made on the basis of the overall journey from origin to destination, which may consist of a number of separate legs with different price and quality attributes.

The drivers are clearly different for different commodities. For those with a low inherent value, such as aggregates, minimising the cost of transport is the major consideration, whereas for high-value products, such as fast-moving consumer goods, whose inherent value is high and for which the selling price is less affected by transport costs, high-quality service and reliability and security of delivery are much more important factors. It is the way in which the different modes can match these requirements which determines the way in which they are used for the movements of goods of different types.

8.2 Key drivers

The main drivers that we have identified are:

- price
- service time, reliability and flexibility of transport mode
- modal connectivity
- security and potential for damage
- ease of intermodal transfer
- need for specialised handling
- value-added activities within the supply chain
- environmental and sustainability issues
- personal and industry relationships.

8.2.1 Price

In a commercial environment, price clearly plays an important part in the modal choice decision, although, as we have discussed above, this will need to be traded off against other components of service quality. However, while rail and coastal shipping offer lower line-haul costs than road transport, unless the two ends of the journey are connected to the rail network or can be served by coastal vessel, the costs of interchange and of haulage for relatively short distances by road transport need to be included in the overall assessment of total costs. For short journeys this can make road the cheapest option. For longer journeys road is usually the more expensive mode, although the balance between rail and coastal shipping can be close if the full journey costs include a requirement for warehousing or storage en route.

Although there is recognition that road is a more expensive mode, this does not prevent fierce price competition among road operators offering similar levels of service. However, it is not always the cheapest operator who gains the traffic, and quality of service differentials, although on a narrower scale than those separating road from rail and coastal shipping, do enter into the choice of operator.

With the recent rapid increase in fuel prices, the cost of transport, particularly by road, has become a more important issue. In a number of the interviews that we undertook, it was indicated that other options which might reduce these transport costs were being investigated. Among them was the consideration of other modes, and possibly increasing the direct delivery of exports to areas away from Auckland to avoid land transport costs.

8.2.2 Service speed, reliability and flexibility

Service speed and reliability also play a very important part in freight mode choice, especially for goods delivered to retail outlets or to tightly-controlled manufacturing processes. In much of the retail sector the space available for storage in the shop or store is becoming increasingly limited, and when stocks on the shelves run out they have to be replenished urgently. The supply chain in these cases has to be capable of rapid and flexible response if the needs of the shopkeeper are to be met.

In addition, many recipients of goods especially those handling large quantities stipulate constrained time windows when they are prepared to accept deliveries. This then therefore puts a premium on a modal choice which can reliably satisfy these delivery windows and is capable of changing delivery patterns and despatch times to meet urgent orders.

These characteristics, in general, favour road. Road transport is usually the quickest and most flexible of the modes and has a driver who is personally responsible for the door-to door movement of the goods. Rail and coastal shipping suffer from inflexibility of service times, and problems of interchanging between modes can also affect journey times.

However, this is not to say that rail and coastal shipping cannot deliver reliable journey times for regular and scheduled consignments of goods. However they cannot offer the same degree of flexibility when changes are required or when goods are required urgently.

A further dimension of the flexibility of the mode is its capacity to handle unforeseen increases in the level of demand. In this, road transport has the advantage of being able to subcontract within the fleet as (possibly) does coastal shipping if use can be made of the spare capacity on international vessels travelling between New Zealand ports. The capacity of rail, at least in recent years, has been very tightly constrained by the availability of rolling stock, which has limited its ability to handle unforeseen changes in demand.

8.2.3 Modal connectivity or its absence

The ability to access a mode and avoid modal interchange is also a key element in the mode choice, in particular where a factory or store has direct access to rail services. It should, however, be noted that access to the rail network, while a necessary condition to satisfy this objective, is not necessarily a sufficient condition, since the rail operator may be unwilling to provide an attractive level of service to a facility which generates only a limited amount of use. There are a number of examples where rail services have been withdrawn when it was considered that their use was insufficient to justify their existence, although this position may change in the future.

In considering new freight generating or attracting developments, there is clearly an advantage in locating these close to rail corridors if they are likely to generate or attract traffic which might usefully be carried by rail, and similar considerations apply to activities which might benefit from easy access to shipping and should therefore be located in or close to ports.

8.2.4 Security and potential for damage

When goods are moved they suffer the risk of damage, especially when they are unloaded or loaded, and this may be an issue for particular commodities, because of their fragility or awkward shapes. To some extent, specialised equipment and handling techniques can be introduced when the quantities are large. These would help to overcome the problems but, unless they are applied successfully in every case, there is always a risk of damage.

Movements which avoid intermediate trans-shipment are probably the most secure, since the loading (and possibly unloading) can be done either directly by, or under the supervision of, the consignee or consignor. Again this favours modes which can offer direct services, either by road or rail throughout, and can raise issues when intermediate trans-shipment is required.

8.2.5 Ease of intermodal transfer

Ease of intermodal transfer also affects the choice of mode, since this can constrain the use of modes other than road where the initial point of supply is only road connected. The ultimate intermodal unit is the container which can be transferred easily among all three modes and, as a result, containerised goods are good candidates for intermodal movements. The extent to which bulk products can be trans-shipped depends to a large extent on the development of intermediate storage facilities and, where these can be provided, intermodal transfers can be achieved relatively easily. In some cases these may just consist of land for storage, as in the case of the movement of logs, and in others may require more sophisticated facilities, as, for example, in the transfer of liquid milk, petroleum or cement.

8.2.6 Requirement for specialised handling facilities

For the movement of chilled or refrigerated containers and a range of bulk products, specialised equipment is needed to transport the goods and so the availability of this is an important consideration in modal choice. All modes have some capacity for handling refrigerated cargoes, with the installation of generators or power points on their equipment, although the availability of this capacity for road vehicles is limited. For short movements, it is also possible to move frozen cargoes without power, although this does pose some risk if there are delays on the journey.

For chilled cargoes the challenges can be greater since, for many products, such as chilled meat, the temperature tolerances are very fine. Here, the constant monitoring which road transport can provide gives it an advantage. Chilled commodities are usually high value and can support the relatively high costs of road transport.

For bulk products, the key is the development of flows of sufficient quantity to make the investment in specialised vehicles worthwhile. However, for a number of dense commodities, road transport, which is currently limited to 44 tonnes gross vehicle weight, may be more constrained than rail which is able to carry heavier consignments. This has been a factor in the development of the Crawford Street freight facility in Hamilton by Fonterra, since the onward rail connection allows export containers to be loaded to greater weights than would be permissible for onward movement by road. Similar considerations could also apply to the movement of other bulk commodities, such as cement and coal.

8.2.7 Provision of value-added activities in the supply chain

With the growing sophistication and complexity of supply chains there are increasing opportunities to include intermediate activities between the despatch of the goods from the manufacturer or importer and their receipt by the customer. These can include warehousing and storage, possibly in temperature-controlled facilities, repackaging and order picking.

In principle, these facilities can be provided by any mode, although the characteristics of the goods likely to be involved in such activities means that these would usually be handled by road, or to a lesser extent, rail. Road has the advantage of a wider range of locations for these activities, whereas for rail or coastal shipping there are few areas where these can be located.

8.2.8 Environmental and sustainability issues

There is an increasing awareness of the environmental and sustainability issues which are posed by the transport of goods. In many instances, firms are prepared to look favourably on the more sustainable modes of rail and coastal shipping as a way of reducing their carbon footprints and demonstrating their environmental credentials to their shareholders and to the community in general. The Warehouse, for example, reports on the energy spent on road and rail transport as part of its overall 'Society and Environment' report, and Fonterra, in its environmental reporting, has published estimates of the savings in truck movements which the development of the Crawford Street facility has permitted.

Even road haulers are seeing the advantages of the use of rail and coastal shipping as a way of reducing the carbon footprint of their own industry and many are actively investigating the integration of alternative modes into their own haulage and distribution activities.

8.2.9 Personal and industry relationships

Although, as discussed above, there are a number of broadly objective criteria which influence freight mode choice, personal relationships (and animosities) can also play a part in the decision process. Memories of earlier successes and failures can also play an important part in current decisions.

8.3 Key issues

8.3.1 A possible framework

For each of the issues identified above, the impact by mode will differ in most cases and these effects are summarised in Table 8.1. In this we have rated the performance of each mode on a simple scale from 1 'Worst' to 3 'Best'.

Table 8.1 Drivers of freight mode choice and potential modal impacts			
Attribute	**Impact by mode**		
	Road	**Rail**	**Coastal shipping**
Price	1	2	3
Service time, reliability and flexibility of transport mode	3	2	1
Modal connectivity	3	2	1
Security and potential for damage	3	2	2
Ease of intermodal transfer	3	3	3
Need for specialised handling	2	3	3
Capacity	3	2	3
Value-added activities in the supply chain	3	3	1
Environmental and sustainability issues	1	2	3

It should be noted that in no sense are these attributes additive, since their weights will reflect journey characteristics and, in particular, the length of haul and the nature of the goods to be transported. The trade-off between different elements will also be different for different commodity movements, with some being very price sensitive and others being more sensitive to the service quality provided.

Typically, the alternative modes, with their lower line-haul costs, become more competitive as journey distances increase, because the savings of these costs outweigh the costs of intermodal transfer. For journeys where only one additional transfer is required, as, for example, in the movement of imports or exports, the critical threshold distance will fall. For low-value goods travelling short distances, such as aggregates the opportunities for movement by alternative modes is low, although the barging of aggregates from the Coromandel to West Auckland, albeit with some financial support, indicates that at least some opportunities may exist.

8.3.2 Application of the framework to selected commodities

The characteristics set out above have been examined in relation to a selection of commodity movements and these are discussed briefly below.

Liquid milk

Liquid milk is a low-value commodity supplied from farms with no rail connections. It also requires specialised handling equipment. For the main movement between farm and factory or central collection point, road is used exclusively. However, milk collected at Oringi in the Manawatu, is transferred to a specialised milk train and then transported to Hawera. The bulk milk is relatively easy to trans-ship, the volumes are sufficient to justify the acquisition of specialised rail rolling stock, and the distance transported is sufficient to cover the costs of double handling. Fonterra is also a keen supporter of rail.

Manufactured dairy products

Manufactured dairy products are a higher-value item, with a high proportion of movements being for export. Although it includes a number of products, many of these have a fairly high mass:volume ratio and can often be transported in containers that are too heavy to be transported by road. Much of the product is also produced in dairy plants which are rail connected. Distribution patterns are complex, material is shipped between a large number of origins and destinations and quantities vary at different times of the year.

Given these characteristics, rail is used fairly extensively for the movement of product between plants and to port. The complex pattern of operations and the need to balance supply and capacity at processing plants and storage facilities in peak and off-peak seasons means, however, that road is also used extensively.

Meat products

Meat products are usually transported frozen or chilled and the meat plants often have rail connections. A high proportion of output goes for export and, increasingly, the meat plants are located at some distance from the ports. The need to provide facilities for frozen containers travelling over fairly long distances probably favours rail, as does the potential for delivery to the ports from the meat plant without trans-shipment.

Reflecting these characteristics, the share of rail is typically high, particularly in the South Island, where supply routes are possibly more fixed, with activity focused on Port Chalmers and Lyttelton. For plants in the North Island, where there are a larger number of possible ports, supply chains may be less well defined and the increased flexibility required to meet shipping schedules and lower distances favours road. In addition, there have been some issues with movement by rail in the past which may still affect current modal-choice decisions.

Cement

Cement is a low-value commodity produced at plants on the coast, which does not require fast journey times. As a result, it is well suited for distribution by coastal shipping to storage facilities which have been developed in a number of major ports in the country.

To date, onward distribution is undertaken by road, reflecting the need for specialised handling equipment and the relatively short distances from the ports to major consuming areas. This onward distribution by road is also flexible in meeting the peak requirements of large construction projects for the product.

Supermarket goods

The movement of supermarket goods can be divided into two groups: movements between DCs and movements from DCs to individual stores. In both cases, consignments are assembled at short notice and may require a range of specialised handling equipment for chilled and frozen goods.

For movements to stores, delivery times need to be short, in response to the needs of stores which have only very limited storage facilities, and goods have to be delivered within tight time frames. The value of the product is usually high. Supermarkets tend to be in residential areas and are not rail connected.

As a result, these movements are undertaken exclusively by road, and it is unlikely that in any scenario, the use of alternative modes would be attractive, even for long and sometimes inter-island trips.

For movements between DCs where timescales may be more relaxed, the use of alternative modes has been trialled in an effort to reduce the costs of transport, and to investigate more environmentally sustainable options. Even for these movements, however, reliability of travel time is important, and the possible disadvantages of the alternative modes need to be balanced against the cost savings and environmental benefits which might result.

Supermarket groups are also attempting to achieve cost and environmental savings through more efficient use of road transport. In practice, this may be a more effective way of achieving these benefits, at least in the short term.

8.4 Overall assessment

There are a number of factors which influence freight mode choice and which would affect different commodities to different extents. Essentially, the choice of mode represents a trade-off between a number of factors (of which price and service quality are the most important) and the balance between these and the way in which different modes supply them differs for different commodities. With the increasing cost of transport following increases in fuel prices, it is likely that the balances will change and the greater awareness of environmental and sustainability considerations will also play a part.

9 Future growth in freight demand

9.1 Recent growth in freight demand

The freight task has been growing steadily over recent years, with much of this growth occurring in the movement of freight by road. The growth in the combined freight task for road and rail is illustrated in Figure 9.1, which is derived from the numbers introduced earlier in this report in Table 1.1.

