

Profile of the Heavy Vehicle Fleet; Update 2004



Prepared for the Road Safety Trust by:

T.H. Mueller

P.H. Baas

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Phone: (09) 262 2556, Fax: (09) 262 2856

PO Box 97846

South Auckland Mail Centre

17-19 Gladding Place

Manukau City

E-mail: info@ternz.co.nz

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Terminology

Term	Description
Heavy vehicle (HV):	An individual truck or trailer weighing between 4.0 tonne and 30 tonne when fully laden.
Truck	All heavy powered vehicles including tractors.
Trailer	Towed vehicles, includes full trailers and semi-trailers.
Over-weight heavy vehicle	An individual truck or trailer weighing over 30 tonne when fully laden.
Bus and coach	Passenger service vehicle that purchased 4 tonne or more of RUC license.
Light vehicle (LV)	A vehicle weighing less than 3.5 tonne. This includes cars, light trucks, vans, light trailers etc.
RUC	Road User Charges as described in (LTSA 1998)
LTSA	Land Transport Safety Authority
RUC Vehicle type	See Appendix 2
CVIU	NZ Police Commercial Vehicle Inspection Unit

Introduction

This report is the third update of the 1999 publication 'Profile of the Heavy Vehicle Fleet' prepared for the Land Transport Safety Authority (LTSA) by Transport Engineering Research New Zealand (TERNZ).

The data is intended to provide essential information for estimating the costs and benefits associated with road safety countermeasures and other policy initiatives.

The analysis of the Road User Charges (RUC) data for the years 1997 through to 2003 has assumed that all standard heavy vehicles had RUC licences between 4 and 30 tonne. In 2003 there were 159 vehicles that had RUC licences in excess of 30 tonnes and these are considered to be special purpose vehicles. Passenger transport vehicles are included in this report.

Uncertainties Associated With Road User Charges

The results presented in this report are based on vehicle registration, RUC purchase and other data collected by the LTSA Vehicle Registry Centre plus information supplied by the transport industry. While every effort has been made to ensure the accuracy of the results presented in this report, there is some uncertainty that is inherent in the way the data is collected. For further information on that uncertainty, please refer to the 1997 Profile of the Fleet report and LTSA reports.

Roading System

New Zealand has a public road network covering 92,188km, 37% of which are non-sealed. In addition there is a rail network of 3,912kms. The road network consists of the state highway network managed by Transit New Zealand and local authority rural and urban roads (Baas and Bolitho 2003).

Table 1 shows the numbers of kilometres of each road type and their surface nature. 12% of the network length is state highway or motorway, 17% is urban roading and the remaining 71% are rural roads. Wanty and Sleath (1998) reported that in New Zealand

- 48% of roads are on flat terrain,
- 30% are on rolling terrain, and
- 22% are on mountainous terrain.

There is approximately one horizontal curve of 750m or less in radius for every 2 km of State Highway. Half of these are 250m or less in radius.

Nearly all of the estimated 30,000kms of private roads in New Zealand are forestry roads. Carter Holt Harvey has approximately 14,000kms. About 3,000kms are used continuously throughout the year, the rest are used for short periods during planting and harvesting. The combined length of the private roads in the Central North Island that formed part of the Fletcher Challenge Forests Ltd. and CNIP forest estates is 16,000kms. 2,000kms of these roads are main access roads.

Table 1. New Zealand Road Network (Statistics New Zealand, 2002).

Nature of the surface (30 June 2001)	Local authority roading		State highways & motorways	Total
	Urban roads	Rural roads		
Paved or sealed	15,708	31,762	10,716	58,186
Metal or gravel	414	33,549	59	34,002
Total	16,122	65,311	10,775	92,188

Traffic Volume

Heavy Vehicle Distance

Figure 1 shows that the distance travelled by heavy vehicles (trucks and trailers) per year since 1997 has steadily increased. There was virtually no growth in the distance travelled by heavy vehicles between 1997 and 1998; this may be due to the slump in exports due to the "Asian Crisis".

Figure 2 and Figure 3 illustrate the travel distance by axle numbers for the truck and trailer fleet respectively from 1997 through 2003.

With the exception of one and two axle trailer types, heavy vehicle travel distance has increased.

Distance travelled for the different RUC vehicle types in 2003 is shown in Figure 4 (See Appendix A for a description of the RUC types). Type 2 trucks travel the greatest distance compared to other RUC vehicle types. These are mostly local delivery vehicles with small loads and are unlikely to be associated with a trailer. The heavier truck types 5, 6 and 14 collectively account for more than 50% of the 2619 million kilometres trucks travelled. Trailers were towed a total distance of 1,081 million kilometres.

One and two axle trailer distances have remained relatively static over the years. Distances travelled for heavy trucks and trailers of different weight groupings (RUC gross vehicle weight) are illustrated in Figure 5 and Figure 6.