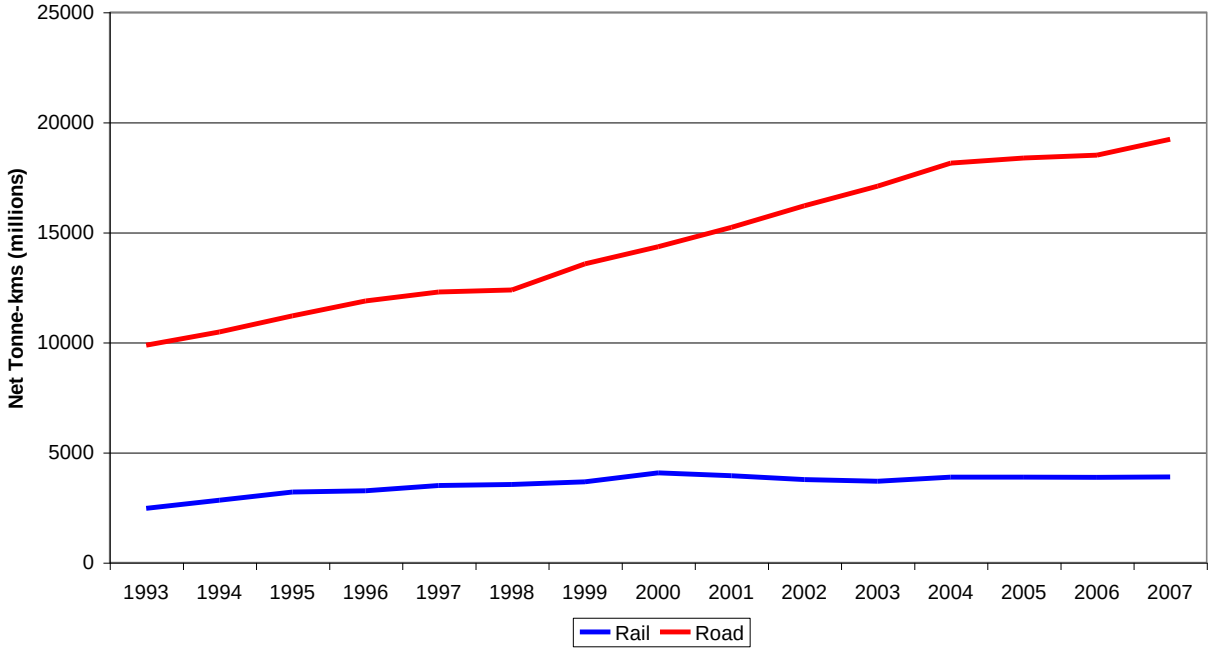


Figure 9.1
Growth in Road and Rail Freight 1993-2007
(Net Tonne Kms)

In recent years there has been some reduction in the rate of growth of road transport, although growth appeared to increase again in 2007.

9.2 Forecasts of the freight task by other parties

Historically, the demand for freight transport, particularly by road, has increased in line with GDP. Work undertaken by TERNZ, analysing the relationship between GDP growth and the estimated volumes of freight moved by road, suggested that the road freight task typically increased at about 135-140 percent of the rate of growth of the economy. This work, however, covered only the period up to 2004-05, although discussions with TERNZ about the updating of this have suggested a continuation of the position identified.

Alternative forecasting approaches being developed by the Ministry of Transport, using observed data up to 2007, have suggested that there has been some decoupling of the linkages between the two, especially in the years after those used for the TERNZ analysis. While it is not clear as to the extent to which these represent a temporary deviation from the patterns observed in earlier years or a longer-term change in the relationship, the MoT forecasts are based on a long-term decline of the multiplier, from a current value of 1.4 to a value of 1.12 in 2041.

Analysis of rail freight flows and anecdotal evidence from the coastal shipping industry suggests that the slowing down of the growth of road freight has not been balanced by an increase in demand for other modes and this, therefore, could represent a significant change in the linkages between freight demand and economic growth. The TERNZ model was also calibrated at a time when rail and probably coastal shipping flows were not growing significantly and so represent an estimate of the growth of the total freight task.

The TERNZ approach suggests that road freight will almost double between 2005 and 2020 whereas the MoT forecasts, which also assume lower rates of GDP growth (averaging about 2 percent over the period 2006 to 2041), show road freight traffic increasing by about 50-60 percent between 2005 and 2020 and by 120-130 percent between 2005 and 2040. In terms of the total freight market, and on the assumption that without intervention there would be a continuation of the present-day volumes carried by rail and coastal shipping, the total freight market would increase by about 70 percent between 2005 and 2020 according to the TERNZ approach, and by 90-100 percent between 2005 and 2040 using the MoT approach. Even with the lower forecasts, the freight task is expected to increase substantially.

The New Zealand Transport Strategy 2008 targets modal shares of 25 percent for rail and 30 percent for coastal shipping by 2040, compared to current shares of 18 percent and 15 percent. On this basis, and using the MoT forecasts described above, the share of coastal shipping would double in a market that is forecast to grow by up to 100 percent. During the period to 2040, coastal shipping would therefore have to grow by about 300 percent. To some extent, rationalisation of international shipping services will provide opportunities for feeder-vessel services, in effect replacing what is now part of international journeys with a leg in a domestic shipping service, but the effect on the overall patterns of freight movement would be low.

Similarly, to meet its targets, rail freight would need to grow by about 160 percent over current levels. The volume of road freight transport would increase more slowly, although in absolute terms the growth would be substantial.

Much of the work undertaken was been based on data before the recent sharp increases in fuel costs and, as discussed in Section 6, this is likely to result in changes in transport patterns. However, these are also affecting economic growth and it is possible that over the short term at least, the rate of both economic growth and the growth in transport demand will diminish or even turn negative without affecting the overall relationship between the two.

9.3 Background population and economic forecasts

A number of the forecasts of transport associated with the individual commodities are tied to economic and population growth within New Zealand. It is therefore necessary to identify appropriate assumptions for these to underpin the transport forecasts.

Forecasts of population growth from Statistics New Zealand (low, medium and high projections) are available with overall annual average growth rates of 0.5 percent, 0.8 percent and 1.0 percent over the period from 2006 to 2031. The figures for the medium projections, which have been used in our subsequent analysis, are set out in Table 9.1.

Table 9.1 Population projections			
Year	**Total population**	**Annual growth rate by five-year period**	**Average annual growth rate from 2006**
2006	4,184,600		
2011	4,393,200	1.0%	1.0%
2016	4,588,700	0.9%	0.9%
2021	4,770,800	0.8%	0.9%
2026	4,939,400	0.7%	0.8%
2031	5,089,700	0.6%	0.8%

Source: Statistics New Zealand

For economic growth we have assumed that GDP will grow by an average of two percent per year over the next 25 years. This figure is in line with that adopted by the MoT in its forecasting of the overall demand for freight, and lies between the forecasts produced by NZIER and those used by MED.

For some of the commodity forecasts, estimates are required of population and GDP growth at a regional level. For population we have again used the Statistics NZ medium-growth forecasts. There are no formal forecasts of GDP growth at a regional level. For these we have taken the relationships between the individual regional growth and national GDP growth over the five year period to mid 2007, and have assumed that these will continue to apply to the period between 2006 and 2011, but that the differences between regional and national growth rates will halve between 2001 and 2016 and will halve again in the period from 2016 to 2031. The regional population and GDP growth rates which result are set out in Table 9.2.

Table 9.2 Regional population and GDP growth assumptions (total growth in constant prices over specified periods)						
Region	**Population growth**			**Regional GDP growth**		
	2006-2011	**2011-2016**	**2016-2031**	**2006-2011**	**2011-2016**	**2016-2031**
Northland	3.9%	3.2%	5.7%	12.4%	11.4%	36.2%
Auckland	8.2%	7.7%	21.0%	8.8%	9.6%	33.2%
Waikato	4.3%	3.5%	7.6%	13.1%	11.8%	36.8%
Bay of Plenty	5.5%	4.7%	11.3%	12.1%	11.2%	36.0%
Gisborne	1.1%	0.4%	-1.5%	9.9%	10.2%	34.2%
Hawke's Bay	1.8%	1.3%	0.8%	9.2%	9.8%	33.6%
Taranaki	0.4%	0.1%	-3.7%	12.1%	11.3%	36.0%
Manawatu	1.3%	1.1%	0.4%	10.9%	10.7%	35.0%
Wellington	3.5%	3.0%	6.4%	10.2%	10.3%	34.4%
Tasman	3.3%	2.6%	5.1%	11.5%	11.0%	35.5%
West Coast	0.0%	-0.6%	-6.0%	14.0%	12.2%	37.5%
Canterbury	4.8%	3.9%	9.0%	12.0%	11.2%	35.9%
Otago	2.7%	2.3%	4.8%	10.0%	10.2%	34.2%
Southland	-0.9%	-1.3%	-8.0%	10.1%	10.2%	30.3%
NZ total	**5.0%**	**4.5%**	**10.9%**	**10.4%**	**10.4%**	**34.6%**

Source: consultant's estimates

9.4 Forecasts by commodity: introduction

Based on reviews of existing statistical and other published information, and the views obtained during our interview programme and our own analysis, we have compiled broad forecasts of growth in both the total volumes transported and in some of the key modal and geographical components for the broad commodity groups identified. Inevitably, in the interviews with firms and agencies which had views on the future, these were very much focused on the shorter term, and were often not well defined, given recent developments in the overall economic outlook and in the costs of transport, both of which deteriorated sharply during the course of the study.

Given the number of commodity groups for which we have investigated, the emphasis in this stage of the work has been on broad forecasts based on a transparent approach. However, the commodity data does allow the development of more detailed and sophisticated approaches should these be required later.

As far as possible, forecasts have been made for the short-term (five years), medium term (10 years) and longer term (25 years).

The commodity groups explicitly considered are:

- liquid milk
- manufactured dairy products
- logs and woodchips
- paper and packaging
- sawn timber
- other timber products
- animals and animal products
- horticultural products
- aggregate
- coal
- petroleum products
- aluminium and steel
- limestone, fertiliser, cement and concrete
- other minerals
- food products
- other retail products
- courier movements.

9.5 Liquid milk and manufactured dairy products

9.5.1 Liquid milk

The growth in liquid-milk production has been reviewed in Section 4 and the recent trends in production are summarised in Figure 9.2.

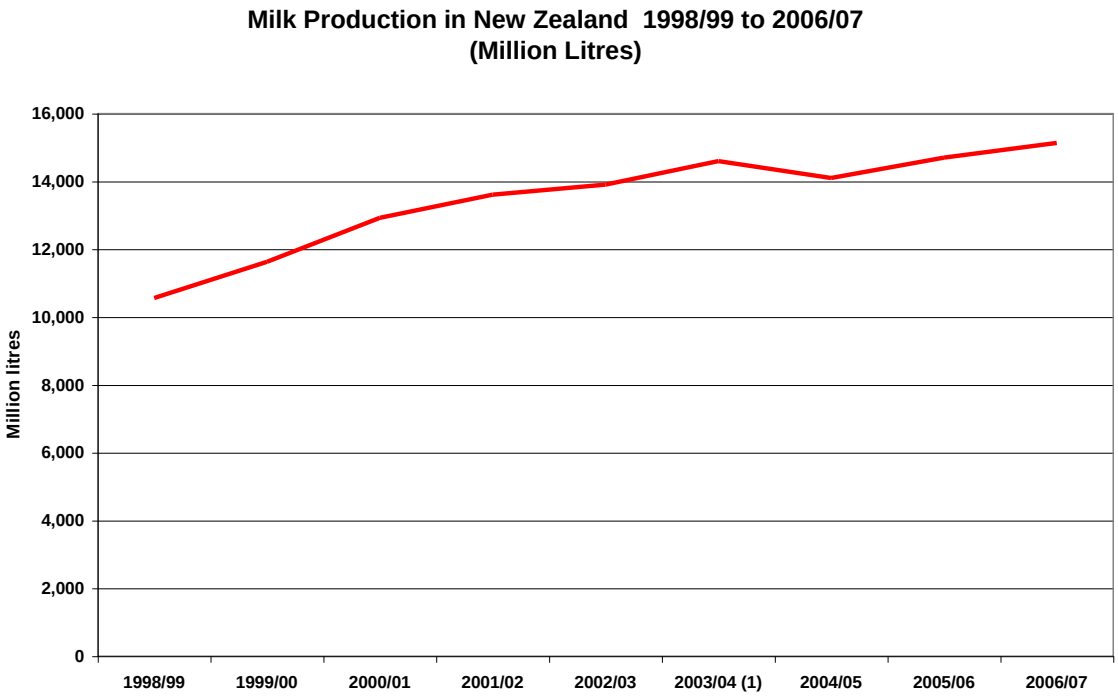


Figure 9.2
Growth of Milk Production in New Zealand 1988/89 to 2006/07
(Million litres)

Over the period, growth in liquid milk production has averaged about 4.5 percent per year. Given the high proportion of output that is exported and the strong and growing international demand for dairy products, especially from countries like China, it is likely that the market will be constrained by the supply of dairy products rather than the demand.

The supply of milk can be increased by either making more effective use of the land that is available or by bringing additional land into use. With the high price of dairy products there has been substantial dairy conversion, often from forestry land, and this is expected to continue into the future.

Over the short term it has been estimated by MAF[18] that the volume of dairy production will increase by three percent per year, with much of this increase concentrated in the South Island, particularly with a switch to dairy from sheep and lambs. Given the share of the South Island in total production, this would represent an increase of almost 10 percent per year, a figure in line with that quoted by an industry representative. These MAF forecasts would therefore represent a continuation of the growth pattern set out in Figure 9.5 above. For the longer term we have assumed that the scope for increasing output becomes more limited as the land available for dairy conversion diminishes and we have assumed a growth rate of 1.5 percent per year over the five to ten year forecast period and 1 percent thereafter, again with all growth concentrated in the South Island.

[18] Situation and Outlook for New Zealand Agriculture and Forestry (August 2008).

In terms of the distances travelled, these will tend to increase as much of the new production comes from farms further away from the dairy factories, especially in South Waikato and North Canterbury, although this may be offset to some extent by the construction of new dairy plants, especially in the southern South Island. We have therefore assumed that the average distance travelled within a region will increase by about 1.5 percent per year to 2016 and then remain constant. The predicted flows of liquid milk are set out in Table 9.3, together with the estimates for manufactured dairy products.

9.5.2 Manufactured dairy products

Much the same argument applies to the output and transport of manufactured dairy products, with flows in the North Island remaining constant while growth is concentrated in the South Island. As in the case of liquid milk production, total national growth is expected to be about three percent per year for the period from 2006-07 to 2011, 1.5 percent per year for the next five years and then one percent per year after that.

Much of the increase in output of finished products will come from plants which are either currently rail served or, in the case of the new plants being constructed in the southern South Island (eg, at Dunsandel and Washdyke), could easily be connected to the rail network. There are also proposals to provide a rail connection to the Fonterra Clandeboye plant, which again would increase the potential for the use of rail.

9.5.3 Total forecasts for milk and dairy products

The total volumes forecast for the movement of liquid milk and dairy products are set out in Table 9.3.

Table 9.3
Forecasts of movements of liquid milk and dairy products 2006-07 to 2031 (million tonnes)

Year	Liquid milk	Manufactured dairy products
2006-07 (actual)	17.15	3.82
2011	20.31	4.64
2016	22.13	5.10
2031	26.05	5.67

9.6 Logs and timber

9.6.1 Introduction

Our forecasts of output by the logs and timber sector draw heavily on unpublished work undertaken for Land Transport New Zealand (Veltman 2007)[19]. This analyses patterns of demand for the major components of the logs and timber sector and produces estimates of future output for each of these. To a large extent, the volume of logs to be harvested is already defined since this is based on trees already planted. The forecasts have been produced on the assumption that the requirements for sawn logs and logs for pulp and paper and board manufacture are forecast explicitly, and the production of logs for export represents the balance of production.

[19] *The Forest Industry's Demand for Transport*, unpublished research by Ron Veltman of Land Transport New Zealand, November 2007.

Future total production figures, which reflect the need to harvest trees already growing, have been taken from a variety of sources, primarily the wood-availability estimates produced by MAF for a number of the key forestry areas. These are based on their Scenario 3 which smoothes the likely output and avoids problems with significant year-to-year fluctuations. When this information is not available other MAF and NZFOA sources have been used.

Each of these components is considered below.

9.6.2 Sawn timber

Sawn timber is exported and also used for domestic consumption. The main driver of the latter is the housing market, which in turn is related to the strength of the economy in general. The forecasts of the total timber produced and the logs required to produce this output are set out in Table 9.4.

Table 9.4
Forecasts of sawn timber inputs and outputs

	Logs to sawmills		Sawn timber	
	000 tonnes	Average annual growth rate over period	000 tonnes	Average annual growth rate over period
2006-07 (estimated)	8,170		4,328	
2011	9,180	2.4%	4,863	2.4%
2016	9,683	1.1%	5,129	1.1%
2031	13,107	2.0%	6,943	2.0%

Over the period to 2031, the volume of logs and outputs associated with sawn timber is forecast to increase by about 60 percent. In general, this is assumed to be sourced from within the region in which it is consumed but, with growing imbalances between production and supply for the Auckland and West Coast Regions, the supply of locally produced logs for input to the sawmills is assumed to be supplemented by logs transported from Northland and Waikato for Auckland and from Tasman for the mills on the West Coast.

9.6.3 Pulp and paper

Pulp and paper are also both exported and used for domestic consumption. Although fluctuating from year to year, the overall demand for pulp and paper has remained broadly constant over the last 15 years. Little change is expected in this position over the future and only very modest growth is expected for the period up to 2031. The forecasts that result are set out in Table 9.5.

Table 9.5
Forecasts of pulp and paper inputs and outputs

	Inputs of logs and chips		Pulp and paper production	
	000 tonnes	Average annual growth rate over period	000 tonnes	Average annual growth rate over period
2006-07 (estimated)	4,820		1,805	
2011	4,811	0.0%	1,802	0.0%
2016	4,910	0.4%	1,839	0.4%
2031	5,122	0.3%	1,918	0.3%

9.6.4 Board production

The demand for board products (mainly veneers and laminates) has been growing fairly strongly over recent years and a continuation of this position is anticipated for the future. The forecasts which result are set out in Table 9.6.

Table 9.6
Forecasts of board inputs and outputs

	Inputs of logs and chips		Board production	
	000 tonnes	Average annual growth rate over period	000 tonnes	Average annual growth rate over period
2006-07 (estimated)	1,634		2,654	
2011	1,738	1.2%	3,519	5.8%
2016	2,047	3.3%	4,146	3.3%
2031	2,946	2.5%	6,017	2.5%

The growth of board is larger than that expected for the other types of timber products and output is expected to double by 2031.

9.6.5 Export logs

Export logs are assumed to meet the balance between the volume of timber felled, which is largely a function of the age of the trees currently planted, and the volume of timber demanded for processing into sawn timber, pulp and paper or board. As there is limited opportunity to change the year when trees are felled, the volumes of export logs can fluctuate from year to year, but the forecasts represent the broad trends.

Forecasts of the total availability, by region, of logs for all purposes, have been made using the material contained in the regional wood-availability forecasts produced by MAF[20], and supplemented by material from NZFOA. This material has been used to growth up the estimates of current log production and the forecasts of total log production by region are set out in Table 9.7.

Table 9.7
Forecast of total log production by region (million tonnes)

Region	2006 (Actual)	2011	2016	2031	Growth 2006-2031 (percent)
Northland	1.88	4.00	4.20	4.30	129%
Auckland	0.74	0.74	0.74	0.74	0%
Waikato	4.78	5.23	6.38	7.46	56%
Bay of Plenty	4.24	4.63	5.65	6.61	56%
Gisborne	0.82	2.36	2.60	3.54	334%
Hawke's Bay	1.45	1.56	1.56	2.22	53%
Taranaki	0.05	0.07	0.10	0.17	268%
Manawatu	0.54	0.83	1.12	1.98	270%
Wellington	0.43	0.66	0.89	1.58	270%
Tasman	2.32	2.67	2.67	4.18	80%
West Coast	0.22	0.20	0.20	0.20	-11%
Canterbury	1.01	0.98	0.98	1.26	25%
Otago	0.99	1.23	1.36	1.85	88%
Southland	0.52	0.52	0.52	0.82	60%
Total	**19.96**	**25.68**	**28.95**	**36.91**	**85%**

[20] *Wood Availability Forecasts* for the major wood-producing regions, produced by MAF.

Estimates of export logs have been made by subtracting the demands for the other products (logs to sawmills, peeler logs and logs used for pulp and paper) from the total production. The forecasts which result are set out in Table 9.8.

Table 9.8
Forecasts of export log movements

	000 tonnes	Average annual growth rate over period
2006-07 (Estimate)	6,943	
2011	11,700	11%
2016	13,800	3.4%
2031	17,600	1.6%%

Given the numbers of trees likely to be coming onto the market and the limited opportunities for other users, the volume of export logs is likely to grow substantially, increasing by about 150 percent over the period to 2031, with a particularly large increase in the immediate future (driven largely by growth in production in Northland and Gisborne). Some of this traffic will use private forestry roads but, with the increasing split between forest and mill ownership and charges now being made for the use of these roads, this is becoming less attractive to potential users. As a result, there will be increasing pressure on the public road and rail networks. The growth of production in the Gisborne area also illustrates the issue of port development in Gisborne or Napier which will be required to accommodate these additional flows, as highlighted in Section 5 above.

9.7 Total flows associated with forest products

The total forecasts of flows associated with forest products are summarised in Table 9.9.

Table 9.9
Forecasts of total forest products
(000 tonnes lifted)

	Sawn timber		**Pulp and paper production**		**Board**		**Export logs**	**Total**
	to sawmills	to customers	to mills	to customers	to mills	to customers		
2006-07 (estimated)	8,170	4,328	4,820	1,805	1,634	2,654	6,943	30,354
2011	9,180	4,863	4,811	1,802	1,738	3,519	11,700	37,600
2016	9,683	5,129	4,910	1,839	2,047	4,146	13,800	41,600
2031	13,107	6,943	5,122	1,918	2,946	6,017	17,600	53,700

This is summarised in Figure 9.3.

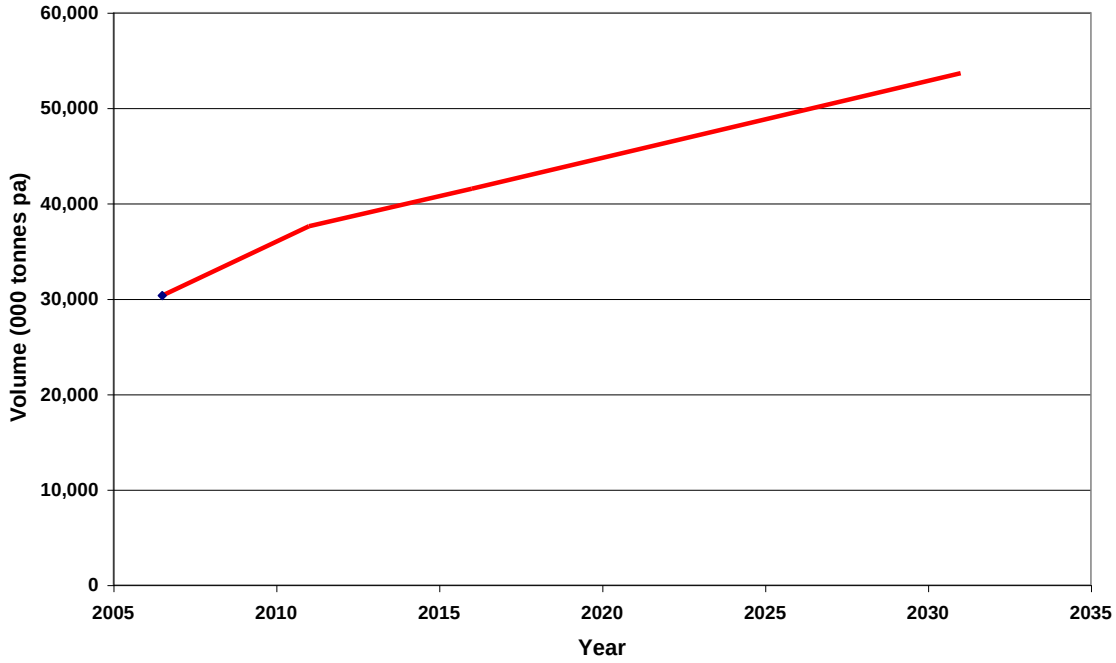


Figure 9.3
Forecast Growth in Total Forest Products

Over the period to 2031, the total volume of forest products lifted is forecast to grow by about 18-19 million tonnes - an increase of about 60 percent or an average annual growth rate of just under two percent.

9.8 Animals and animal products

The growth of the total volume of meat produced in New Zealand in recent years is set out in Table 9.10 and Figure 9.4.

Table 9.10
Growth of meat production in New Zealand
(000 tonnes – bone-in)

Year	Lamb	Mutton	Beef	Calf	Other	Total
1989-90	347.0	153.0	459.9	11.5	44.3	1015.8
1990-91	383.6	145.7	519.4	12.3	47.5	1108.6
1991-92	399.3	157.7	523.1	13.3	64.4	1157.8
1992-93	351.8	134.5	558.7	13.6	74.4	1132.9
1993-94	397.9	124.8	523.7	14.0	70.9	1131.3
1994-95	389.2	143.9	606.8	22.3	75.3	1237.6
1995-96	375.5	134.4	607.2	25.0	69.0	1211.1
1996-97	419.1	123.5	625.4	24.6	68.6	1261.2
1997-98	416.5	128.6	610.3	23.8	75.2	1254.4
1998-99	401.0	116.6	540.0	21.7	73.8	1153.0
1999-00	427.8	104.9	548.8	18.8	69.5	1169.8
2000-01	433.5	128.7	571.8	19.7	75.8	1229.5
2001-02	414.1	107.2	554.5	21.8	71.8	1169.4
2002-03	433.5	112.9	634.1	26.2	78.2	1284.8
2003-04	411.3	107.0	686.1	23.5	76.3	1304.1
2004-05	437.6	105.2	629.5	22.2	52.4	1247.0
2005-06	435.8	103.0	620.3	21.7	91.9	1272.7

Sources: Ministry of Agriculture and Forestry
Deer Industry New Zealand
Meat & Wool New Zealand Economic Service

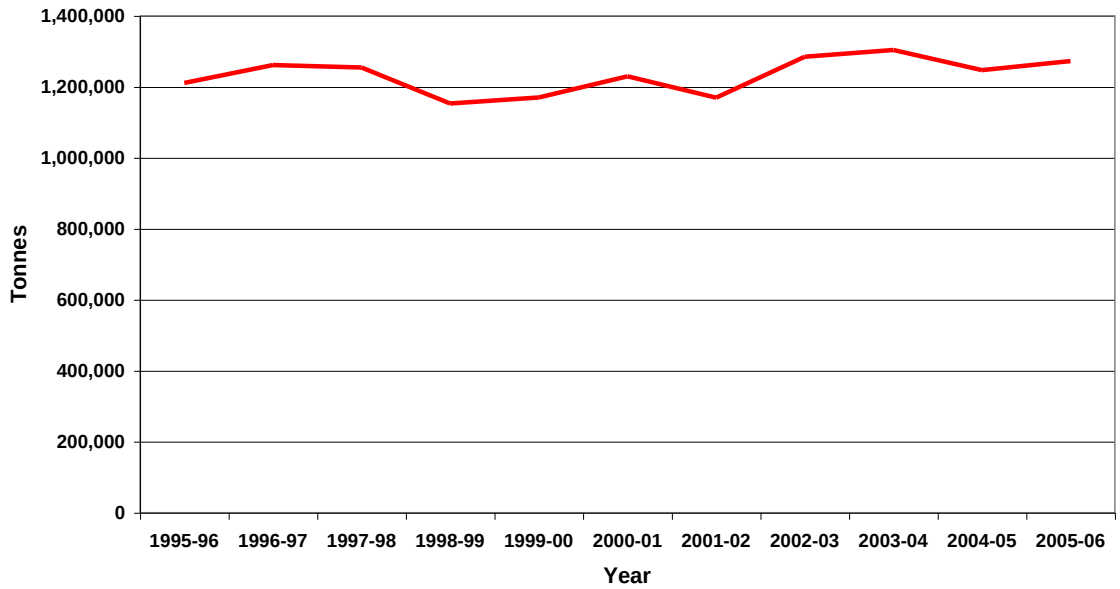


Figure 9.4
Total Meat Production (Bone-In) in New Zealand

While there has been fluctuation from year to year, this shows that, in general, there has been little long-term growth over the last 10 years. These figures take into account increases in the numbers of dairy cattle slaughtered, which are balanced by a decline in beef cattle.