RUC travel figures indicate that there has been a 22% increase in heavy vehicle prime mover (truck) travel between 1997 (2,042 million kilometres) and 2003 (2,619 million kilometres); an average increase of 3.1% p.a.

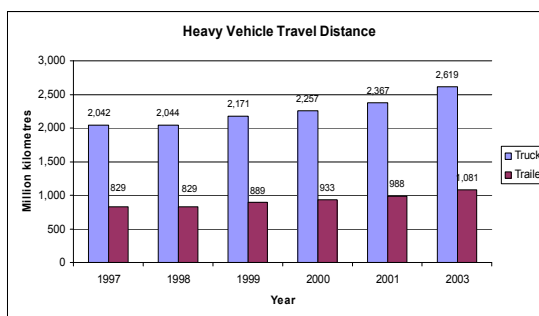


Figure 1. Heavy vehicle travel distance.

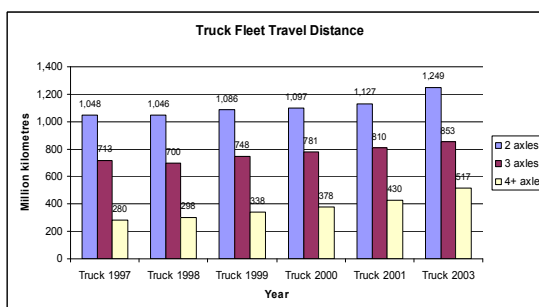


Figure 2. Truck distance by axle numbers.

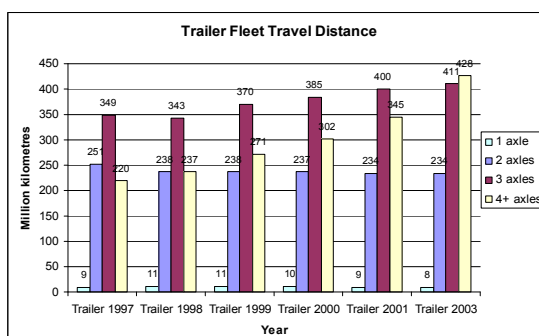


Figure 3. Trailer distance by axle numbers.

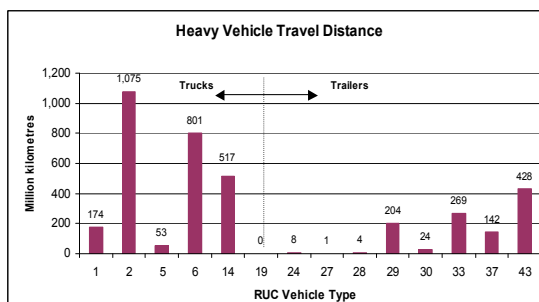


Figure 4. Heavy vehicle distance travelled by RUC type.

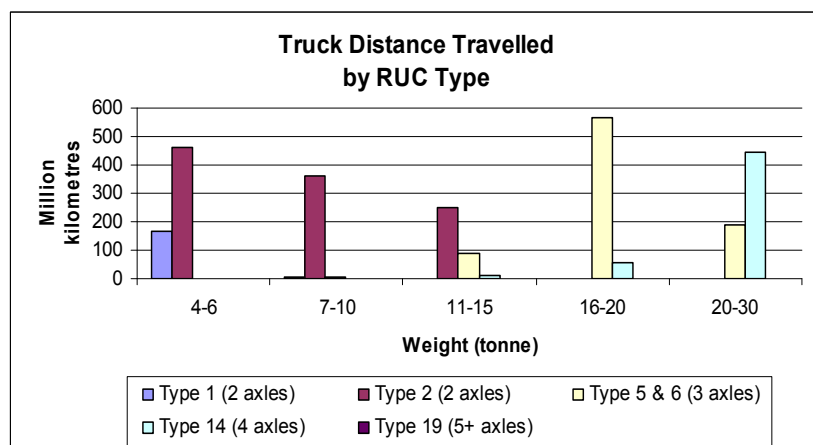


Figure 5 Truck distance by type and weight, 2003.

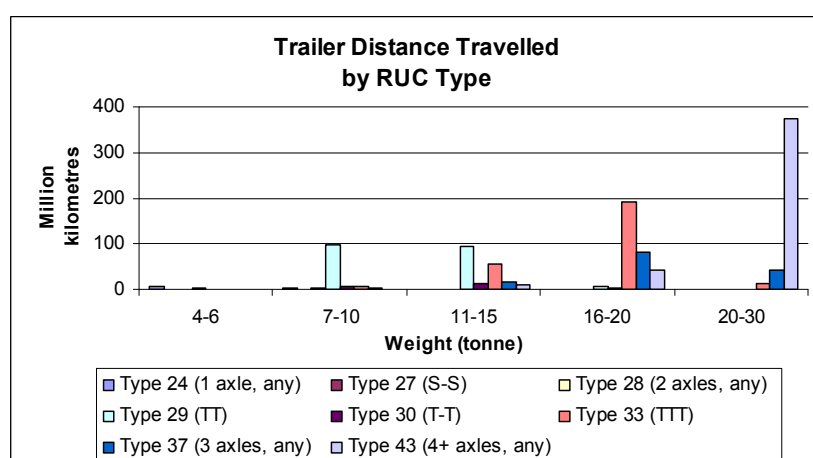


Figure 6. Trailer distance by type and weight, 2003.