Discussions with members of the industry have indicated that some reductions in the volumes slaughtered and the output of the industry as a whole are likely in response to changing farming patterns and the substitution of dairy production for meat production. In addition, increasing fuel prices appear to be contributing to a trend towards increasing the volumes processed close to the areas where the livestock are reared, at the expense of plants located closer to the ports. The current closures of a number of meat industry plants are possibly an early reflection of this.

Changes in shipping patterns have in any case reduced the benefit of locations close to ports if services are removed, and the pattern of flows identified in Section 4 indicates that in many instances outputs are transported considerable distances to ports where the appropriate shipping services are available. The rise in transport costs has also meant that it has become more economical to slaughter closer to the areas where livestock are reared.

While the industry does not have any forecasts of output beyond the immediate future, it is anticipated that output will fall by up to five percent over the next year or so and this decline may continue into the future, especially with the strength of the dairy sector. For our forecasts we have therefore assumed that the volumes handled will decline in the short term (to 2011) by 10 percent, with most of this impact being felt in the sheep-rearing areas of the South island. Beyond 2011, forecasts are more problematic but it has been assumed that the volumes produced will remain broadly constant, reflecting the growth trend observed in recent years, with the substitution by dairy farming counteracting any increases in productivity within the sector.

In addition, we believe that the distances travelled by livestock will reduce, and have made a nominal allowance for a fall of two percent per year for the period up to 2016. To reflect the greater distance of processing plants from the ports we have assumed that distances within regions will similarly increase by about two percent per year.

With greater distances travelled by meat products, there is potentially some increased scope for movement by rail. Although at present the rail share of meat products is relatively high, this reflects a high modal share in the South Island and there may be scope for transferring traffic to rail in the North Island.

9.9 Horticultural products

The horticultural sector has been growing rapidly and substantial expansion is expected in the future, especially in export markets. New Zealand benefits from an equable climate as well as efficient, and often low-energy, production techniques, although its distance from key markets may put it at some disadvantage if 'food miles' enter into users' considerations.

Forecasts have been made for an increase in vegetable exports from about $550 million now to about $2 billion by 2019. If similar increases apply to other export sectors of the horticulture market, the latter would grow to about $9-10 billion by 2020, although some of this growth may represent a shift towards higher-value items. As a result, growth of exports in volume terms may be more limited but is still likely to be substantial.

The volume for the domestic market is likely to grow much more slowly; probably slightly faster than GDP at about two to three percent per year over the period, with different growth rates being assumed for the different regions in line with the regional GDP forecasts set out above.

In addition, with increased transport costs there may be moves to grow crops closer to markets, with some reduction in the volume of freight (measured in tonne-kms), reducing this by, say, 0.5 percent.

Combining these two components, exports and production for the domestic market would give overall growth of about 4.5 percent per year over the 5, 10 and 25-year time-spans. In terms of the volumes lifted, the results are summarised in Table 9.11.

Table 9.11
Forecast growth in grain and horticulture volumes
(000 tonnes pa)

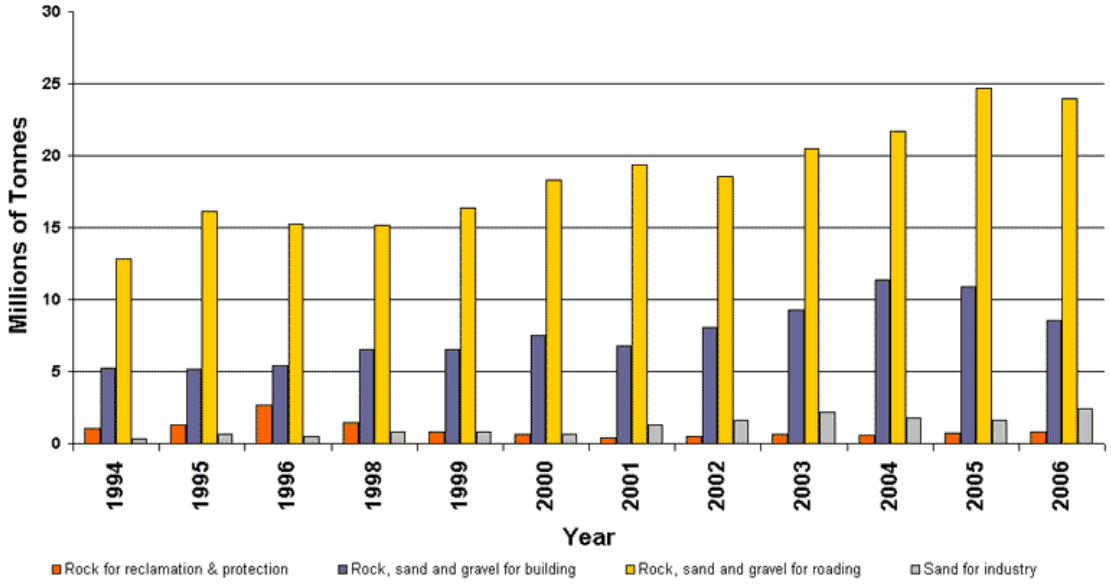
	Current 2006	2011	2016	2031
Exports	1467	2059	2888	6921
Average annual growth rate		*7.0%*	*7.0%*	*6.0%*
Domestic consumption of horticultural products and grain	2730	3090	3493	4975
Average annual growth rate		*2.5%*	*2.5%*	*2.4%*
Total	4197	5148	6381	11896
Average annual growth rate		*4.2%*	*4.4%*	*4.2%*

At present, horticultural products are almost entirely carried by road, with the high levels of production in the North and South Islands providing good opportunities for efficient backloading operations, and hence reductions in costs. However, the substantial predicted growth in export traffic may provide opportunities for rail services linking producing areas and the ports.

9.10 Aggregates

Aggregate is used almost entirely within the construction sector and so the likely growth in production and use is closely allied to the forecasts of sector growth. Of the total aggregates produced, 60 percent is used for road construction, 20 percent for building and 20 percent for other purposes (primarily fill).

The growth of aggregate demand is set out in Figure 9.5.



Source: MED

Figure 9.5
Aggregate Production 1994-2006

The NLTP calls for substantial investments in road construction over at least the next 10 years, and the longer-term strategy for the development of the State highway network outlined in Section 5, suggest that a high level of activity is likely to exist over the longer term. On the basis of the expenditure forecasts in the most recent *Transit State Highway Strategy*, expenditure is forecast to increase by about four percent per year over the next 10 years. Continuation of growth, although probably at a reduced level of about 2.5 percent per year over the longer term, seems likely to reflect the on-going development of the road network (as set out in the *National State Highway Strategy*) and continuing increases in traffic levels.

In the short term, the demand for aggregates for building may be affected by the current economic downturn, continuing the position set out in Figure 9.9. For the forecasts, the demand has been taken as constant with no growth over the period from 2006 to 2011 and then at four percent per annum and 2.5 percent per annum in line with the demand for aggregates for roading in subsequent years. These factors have been applied to demand in all regions.

A feature of the anticipated growth is the large number of projects in Auckland, and it is likely that local sources will become increasingly unable to meet the forecast demands. There is therefore likely to be a particular growth in movements from the Waikato and Northland. For the purpose of these forecasts it has been assumed that the production of aggregates in Auckland will remain broadly constant and that the shortfall in demand will be met by production from Northland and Waikato in the same proportion as is the case at present (about two-thirds from Waikato and one-third from Northland).

Longer distances may make rail attractive for the hauls, though a suitable discharge location in Auckland may be problematic. There may also be scope for expanding the barging operation from Thames, although unless improved or additional unloading facilities are made available the scale of this may remain limited.

The forecasts of the volumes of aggregates transported are set out in Table 9.12

Table 9.12 Forecasts of the demand for aggregates				
	Use of aggregate			
	Roading	**Building**	**Other**	**Total**
2006 actual ((M tonnes)	24.7	10.9	5.0	40.6
Annual growth rate 2006 to 2011	*4%*	*0%*	*0%*	*2.5%*
2011 estimated ((M tonnes)	30.1	10.9	5.0	46.0
Annual growth rate 2011 to 2016	*4%*	*4%*	*4%*	*4%*
2016 estimated ((M tonnes)	36.6	13.3	6.1	55.9
Annual growth rate 2016 to 2031	*2.5%*	*2.5%*	*2.5%*	*2.5%*
2031estimated ((M tonnes)	53.0	19.2	8.8	81.0

9.11 Coal

The current volume of coal moved in New Zealand is about 6.4 million tonnes per annum.

The major change in the near future will be the completion of the preliminary works at the Pike River mine and loading point at Ikamatua, and the commencement of mining. By 2010 it is expected to be producing one million tonnes per year. This will be taken to Ikamatua (about 15 km) by truck and then railed 265 km to Lyttelton, thereby generating a further 280 million tonne-kms.

Solid Energy is likely to increase production for export at its Greymouth Spring Creek mine, which was just commencing in the 2006-07 year. Eastern Corporation has an extensive resource on the Denniston Plateau near Westport, which it intends to explore further and it also intends to increase production at its Ohai mine.

With the current price of coal, other mining companies are likely to either increase their exports or start exporting. An entrepreneur is seeking to aggregate and export up to an additional 3.6m tonnes of coal from the West Coast, probably through Lyttelton. Mines in Taranaki, near Ohura, are being explored with a view to re-starting production.

A potential constraint on coal exports from West Coast mines is the Otira Tunnel. According to Solid Energy, the rail capacity is about five million tonnes per annum, which is more than enough to cope with the likely Solid Energy and Pike River demands. If, however, the Eastern Corporation mine at Denniston is developed, further measures will have to be taken to increase the tunnel's capacity. One possibility is electrification which, by reducing fume levels, would allow the more frequent passage of trains. We have assumed that this mine will be developed by 2016, potentially adding about two million tonnes per year to the demand for movement between the West Coast and Canterbury, although alternative export routes may be available.

Imports of coal for the Genesis Huntly plant have reduced recently, and are currently at only 500,000 tonnes per annum, compared with almost a million tonnes in 2006-07 and a peak of over 1.2 million tonnes. The plant's use of imported coal varies in relation to demand for its electricity and the local availability of coal supply. It is unlikely to return to high levels of imports, with the proposed expansion of mining activity in the Huntly area. For 2011 we have assumed that the demand for imported coal will remain at about 500,000 tonnes per year and by 2016 it would have been replaced by coal mined locally in the Waikato.

Other existing industrial users may change their sources of supply. As noted, there have been trials of imported coal for the Glenbrook steel mill. The cement works at Portland may get its coal once again from Huntly and this has been assumed for 2011. If the cement works goes ahead at Weston, Oamaru, then it will use local coal delivered by truck over about 20 km and the flow to the works at Westport will cease. Again, this has been incorporated into the 2011 forecasts.

It is difficult to make longer-term forecasts, with much depending on the price of coal and transport, and the mining companies' reaction to these.

In the short term, the volumes of coal moved are forecast to increase from about 6.4 million tonnes in 2006-07 to about 8.4 million tonnes by 2011. This represents an increase of about 30-35 percent. Over the medium term to 2016, there is the potential for further expansion of coal mining on the West Coast and in the Waikato, and the volume of coal moved could increase to about 10.4 million tonnes. This will depend, however, on the provision of sufficient capacity within the transport sector to carry the increased volumes, particularly on the rail link between the West Coast and Canterbury.

Over the longer term, the government's policy to increase the level of renewable sources for electricity generation may reduce the level of demand, although increasing export prices may act against this. Given these conflicting forces, our longer-term forecast has total demand at a similar level to that forecast for 2016.

9.12 Petroleum products

The recent and likely future increases in fuel prices as the result of increases in world fuel prices and the effects of proposed emissions taxes and the downturn in the economy are likely to depress the demand for petroleum products. Over the longer term, improved fuel-consumption characteristics of both the private car and diesel fleets may offset increases caused by a continued growth in car ownership as the population continues to grow. Our forecasts therefore assume a continuation of the existing volumes of petroleum moved, although with the substitution of imported products by those sourced from the expanded refinery at Marsden Point where capacity is expected to increase by about 20 percent, or one million tonnes per year. This is taken to particularly affect imports through Auckland and Tauranga, which would be substituted by increased movements from the refinery at Marsden Point.

The increasing use of bio-fuels could have some impact on the patterns of movement, depending on the volumes used and the extent to which they are imported or produced within New Zealand. However, given the uncertainties, the forecasts set out above exclude these possible effects.

9.13 Aluminium and steel

Although affected by fluctuations in output from year to year, the production of aluminium and steel is expected to remain broadly constant over the future and there are no plans to expand output. Some increases in local demand will be met largely by increased imports, but moving only short distances.

9.14 Limestone, fertiliser, cement and concrete

9.14.1 Limestone

Limestone is used primarily in the agricultural and construction sectors. With the increasing cost of fertiliser, the demand for limestone, which to some extent is linked to the demand for fertiliser, is likely to grow fairly strongly. This will be accentuated by the need to support further dairy conversion which, again, uses substantial quantities of limestone to improve and sustain soil fertility. With the proposed construction of the new cement plant at Weston which will have a higher capacity than that currently provided at Westport, the demand for limestone (a key ingredient) will also increase.

For limestone used in agriculture, we have linked the forecast growth to the increases in dairy output, although this assumes that limestone consumption will be about 2 percentage points higher in early years and one percent higher thereafter. This growth will also reflect the expansion of horticulture, for which substantial increases in output have been forecast.

For the limestone used in cement the major change over the short term will be the proposed construction of the new cement plant at Weston, which will increase the output of the cement industry, and hence its use of lime, by about 20-30 percent. However, the extra capacity will be absorbed largely by growth in the short term and there is the possibility that further plants may be constructed or existing ones expanded over the longer term. We have therefore taken the view that the demand for limestone will increase by about 27 percent over the short term, remain the same rate as forecast for total aggregate consumption (about four percent per year) for the period from 2011 to 2016 and then fall to 2.5 percent per year for the rest of the period to 2031.

Limestone for industry and roading is used primarily in the production of steel, for which we have forecast that output will remain broadly constant. For the period up to 2011, we have therefore forecast no growth in demand, with some modest increases in subsequent periods.

The forecasts which result are set out in Table 9.13.

Table 9.13
Growth in demand for limestone

	Limestone and marl for cement	Limestone for agriculture	Limestone for industry & roading	Total
2006 actual ((M tonnes)	1.7	2.6	0.9	5.2
Annual growth rate 2006 to 2011	*4.9%*	*5.0%*	*0.0%*	*4.2%*
2011 estimated ((M tonnes)	2.2	3.3	0.9	6.4
Annual growth rate 2011 to 2016	*4.0%*	*2.5%*	*1.0%*	*2.8%*
2016 estimated ((M tonnes)	2.6	3.8	0.9	7.3
Annual growth rate 2016 to 2031	*2.5%*	*2.0%*	*1.0%*	*2.1%*
2031 estimated ((M tonnes)	3.8	5.1	1.1	10.0

Over the period, the increases in demand for limestone used in cement and in agriculture will result in substantial increases in the volumes transported.

9.14.2 Fertiliser

Although fertiliser is an important input to the agricultural sector, for which we have forecast substantial growth, this effect will be attenuated by the recent large price increases which are likely to reduce demand sharply. We have therefore forecast some reduction in demand, averaging about two percent per year to 2011, with only modest growth thereafter as prices continue to increase. These changes are expected to apply equally to all regions.

9.14.3 Cement

The growth in demand for cement will parallel the growth in demand for aggregates and limestone, and demand is expected to increase at the same rate across regions. With the construction of the new plant at Weston there will, however, be changes in the geographical and modal patterns of distribution and our forecasts assume that this will be achieved by 2011. Given the substantial on-going increases in demand to 2031, we have taken the view that, although there are no further plans to expand the cement industry in New Zealand, the increase in demand, coupled with likely increases in the cost of shipping, will make it more economic to develop new manufacturing capacity within the country, rather than to rely solely on imports to cover the potential growth.

9.14.4 Concrete

The demand for concrete has been anticipated to grow at the same rates as cement and aggregates.

9.14.5 Total growth in limestone, fertiliser, cement and concrete

The total forecast growth in limestone, fertiliser, cement and concrete is summarised in Table 9.14.

Table 9.14
Growth in demand for limestone, fertiliser, cement and concrete

	Limestone	Fertiliser	Cement	Concrete	Total
2006 actual ((M tonnes)	5.2	2.8	2.1	8.9	19
Annual growth rate 2006 to 2011	4.2%	-2%	4.90%	4.90%	3.8%
2011 estimated ((M tonnes)	6.4	2.5	2.6	11.4	22.9
Annual growth rate 2011 to 2016	2.8%	1%	4.00%	4.00%	3.3%
2016 estimated ((M tonnes)	7.3	2.6	3.2	13.8	26.9
Annual growth rate 2016 to 2031	2.1%	1%	2.50%	2.50%	2.2%
2031 estimated ((M tonnes)	10.0	3	4.6	20	37.6

Again, the growth in these products is forecast to be substantial, with the numbers of tonnes lifted more than doubling between 2006-07 and 2031.

9.15 Other minerals

New Zealand has many other mineral deposits but, apart from oil, coal and gold, there is little attempt to exploit them. As well, many potential sources are tied up in the conservation estate. Little change is expected in the overall haulage requirements for these commodities or the associated patterns of movement.

9.16 Supermarkets and food retailing

The overall demand in volume for supermarket and other food products has been taken to be related to population growth and is therefore expected to increase only slowly in the future.

The main changes likely to arise are in the patterns of distribution to help reduce the effects of increasing transport costs. The three main trends identified are:

- increasing flows through centralised DCs
- greater use of rail and possibly coastal shipping
- more use of direct shipping services to Wellington and the South Island.

The first factor will increase the tonnages handled since it creates an intermediate step between the initial supplier and the retail store; the second will alter the mode of transport but not the volume; and the third will alter the pattern of transport but leave the volumes unchanged because one Distribution Centre is substituted for another.

Forecasts have been made assuming that the share of goods through centralised DCs increases by about 15 percent over the period to 2011 and by a further 15 percent to 2016, by which time the maximum share is reached. The use of more direct shipping services is assumed to divert 15 percent of the traffic between Auckland and Wellington/Manawatu and between Auckland and the South Island by 2011, with a further 15 percent being diverted by 2016 and a further 15 percent being diverted by 2031.

The forecast tonnages and tonne-kms that result are set out in Table 9.15.

Table 9.15 Food retailing: forecast tonnages and tonne-kms			
Year	**Tonnes lifted (millions)**	**Tonne-kms (billions)**	**Average length of haul (kms)**
2006-07	7.40	1.38	186
2011	8.23	1.36	165
2016	9.09	1.35	148
2031	10.16	1.35	133

Overall therefore, the land transport task associated with the movement of food retailing goods, in tonnes lifted, is forecast to increase by about 11 percent to 2011, by a further 10 percent to 2016 and by a further 12 percent to 2031. These increases reflect both the increasing volumes sold at the shops and the effects of increasing centralisation of activities through DCs, with a single movement from supplier to store being replaced by one from supplier to DC and then an onward delivery from the DC. In terms of tonne-kms, the freight task is forecast to remain virtually unchanged, with increasing volumes of imported goods being delivered directly to Wellington and Canterbury, replacing the movement by land from Auckland. As a result, the average length of haul of goods carried for supermarkets and other food outlets is forecast to drop significantly.

9.17 Other retail products

For other retail products similar pressures to those identified for supermarkets and food retailers will apply although the much larger number of operators in this sector means that the impacts of these changes are likely to be much less marked. The total demand by consumers is expected to increase in line with GDP (about two percent per year) and in line with the forecasts set out at the beginning of this section although, as in the case of food products, changes in distribution patterns are forecast to alter the total volumes of goods lifted and the tonne-kms generated.

The volumes that result are set out in Table 9.16.

Table 9.16 Other retailing: forecast tonnages and tonne-kms			
Year	**Tonnes lifted (millions)**	**Tonne-kms (billions)**	**Average length of haul (kms)**
2006-07	6.63	1.29	194
2011	7.55	1.38	183
2016	8.52	1.48	173
2031	11.44	1.90	166

The volumes carried are forecast to almost double between 2006 and 2031 although, with the pressure to reduce land transport costs, tonne-kms are forecast to increase rather more slowly (by about 50 percent). As a result, the average length of haul decreases, reflecting the substitution of direct delivery to the Lower North Island and South Island rather than trans-shipment via Auckland and onward movement by domestic transport.

9.18 Courier movements

Courier movements have been growing somewhat faster than GDP – typically at about five percent compared to GDP growth of 3-3.5 percent. With increased fuel costs, however, growth rates may be reduced - although this may be offset by increases in Internet shopping, again driven by increases in fuel prices. The latter may also encourage some increases in expenditure at local shops which are often supplied (at least in part) by couriers, and this may in turn help to sustain the courier market.

9.19 Overall increases in traffic

The overall increases in traffic which are forecast to result for the commodities identified are set out in Table 9.17 and are summarised in Figure 9.6.

Table 9.17
Overall growth forecasts: tonnes lifted for commodities identified (millions)

Product	2006/07	2011	2016	2031
Liquid milk	17.1	20.3	22.1	26.1
Manufactured dairy products	3.8	4.6	5.1	5.7
Export logs and chips	6.9	11.7	14.1	17.5
Logs to sawmill	8.2	9.3	9.8	13.6
Sawn timber to users	4.3	4.8	5.1	6.9
Inputs to pulp and paper	4.8	4.9	4.9	5.1
Pulp and paper to users	1.8	1.8	1.8	1.9
Logs to board manufacturing	1.6	1.7	2.0	3.0
Boards to customers	2.7	3.5	4.1	6.0
Livestock	3.6	3.3	3.3	3.3
Meat	0.9	0.8	0.8	0.8
Fish and horticultural products	4.2	5.1	6.4	11.9
Aggregate	40.2	45.6	55.4	80.4
Coal	6.4	8.4	10.4	10.4
Petroleum products	9.0	10.0	10.0	10.0
Aluminium and steel	1.9	1.9	1.9	1.9
Limestone	5.1	6.2	7.1	9.7
Fertiliser	2.8	2.5	2.6	3.0
Cement	2.1	2.6	3.2	4.6
Concrete	8.9	11.4	13.8	20.0
Other minerals	2.0	2.0	2.0	2.0
Food products	7.4	8.2	9.1	10.2
Other retail products	6.6	7.5	8.5	11.4
Courier movements	0.4	0.5	0.6	1.0
Total	**152.7**	**178.8**	**204.3**	**266.3**
Growth from 2006/7				
Total growth from 2006/07		**17%**	**34%**	**74%**
Annual average growth from 2006/07		**3.2%**	**3.0%**	**2.2%**

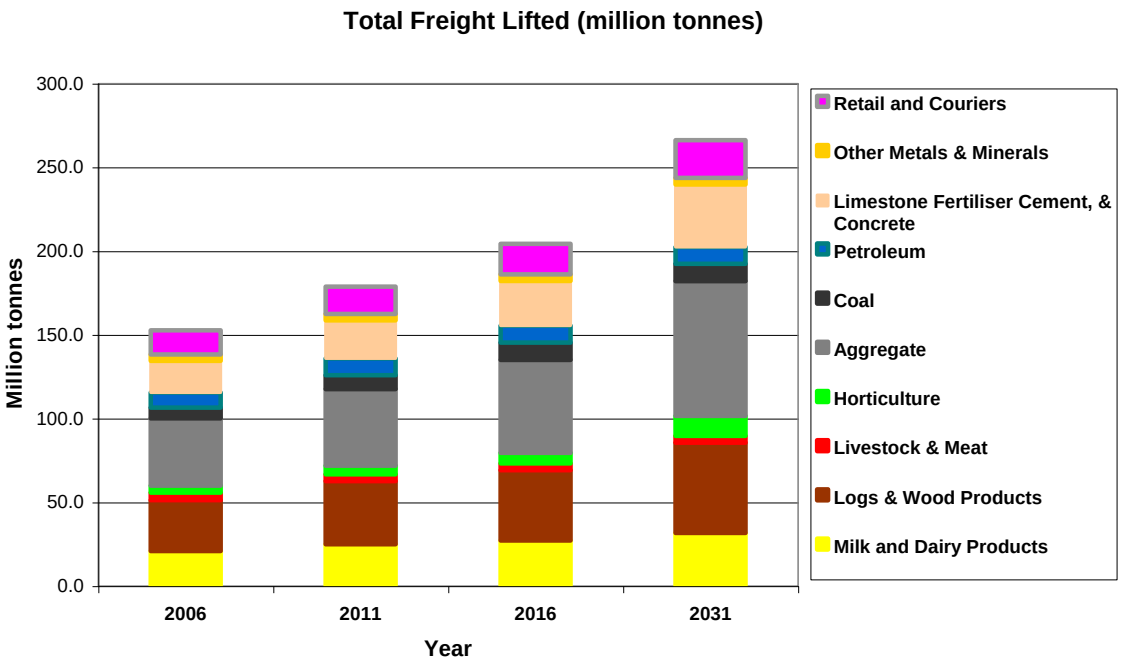


Figure 9.6
Growth in Total Commodities Identified 2006-07 to 2031

Over the period 2006/07 to 2031 the freight task in terms of tonnes lifted and commodities identified is expected to increase by about 75 percent. This figure of 75 percent growth to 2031 can be compared with estimates of growth derived from the TERNZ approach (which gives a figure of about 70 percent between 2005 and 2020) and the MoT approach (which gives growth of up to 100 percent by 2040) and so lies between the two.

As well as identifying the total growth in the volumes of freight lifted it is also possible to identify changes in the origin-destination patterns of movements. The position for 2006-07 is set out in Table 9.19, for 2031 in Table 9.20 and the growth over the period is summarised in Table 9.21. Our estimate of the tonne-kms transported in 2031 is set out in Table 9.22.

Table 9.19
Estimated pattern of movements in 2006-07: all commodities and movements identified (million tonnes pa)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	6.88	2.74	0.06	0.71	0.00	0.24	0.11	0.00	0.27	0.22	0.00	0.23	0.24	0.16	**11.87**
	Auckland	0.89	22.75	1.76	0.93	0.08	0.16	0.13	0.48	0.58	0.11	0.03	0.63	0.19	0.08	**28.81**
	Waikato	0.06	5.99	15.53	3.00	0.00	0.23	0.35	0.04	0.01	0.01	0.00	0.05	0.01	0.00	**25.29**
	Bay of Plenty	0.01	1.07	2.32	11.65	0.24	0.29	0.07	0.79	0.22	0.00	0.00	0.08	0.01	0.01	**16.77**
	Gisborne	0.01	0.05	0.03	0.17	1.37	0.24	0.00	0.02	0.05	0.01	0.00	0.00	0.00	0.00	**1.94**
	Hawke's Bay	0.04	0.15	0.13	0.01	0.13	4.80	0.03	0.54	0.26	0.00	0.00	0.00	0.00	0.00	**6.09**
	Taranaki	0.19	0.05	0.34	0.11	0.00	0.45	3.86	0.16	0.00	0.00	0.00	0.03	0.00	0.00	**5.20**
	Manawatu	0.00	0.04	0.04	0.07	0.01	0.32	0.97	4.79	1.09	0.00	0.00	0.09	0.00	0.00	**7.43**
	Wellington	0.00	0.06	0.06	0.05	0.00	0.10	0.03	1.30	5.11	0.03	0.01	0.04	0.00	0.00	**6.78**
	Tasman/ Marlborough	0.00	0.03	0.01	0.00	0.00	0.02	0.01	0.05	0.18	5.20	0.12	0.66	0.04	0.03	**6.35**
	West Coast	0.00	0.16	0.04	0.00	0.00	0.00	0.05	0.00	0.10	0.31	2.44	3.00	0.12	0.02	**6.23**
	Canterbury	0.01	0.15	0.09	0.08	0.00	0.02	0.06	0.15	0.19	0.40	0.14	14.26	0.76	0.25	**16.55**
	Otago	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00	1.26	5.50	0.72	**7.58**
	Southland	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.29	0.89	4.24	**5.51**
	Total	**8.08**	**33.25**	**20.42**	**16.83**	**1.83**	**6.87**	**5.67**	**8.42**	**8.09**	**6.31**	**2.74**	**20.63**	**7.77**	**5.50**	**152.41**

Table 9.20
Forecast pattern of movements in 2031: all commodities and movements identified (million tonnes pa)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	13.77	8.28	0.13	1.48	0.00	0.31	0.12	0.00	0.87	0.22	0.00	0.23	0.24	0.16	25.82
	Auckland	0.70	31.96	2.32	1.15	0.10	0.23	0.19	0.44	0.65	0.12	0.04	0.81	0.20	0.08	38.99
	Waikato	0.17	16.14	25.99	4.89	0.01	0.49	0.67	0.09	0.03	0.01	0.00	0.06	0.02	0.00	48.57
	Bay of Plenty	0.01	1.54	1.37	20.38	0.38	0.35	0.06	0.91	0.40	0.00	0.00	0.10	0.01	0.01	25.52
	Gisborne	0.01	0.08	0.06	0.17	4.76	0.83	0.00	0.05	0.11	0.02	0.00	0.00	0.00	0.00	6.09
	Hawke's Bay	0.05	0.24	0.16	0.05	0.22	8.67	0.04	0.83	0.36	0.00	0.00	0.00	0.00	0.00	10.62
	Taranaki	0.19	0.09	0.57	0.14	0.00	0.02	6.43	0.27	0.01	0.00	0.00	0.03	0.00	0.01	7.74
	Manawatu	0.00	0.05	0.06	0.05	0.02	0.97	1.35	8.89	2.21	0.00	0.00	0.20	0.00	0.00	13.81
	Wellington	0.00	0.09	0.14	0.10	0.00	0.07	0.04	1.75	10.52	0.07	0.01	0.02	0.00	0.00	12.83
	Tasman/ Marlborough	0.00	0.03	0.01	0.00	0.00	0.01	0.01	0.09	0.11	9.84	0.46	1.21	0.08	0.05	11.92
	West Coast	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.28	2.45	6.98	0.16	0.03	9.99
	Canterbury	0.01	0.28	0.17	0.15	0.00	0.04	0.10	0.35	0.35	0.66	0.18	28.46	1.46	0.39	32.60
	Otago	0.00	0.29	0.01	0.00	0.00	0.00	0.11	0.00	0.22	0.09	0.03	1.16	10.33	1.14	13.37
	Southland	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.02	0.04	0.03	0.00	0.36	0.94	7.08	8.53
	Total	14.92	59.13	31.04	28.58	5.49	11.97	9.11	13.69	15.89	11.37	3.17	39.65	13.44	8.94	266.41

Table 9.21
Forecast changes in tonnages lifted 2006-07 to 2031: all commodities and movements identified
2031 flows as percentage of 2006-07 flows

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	189%	297%	204%	196%	(1)	127%	103%	(1)	321%	100%	(1)	100%	100%	100%	209%
	Auckland	141%	141%	132%	130%	128%	146%	140%	90%	113%	114%	127%	128%	106%	100%	138%
	Waikato	293%	267%	162%	161%	(1)	214%	187%	214%	(1)	(1)	(1)	115%	(1)	(1)	188%
	Bay of Plenty	(1)	151%	75%	174%	159%	119%	119%	115%	177%	(1)	(1)	128%	(1)	(1)	157%
	Gisborne	(1)	202%	226%	196%	349%	176%	(1)	205%	226%	(1)	(1)	(1)	(1)	(1)	293%
	Hawke's Bay	144%	152%	131%	120%	169%	173%	120%	155%	139%	(1)	(1)	(1)	(1)	(1)	168%
	Taranaki	101%	132%	166%	113%	(1)	(1)	163%	168%	(1)	(1)	(1)	110%	(1)	(1)	159%
	Manawatu	(1)	143%	150%	133%	(1)	299%	151%	170%	200%	(1)	(1)	168%	(1)	(1)	177%
	Wellington	(1)	182%	227%	217%	(1)	73%	162%	200%	202%	226%	(1)	(1)	(1)	(1)	200%
	Tasman/ Marlborough	(1)	(1)	(1)	(1)	(1)	(1)	(1)	177%	184%	185%	380%	182%	198%	191%	188%
	West Coast	(1)	27%	109%	(1)	(1)	(1)	0%	(1)	10%	149%	101%	233%	128%	(1)	164%
	Canterbury	(1)	173%	194%	180%	(1)	175%	181%	155%	180%	166%	127%	189%	172%	160%	186%
	Otago	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	229%	182%	159%	193%
	Southland	(1)	(1)	(1)	100%	(1)	(1)	(1)	(1)	(1)	(1)	(1)	130%	138%	157%	154%
	Total	185%	178%	152%	170%	299%	174%	161%	163%	196%	180%	116%	192%	171%	155%	174%

Note (1): Annual flows were less than 20,000 tonnes in 2006-07, so forecasts of percentage increases may be unreliable and have been omitted.

Table 9.22
Forecast pattern of movements in 2031: all commodities and movements identified (billion tonne-kms pa)

		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	0.89	1.35	0.04	0.52	0.00	0.20	0.06	0.00	0.72	0.20	0.00	0.27	0.37	0.28	4.89
	Auckland	0.11	0.69	0.27	0.24	0.05	0.10	0.07	0.23	0.42	0.10	0.03	0.81	0.27	0.12	2.75
	Waikato	0.05	2.00	1.06	0.55	0.00	0.14	0.16	0.03	0.02	0.01	0.00	0.05	0.02	0.00	4.09
	Bay of Plenty	0.01	0.31	0.14	1.45	0.11	0.10	0.02	0.36	0.21	0.00	0.00	0.09	0.02	0.01	2.74
	Gisborne	0.01	0.04	0.02	0.05	0.52	0.17	0.00	0.02	0.06	0.02	0.00	0.00	0.00	0.00	0.91
	Hawke's Bay	0.10	0.10	0.05	0.01	0.06	0.43	0.02	0.15	0.11	0.00	0.00	0.00	0.00	0.00	1.00
	Taranaki	0.10	0.02	0.14	0.04	0.00	0.01	0.26	0.06	0.00	0.00	0.00	0.02	0.00	0.01	0.65
	Manawatu	0.00	0.02	0.02	0.02	0.01	0.17	0.23	0.34	0.31	0.00	0.00	0.10	0.00	0.00	1.09
	Wellington	0.00	0.06	0.07	0.05	0.00	0.02	0.01	0.23	0.39	0.01	0.01	0.01	0.00	0.00	0.80
	Tasman/ Marlborough	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.02	0.01	0.71	0.14	0.67	0.07	0.05	1.70
	West Coast	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.19	2.43	0.09	0.02	2.89
	Canterbury	0.01	0.27	0.14	0.13	0.00	0.03	0.07	0.16	0.12	0.29	0.05	1.45	0.54	0.24	3.25
	Otago	0.00	0.39	0.01	0.00	0.00	0.00	0.11	0.00	0.16	0.07	0.01	0.44	0.62	0.36	2.15
	Southland	0.00	0.02	0.02	0.04	0.00	0.00	0.00	0.02	0.03	0.03	0.00	0.22	0.25	0.39	1.02
	Total	1.28	5.34	2.03	3.09	0.75	1.37	1.02	1.63	2.55	1.51	0.43	6.57	2.24	1.47	31.28

9.20 Modal forecasts

9.20.1 Introduction

In addition to the flows by all modes identified above, we have made some initial estimates of the potential growth of rail and coastal shipping traffic. This assumes that there are no major pricing or other policy interventions by government, other than the proposed emissions trading scheme, to promote a shift to rail or coastal shipping and therefore forms a baseline against which the need for any such measures can be assessed.

For this analysis we have adopted a fairly straightforward approach to the forecasting of rail and coastal shipping flows, based either on the assumption of a constant share of the movements for a particular mode or on knowledge of specific developments which may affect the modal share.

Brief comments for each of the main commodities handled by rail are set out below.

9.20.2 Manufactured dairy products

Rail currently has a reasonably high mode share, about 40 percent, of manufactured dairy products. The major player, Fonterra, has a strong commitment to sustainability and the use of rail, and, as noted above, much of the expansion of output is forecast to take place in the South Island where a number of new plants are located close to the existing rail network. As a result, our forecasts assume that rail traffic will not only grow, reflecting the growth of the dairy sector as a whole, but will also increase its modal share by 25 percent, giving it about 50 percent of the total market. As a result, rail traffic is forecast to increase from about 2.2 billion tonne-kms to about 4.1 billion tonne-kms, an increase of about 85 percent over the period.

9.20.3 Meat products

Rail also has a reasonably high share of the total freight market for meat products, carrying about 40-45 percent of the total tonnage. There are significant differences between the position in the South Island, where the rail share is relatively high, and that in the north where it is much lower. In the future there is likely to be a greater concentration of activity in processing plants closer to the source of supply of livestock and, consequently, longer distances to the main export ports, so there should be an opportunity for rail to increase its modal share; we have again assumed that this will increase by 25 percent, which will give rail about half of the total market.

However, our overall forecasts for the meat sector assume that production will decline from the levels achieved in 2006-07 and so the increase in rail traffic is fairly modest at about 12 percent, with the tonnes carried increasing from 0.48 million to about 0.54 million.

9.20.4 Wool

We have not made any explicit forecasts about the movement of wool as part of our main commodity analysis, because it is likely to be affected by the general trends depressing the output of the meat industry. We have therefore assumed that wool flows by rail will fall by about 10 percent over the period to 2031.

9.20.5 Horticultural products

The horticultural products sector is forecast to grow substantially, primarily on the basis of a rapid increase in exports. Rail currently has only a very small share of the movements of horticultural products, although the increasing focus on exports should provide opportunities for this share to increase. We have therefore assumed a modest increase in modal share of 10 percent to reflect this, giving an overall increase in the tonnes carried from about 0.13 millions in 2006-07 to about 0.42 millions in 2030 – an increase of over 200 percent during that period.

9.20.6 Logs and woodchips

The share of rail for the transport of logs and woodchips, for both domestic use and export, is relatively small. We have assumed that this share remains constant in the future, with the disadvantages resulting from the greater dispersion of the harvesting areas being balanced by the relative growth of export traffic for which rail may have some advantage. With the rapid growth in the total production, the volume of rail traffic is expected to increase sharply, resulting in an increase of about 150 percent over the period.

9.20.7 Timber products

We have again assumed a constant modal share for timber products – an overall increase of about 25 percent.

9.20.8 Coal

Based on our analysis of the particular movements of coal identified, and assuming that all export movements from the West Coast are transported by rail to Lyttelton, we have made explicit forecasts. This does imply further investment in the rail line connecting the two to provide the additional capacity. The forecasts also assume a reduction in imported coal from Tauranga to Huntly and its replacement by coal mined locally in the Huntly area and transported by road or directly by conveyor.

On this basis, the volumes carried by rail are forecast to increase from about 4.1 million tonnes in 2006-07 to about 5.5 million tonnes.

9.20.9 Petroleum products

Petroleum products are currently carried by sea or by road. While there may be opportunities for rail to participate in this market, we have not taken this into account in our forecasts. The increase in capacity of the refinery at Marsden Point will, however provide greater opportunities for coastal shipping and we have assumed that the volumes carried will increase by about one million tonnes per year.

9.20.10 Aluminium and steel

Given that there is no growth forecast for this sector, we have assumed that the volumes carried by rail will remain constant

9.20.11 Chemicals, fertiliser and minerals

Forecasts for this sector have been based on the growth of the commodities identified within this. For limestone, fertiliser and other minerals we have assumed a constant modal share. The proposed relocation of the cement plant from Westport to Weston provides a major opportunity for rail to transport bulk product to the port and to undertake local distribution within the South Island. While rail does not carry cement at present, the product is well suited to movement by rail. We have therefore assumed that 90 percent of the output of the new plant could possibly transfer to rail, with some reduction in coastal shipping.

Overall, the effect would be to increase the volume of this commodity group transported by rail from about 0.2 million tonnes in 2006-07 to about 1.4 million tonnes by 2031.

9.20.12 Food

It has been assumed that the volume of food carried will increase at the same rate of growth as that estimated for supermarkets and food retailers, growing by about 40 percent between 2006-07 and 2031. A similar growth rate has been assumed for fish.

9.20.13 Manufactured products and products not elsewhere specified (NES)

The volumes carried by rail have been forecast to grow in line with the growth in volumes predicted for the retail sector, increasing by about 70-75 percent by 2031.

9.20.14 Overall growth

The overall forecast growth in rail freight movements is set out in Table 9.23

Table 9.23
Forecast growth in rail traffic 2006-07 to 2031 (million tonnes)

Product group	2006-07	2031	Growth to 2031
Dairy products, including milk	2.20	4.08	85%
Meat	0.48	0.54	13%
Wool	0.10	0.09	-10%
Horticultural products	0.13	0.42	223%
Fish	0.07	0.09	29%
Logs and woodchips	1.29	3.24	151%
Timber, wood products and pulp and paper	1.41	1.75	24%
Coal	4.07	5.50	35%
Aluminium and steel	0.36	0.36	0%
Chemicals, fertiliser and minerals	0.21	1.38	557%
Food	0.17	0.23	35%
Other manufactured products	2.91	5.02	73%
Not elsewhere specified	0.21	0.36	71%
Total	**13.59**	**23.06**	**70%**

These forecasts would imply that the modal share of rail would remain constant, with the 70 percent increase in rail traffic being slightly below the overall forecast increase of about 75 percent. Nevertheless, it would represent a very substantial increase on present-day flows, representing an average annual increase of about two percent, which can be compared with the current position of constant flows.

9.20.15 Coastal shipping

The movement of petroleum is likely to grow with the expansion of the refinery at Marsden Point and the movement of cement will be reduced as product is distributed by land across the South Island. For the rest of the commodities handled, which we have classified as general cargo, we have tentatively forecast that this might increase at the same rate as for manufactured goods. Overall, this would therefore give forecasts for 2031 of about 8.5-9.0 million tonnes, about double those of 2006-07 but, again, roughly in line with the growth of the sector as a whole.

Again, this represents a considerable increase on current levels and our understanding that coastal shipping movements have been broadly constant over recent years.

9.21 Growth by region

The figures in Tables 9.19 and 9.20 can also be used to provide information on the likely growth, by region, of freight traffic for the commodities identified. These are illustrated in Figures 9.7 and 9.8 for movements originating and terminating in the regions. In both cases the figures include movements within the regions.

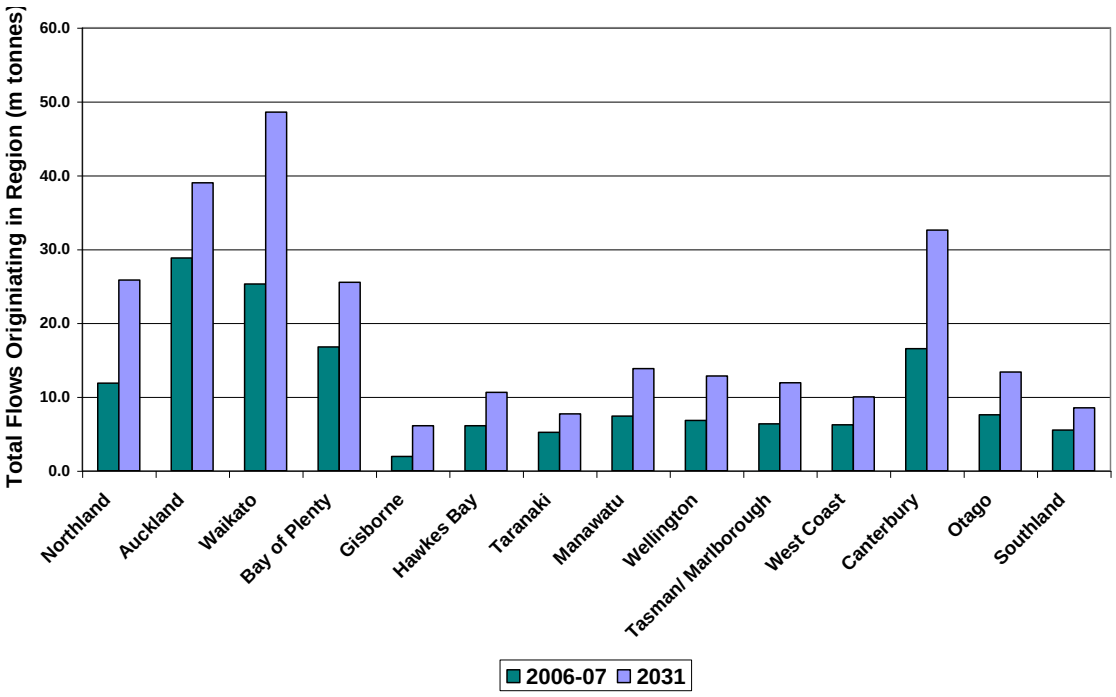


Figure 9.7
Forecast Growth in Freight Traffic Generated in Regions (million tonnes)
2006-07 to 2031
Identified Commodities Only

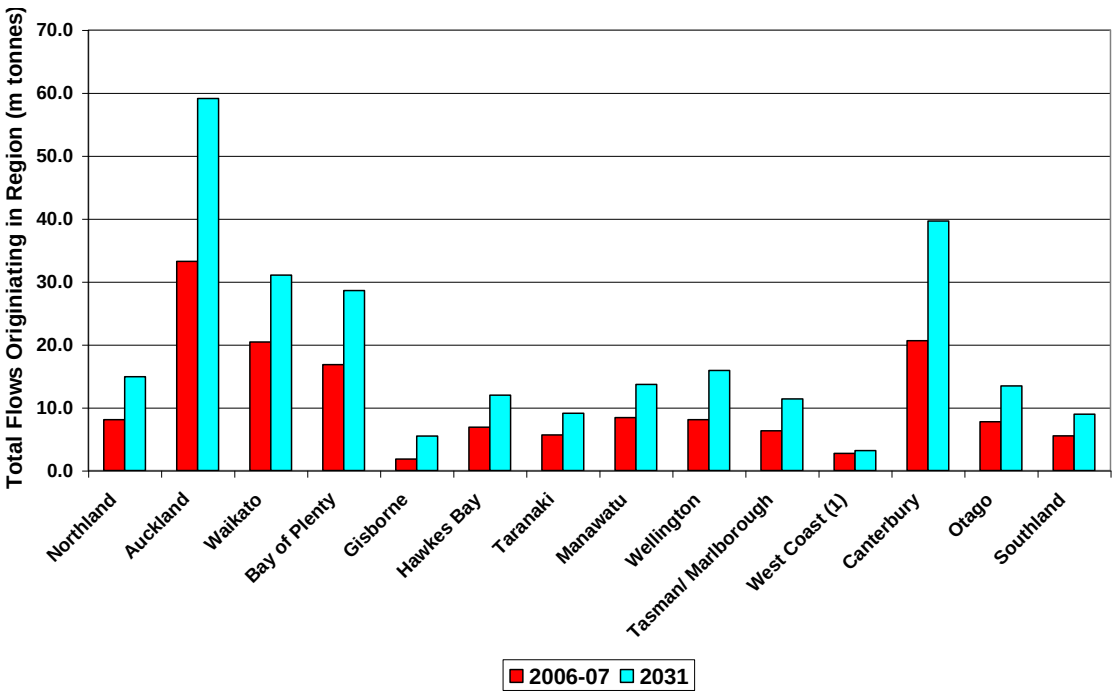


Figure 9.8
Forecast Growth in Freight Traffic Attracted to Regions (million tonnes)
2006-07 to 2031
Identified Commodities Only

Substantial growth in traffic generated is forecast for the Waikato and Canterbury regions, reflecting growth in the forestry or dairy industries and, in the case of Waikato, in the volume of aggregates being produced to serve the needs of the region itself and the neighbouring Auckland region.

The greatest increase in goods attracted to the regions is predicted for Auckland, reflecting, in part, the movement of primary products from Northland and Waikato. The Canterbury region is also forecast to have substantial growth, reflecting the growth of the dairy industry and, to a lesser extent, of coal traffic from the West Coast.

10 Following on from the Freight Demands Study

10.1 Ongoing improvements in the availability of data on the freight sector

The work set out in the previous sections is a snapshot of the freight task in New Zealand in 2006-07. While we have collected information from a number of the key operators within the freight sector and used this to provide a reasonably comprehensive picture for the sector as a whole, it should be noted that, because of the complexity of the freight task and the very large number of agencies involved as owners or transporters of the goods, there are inevitably some gaps which remain. In addition, the nature of the freight task is evolving rapidly in response to a number of pressures, and in the course of the study we have identified areas for which the situation as at 2006-07 (the base year) has changed significantly even by now. The impacts of the rapid increases in fuel prices and the global slowdown are also likely to have significant impacts on the scale and pattern of freight movements.

To help the government manage and monitor the freight sector so that it is able to operate efficiently in meeting the needs of New Zealand and New Zealanders, it needs reliable and up-to-date information on the sector. In addition, parties within the freight sector need reliable and comprehensive information to enable them to take advantage of the opportunities offered by current and future developments and to manage their own operations more effectively. This is evident from a range of reports for major agencies within the sector such as the Road Transport Forum. While our study aims to provide a snapshot of the sector as it operated in 2006-07 it needs to be regularly updated and information sought on the areas which it has not been possible to examine in depth. We therefore recommend that our study is updated regularly by a programme of comprehensive data collection across the freight sector. We understand that this would be covered by the provisions of the 1975 Statistics Act, which states that:

"Information may be required of any person in a position to provide it to enable the production of official statistics of any or all of the following kinds:

(m) Internal trade, external trade, visible and invisible, and financial transactions with other countries:
(o) Economic, financial, production, and other matters relating to undertakings, including public administration, the Executive Government of New Zealand and local authorities; forestry, fishing, trapping; agriculture; mines, quarries, and wells; manufacturing; construction; transportation, storage, and communications; electric power, gas, and water utilities; wholesale and retail trade; finance, insurance, and real estate; restaurants; hotels and accommodation; and other community, business, welfare, and personal services…"

The government's ownership of the railways should allow it to collect information on rail freight movements. In establishing the operating conditions for the new rail company as a matter of urgency arrangements should be made for detailed data to be made available, at least to appropriate government agencies, with summary data being made available to industry stakeholders and the public in general, within the constraints of commercial confidentiality to both customers and the railway company.

For the road freight sector we would recommend that data be collected by means of a regular survey, possibly following the approach taken in the United Kingdom (UK). In this, road goods vehicles with a Gross Vehicle Weight of over 3.5 tonnes are chosen at random from the lists held by the Vehicle Registration Agency and their owners are sent a questionnaire asking for detailed information on their operations over a specified time period. This information includes:

- details of the vehicle operated
- journeys undertaken (origins and destinations)
- the nature and weight of commodities carried for both single point-to-point journeys and more complicated delivery and collection rounds.

Separate questionnaires are produced for rigid and articulated freight vehicles. A copy of the questionnaire for rigid vehicles is set out in Appendix J. The questionnaire for articulated vehicles is very similar.

The collection of this information is covered by legislation (as we understand would be the case in New Zealand) and is compulsory. As a result, the response rate is high.

The information produced by the survey provides a comprehensive and reliable picture of freight movements undertaken by UK-registered road freight vehicles. It covers items such as the movements by type of vehicles, method of handling, commodities carried and broad origin-destination patterns. As a result, it provides a valuable resource for understanding and managing operations within the road-freight sectors, for both government and private-sector operators, and also for monitoring the effects of any policy developments or changes within the sector.

By providing a readily accessible form of data available to the different parties with interests in the sector, it assists in negotiations among these groups. It also provides the means by which the effects of policy and other changes can be monitored.

We therefore recommend that the government, probably through Statistics New Zealand or possibly through the MoT, initiates steps to undertake a comprehensive and reliable data-collection program on the movement of freight by road.

The other area where the government should seek to obtain information is on the movement of goods by coastal shipping. Because the number of operators within this market is relatively small, this information should be sought by direct data collection from the shipping companies and the ports concerned. It should be a requirement that any application for funding for measures to support coastal shipping should be supported by detailed statistical material on recent trends in coastal shipping for the operators and/or ports concerned. As with the information sought from the road haulage sector there are issues of commercial confidentiality which would need to be respected. An appropriate framework should be developed which would protect legitimate concerns over data confidentiality, but with the understanding that as much information as possible within these constraints becomes available in the public domain.

Annex to Section 10

Questionnaire for data collection on the road freight industry in the United Kingdom

Section 2: Vehicle Activity

10. Please record the odometer reading at the start of the **first** survey day and the end of the **last** day

Start ☐ End ☐ miles/km*

11. If the tractive unit was not used at all on the public roads during the seven day period of the survey, was this because of:

Not taxed ☐ No work ☐
Repair ☐ Site work ☐
Holiday ☐ MOT/Service ☐
No driver ☐ Other reason ☐

*Delete as appropriate

12. Please give an estimate of the mileage this vehicle undertakes in the UK each year

☐ miles/km*

13. How many litres of fuel were purchased or taken from your own supplies for this vehicle during the survey week ?

Please give the total regardless of the mileage done during the survey week.

☐ gallons/litres*

*Delete as appropriate

Section 3: Business Details

14. Name and telephone number of the person to be contacted if questions arise about this form (please print)

Name ☐
Tel. No ☐

15. Does your firm nationally have a total employment of less than 10 people

Yes ☐ No ☐

16. Please state name of town where this vehicle is based (if different address on page 1)

☐

17. Was this vehicle mainly being operated during the survey period (See Note 3)

On own account ☐ For Hire/Reward ☐

What is the nature of your business ?

☐

Section 4: Change of possession

If the vehicle has been scrapped or stolen, please give the date this happened — Date scrapped/stolen ☐

If the vehicle was sold before the survey week, please give the date sold and the new owner's details — Date sold ☐

☐

If the vehicle is on hire to someone else during the survey week, please give their name and address

☐

Section 5: Certification

I hereby declare that the information given in this return is complete and accurate to the best of my knowledge

Signed..... Date.....

BEFORE RETURNING THIS FORM PLEASE ENSURE JOURNEY DETAILS ARE COMPLETED ON PAGE 2

For official use

Odo St	Odo Fin	Not Used	Ann Mile	Fuel	Region	P/O

SIC	Prop Code	Whl Plan	Tax	B Type Code	TAO	Regn Yr	Body Type	Tipper	Survey Week

Page 3

Department for Transport

COMMERCIAL IN CONFIDENCE

Continuing Survey of Road Goods Transport (GB)

Ref: _____

This information is required under Section 1 of the Statistics of Trade Act 1947

Name and address of registered keeper

☐

Survey week from ☐ to ☐

Registration mark of vehicle ☐

If this vehicle is no longer in your possession, please complete sections 4 and 5 ONLY on the back page and return the form immediately in the envelope provided (See Note 1).

Section 1: Vehicle Details

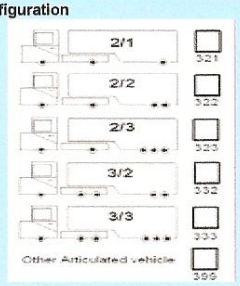
1. Trailer type (please tick as appropriate)

Flat/drop sided ☐ Solid bulk tanker ☐
Box/non specialised ☐ Livestock carrier ☐
Temperature controlled ☐ Car transporter ☐
Curtain sided ☐ Tipper ☐
Liquid tanker ☐ Other ☐

2. (See Note 2)

Gross vehicle weight ☐ kg
Carrying capacity ☐ kg

3. Please tick the box that best describes the **axle configuration**



4. Is this vehicle ever used to carry abnormal loads under a Special Types General Order ?

Yes ☐
No ☐

5. If 'Yes', when under an STGO, what is the gross train weight ?

☐ kg

6. Please state the number of retractable axles that the vehicle has

Tractive Unit ☐
Trailer* ☐

*If more than one trailer is used, describe the one used most often

7. Please state the number of super single tyres that this trailer has fitted

☐

8. Is this trailer a double decker ? (please tick as appropriate)

Yes ☐
No ☐

9. Is the vehicle fitted with any of the following (tick all that apply)

Vehicle tracking system (e.g. GPS) ☐
Fleet management system ☐
On board computer system ☐

NOW PLEASE TURN TO THE BACK PAGE

For official use

T Type	GVW	C Cap	Axle Con	STGO	STGO Weight

Ret Axle	Ret trail ax	SST	DD	GPS

CSRGT(GB)A (Dft1555)

Page 1

Journeys made on each day with four or fewer stops. Please use accompanying guidance notes to help you complete the journey information

Day of week	Journeys Please give nearest town and county name. If the journey was to or from a dock,airport or rail terminal, please show this (eg, Dover - Docks, Birmingham - rail) and how the goods were transferred (see Notes 4 & 5)		Type of Goods Please describe the goods carried (see Note 6). If the goods are a dangerous substance please code product as shown in Note 7.	Distance travelled *(indicate whether miles or kms by deleting as appropriate)		Weight of Goods Carried If empty put zero, if unknown please estimate - (see Note 8)	Please tick if more than 90% of available space was filled with this load	Please tick if the load was limited by weight	MOA (how carried - see Note 9)	No of trailer axles, if trailer not as Q3 (see note 10)	Please tick if load was carried under STGO
	Origin	Destination		Loaded miles/km*	Empty miles/km*	Kilogrammes					

Journeys made on each day with increasing or decreasing loads with five or more stops

Day of week	Journeys Please give nearest town and county name. If the journey was to or from a dock,airport or rail terminal, please show this (eg, Dover - Docks, Birmingham - rail) and how the goods were transferred (see Notes 4 & 5)		Type of Goods Please describe the goods carried (see Note 6). If the goods are a dangerous substance please code product as shown in Note 7	Distance travelled *(indicate whether miles or kms by deleting as appropriate)		Please give name of town of furthest stop made from origin	Total Weight of Goods Delivered (See Note 8)	Total Weight of Goods Collected (See Note 8)	Number of Stops for Delivery only	Number of Stops for Collection only	Number of Stops where both a Delivery and Collection were made	MOA (how carried - see Note 9)	No of trailer axles, if trailer not as Q3 (see Note 10)
	Origin	Final Destination		Loaded miles/km*	Empty miles/km*		Kilogrammes	Kilogrammes					

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Appendix A

Organisations interviewed or responding to the surveys

Organisations and agencies involved in study	
Type	**Organisation**
Airports	Auckland International Airport
	Christchurch International Airport
	Hamilton Airport
	Palmerston North Airport
	Wellington International Airport
Associations and industry groups	Aggregates Association
	Auckland Chamber of Commerce
	Canterbury Chamber of Commerce
	Employers' and Manufacturers' Association
	Federated Farmers
	Meat & Wool NZ Ltd
	Meat Industry Association
	National Road Carriers
	NZ Forest Owners' Association
	NZ Minerals Association
	NZ Road Transport Association
	NZ Shipping Association
	NZ Shipowners' Federation
	NZ Timber Industry Federation
	Pipfruit NZ Ltd
	Roading NZ
	Road Transport Forum
	Seafood Industry Council
	Wellington Chamber of Commerce
Manufacturers, growers and retailers	AFFCo
	Alliance Meats
	Ballance Fertilisers
	Bluescope Steel
	BP
	Bridgestone - Firestone
	Cadbury Schweppes
	Caltex
	Carter Holt Harvey
	Comalco New Zealand
	Dow Chemicals
	Farmers
	Fisher & Paykel
	Fonterra
	Foodstuffs

Organisations and agencies involved in study	
Type	**Organisation**
Manufacturers, growers and retailers (ctd)	Golden Bay Cement
	Greenlea
	Holcim Cement
	Laminex
	MCK Metals
	McCain
	Mitre 10
	Mobil
	Monier Bricks
	NZ China Clays
	New Zealand Refining Company
	New Zealand Steel
	Norske Skog
	Olex
	Open Country Cheese
	Pacific Steel
	Progressive Enterprises
	Ravensdown
	Shell
	Taranaki Timber Industries
	Tatua Co-op Dairy Ltd
	Turners and Growers
	Warehouse
	Watties
	Westland Milk Products
	Zespri New Zealand
Mining companies	CSR Clay
	Diatomite Products Ltd
	Dominion Salt
	Eastern Corporation
	Fulton Hogan
	GNS Science
	Hatuma Lime
	McDonalds Lime
	Omya
	Rorison Mineral Devs
	Solid Energy
	Tetra
	Transform Minerals
	Winstone Aggregates
Road transport operators	AF Logistics
	Hilton Haulage Ltd
	Hooker Bros
	J Swap

Organisations and agencies involved in study	
Type	**Organisation**
Road transport operators (ctd)	Linfox Group
	Northland Southland Transport
	NZLines
	Peter Baker Transport (PBT)
	Road Metals
	Tapper Transport
	Toll Translink
	Tulloch Transport
	Turners Transport
Couriers and post	Courier Post
	DHL
	Peter Baker Couriers
	Post Haste
	New Zealand Post
Central government	Land Transport New Zealand
	Ministry of Agriculture & Fisheries
	Ministry of Economic Development
	Ministry of Transport
	New Zealand Customs
	Transit New Zealand
	Statistics New Zealand
Ports	Centreport Wellington
	Lyttelton
	Northport
	Port Marlborough
	Port Nelson
	Port of Gisborne
	Port of Napier
	Port Otago (Dunedin)
	Port Taranaki
	Ports of Auckland
	Port of Tauranga
	Prime Port Timaru
	Southport (Bluff)
City and District Councils	Auckland City Council
	Buller District Council
	Carterton District Council
	Central Otago District Council
	Franklin District Council
	Hamilton City Council
	Hutt City Council
	Kapiti Coast District Council

Organisations and agencies involved in study	
Type	**Organisation**
City and District Councils (ctd)	Kawerau District Council
	Manawatu District Council
	Napier City Council
	Nelson City Council
	New Plymouth District Council
	Otorohanga District Council
	Palmerston North City Council
	Rangitikei District Council
	Rotorua District Council
	South Taranaki District Court
	Stratford District Council
	Tasman District Council
	Taupo District Council
	Tauranga City Council
	Thames-Coromandel District Council
	Timaru District Council
	Upper Hutt City Council
	Waikato District Council
	Wairoa District Council
	Waitakere City Council
	Wanganui District Council
	Wellington City Council
Regional Councils	Auckland Regional Council
	Environment Canterbury
	Environment Southland
	Gisborne District Council
	Greater Wellington Regional Council
	Taranaki Regional Council
	West Coast Council
Rail	ONTRACK
	Toll NZ/KiwRail
Shipping	Cosco NZ Ltd
	Maersk
	Pacifica
	Searoad
	Seatrade NZ Ltd
	Silver Fern
	Strait Shippping
	Toll Interislander
Other	Lincoln University
	Booz Allen Hamilton
	TERNZ

Appendix B

Questionnaire for owners of the goods

National Freight Demands Study

Questionnaire for owner or provider of the goods

Introduction

Richard Paling Consulting in association with Peter Carr, Murray King and John Bolland have been appointed by the MOT and MED to undertake a study of the current movements of freight in New Zealand and possible issues arising. This will provide Government with a better understanding of the freight sector and assist in the development of policies and strategies for freight and in the Government's response to the issues arising.

As part of this work, we are interviewing a wide range of key firms and agencies involved in the movement of freight by all modes. The attached questionnaire is intended to form the guidelines for these interviews and sets out the broad questions to be covered. The material required is essentially in two parts, general questions about your firm's operations and views of current and future conditions, which we would expect to discuss at the interview and more detailed questions set out in Question 4 which may take more effort to complete and which you may wish to complete separately.

In completing Question 4, we would be happy for you to provide information in a form which is easy for you to prepare and which can be extracted easily from your own records. If necessary, we would be happy to extract information from your records directly if this can be achieved reasonably easily and allows us address all the issues set out in Question 4. For convenience, we have also developed an electronic version of Question 4 as an Excel spreadsheet and this also is attached.

The material you provide will be treated as confidential and at the interview we would discuss with you the nature of any limitations you would require to be placed on the use of the information provided. We have signed a confidentiality agreement with the Ministry of Transport but we would be happy to discuss any further limitations on the use of the data.

As well as the information sought in the Questionnaire, we would be happy to receive your views on other matters which you believe to be important in the development of the freight transport sector in New Zealand

I do hope that you will be prepared to participate in our study which we believe to be vital to the development of a freight sector in New Zealand which is able to meet the challenges of today and the future and which is able to contribute to high levels of economic growth.

Should you have any queries with this questionnaire please contact either your interviewer or Richard Paling (email rpaling@xtra.co.nz phone 09 575 9069 or mobile 021 377 095).

Thank you for your co-operation.

National Freight Demands Study

Detailed questionnaire

1. What is the broad nature of your business eg Manufacturer/Grower/Consolidator?
2. Which are the broad sectors in which you operate? (eg agriculture, basic materials manufactured goods etc.) What are the major commodities that you produce and transport and the totals per year?
3. How do you usually measure the volume of freight produced moved (eg tonnes, truckloads, trainloads)? For measures not in tonnes, it would be very helpful if you could give an estimate of the tonnage per unit.
4. For all the freight which you produce and transport can you please provide the information for the latest convenient time period (ideally annual but should be at least one month). The details required are listed on the **next page** and are also included in the electronic version of Question 4. If possible this should apply to all of the commodity flows you have identified in Question 2.
5. For the data you are providing, what is the time period covered? (eg last week, Jan 2007, FY 06/07.) If possible please indicate how these relate to annual totals for 2006 or 2007.
6. To what extent are the flows seasonal? If so please indicate the extent of seasonal variation, possibly by indicating the flows identified above **and** the peak season flows as a proportion of the average flows for the year.
7. Are you aware of any constraints which affect your current transport operations? These could be local constraints, constraints or limitations in the services operated, infrastructure, institutional constraints etc. If you export or import goods, who decides on the port to be used?
8. Are you contemplating making greater use of other modes than at present? Are there any particular factors which are limiting or encouraging this?
9. To what extent is backloading possible and used? Is there the potential for increasing the extent of this? Do you arrange backloading movements yourself?
10. What has been the historic growth in the volumes produced and the distances transported over the last few years? Has your average length of haul changed and if so by how much? Are there particular factors which have affected this?. Have these changes been in line with those for the market as a whole?
11. How do you see the volumes you produce and transport changing in the short and longer term future? Are these changes in line with those in the markets generally?
12. Do you foresee any changes in future in the way freight is transported, either by you or others in your industry? (eg changes in the supply chain, bigger trucks, switch to alternative modes.)
13. What do you see as the main factors which drive the changes you have identified in Question 12?

National Freight Demands Study

Question 4: Details of movements

4. For all the freight which you generate or receive can you please provide the following information for the latest convenient time period (ideally annual but should be at least one month). This should apply to **all of the commodity flows** you have identified in Question 2 if possible. As well as movements from your premises, it should include flows of unprocessed or semi processed goods and other inputs to any manufacturing or processing activities (for example coal for heating).										
Commodity type										
Origin in New Zealand										
Destination in New Zealand										
Tonnage, volume or similar (please specify)										
Time period covered (see Question 5)										
Mode or modes of transport used (may be road then rail or vice versa)										
Truck, train or vessel (or other) movements per time period										
Distance moved in New Zealand										
Type of activity undertaken by you at the origin or destination (eg none, farm, processing plant, DC, wholesale market)										
Method of handling eg in containers, bulk liquids, bulk solids, palletised, other (please specify)										
Overseas origin or destination if appropriate										
This should include both inward and outward movements. Linked flows should be identified where possible.										

Please continue on additional pages if required.