Heavy Vehicle Fleet Numbers

Licensed Heavy Vehicles

The number of licensed heavy vehicles between 1997 and 2003 (January to December) are tabulated in Table 2. The number of licensed trucks grew by 2.8% p.a. from 70,272 in 1997 to 82,747 in 2003. Trailers grew by 2.9% p.a. from 18,460 to 23,180 over the same period. Private passenger vehicles had the lowest growth rate of 1.1% p.a.

Table 2. Numbers of licensed heavy vehicles (Baas, Broatch et al. 2003).

Vehicle Type	1997	1998	1999	2000	2001	2002	2003
Bus	5,898	6,447	6,584	6,727	6,717	6,776	7,250
Private Passenger Vehicle	7,612	8,214	8,404	8,641	8,145	7,855	8,252
Trailer	18,460	20,941	21,834	22,641	22,544	22,735	23,180
Truck	70,272	77,256	78,854	81,287	80,313	80,522	82,747
Total	102,242	112,858	115,676	119,296	117,719	117,888	121,429
Total less private passenger	94,630	104,644	107,272	110,655	109,574	110,033	113,177

Number of Vehicles for which Road User Charges Purchased

Table 3 shows the number of trucks, semi-trailers and full trailers for which Road User Charges were purchased each year since 1997.

The total number of vehicles increased 20.4% over the seven year period (average 2.9% p.a.). The greatest percentage increases were in the number of four-axle trucks (RUC type 14) and four-axle trailers (RUC type 43) with 6.1% and 6.5% average p.a. increases respectively.

Five axle trucks (RUC type 19) have declined from 46 in 1997 to 11 in 2003. There has also been a decline in the number of 1, 2 and 3-axle trailers over the past seven years. The number of HV's by RUC type is shown in Table 4.

Figure 7 illustrates the variations in the number of vehicles over the seven year period (1997 to 2003) by vehicle axle numbers.

The proportion of vehicles by RUC licence weights for 2003 is shown in Figure 8.

Table 3. Heavy Vehicle RUC purchased, 1997 to 2003.

Vehicle	1997	1998	1999	2000	2001	2003
Trucks 2-axes	51915	57089	58162	58744	60190	66959
Trucks 3-axes	16515	16730	17118	17649	18029	19498
Trucks 4-axes	4203	4323	4690	5254	5776	7307
Trucks 5-axes	46	52	31	33	33	11
Total Trucks	72679	78194	80001	81680	84028	93774
Semi-trailers 2-axes	4824	4835	4725	4714	4728	4661
Semi-trailers 3-axes	3768	3990	4122	4334	4516	4948
Total Semi-trailers	8592	8825	8847	9048	9244	9610
Trailer 1-axle	798	851	784	712	697	578
Trailer 2-axle	2896	2872	2657	2538	2465	2173
Trailer 3-axle	4278	4204	4134	4124	4153	4034
Trailer 4-axle	3262	3552	3852	4284	4832	5998
Total Full Trailers	11234	11479	11427	11658	12147	12783
Total Trailers	19826	20304	20274	20706	21391	22393
Total Vehicles	92505	98498	100275	102386	105419	116167

Table 4. Heavy vehicle numbers by RUC type and weight (2003).

Weight	RUC Vehicle Type																
	1	2	5	6	14	19	24	27	28	29	30	33	37	43	129	136	140
4	6895	9913	8	18	1	1	49	7	25	23	8	0	1	0	0	0	0
5	837	11152	22	28	1	0	93	17	46	32	12	2	5	1	0	0	0
6	231	7142	5	33	0	0	115	32	37	45	35	13	9	8	0	0	0
7-10	371	18433	24	184	17	0	309	79	104	1370	291	100	61	36	0	0	0
11-15	216	11708	413	1740	281	1	12	16	62	2868	1024	740	363	118	0	0	0
16-20	7	48	732	11515	1085	0	0	2	7	314	364	3649	2099	669	0	0	0
21-25	0	4	21	4740	5499	2	1	0	4	10	1	438	1445	5113	1	1	1
26-30	2	0	0	16	422	7	0	0	1	1	0	7	52	52	0	1	0
Total	8559	58399	1224	18274	7307	11	578	153	286	4661	1735	4948	4034	5998	1	2	1

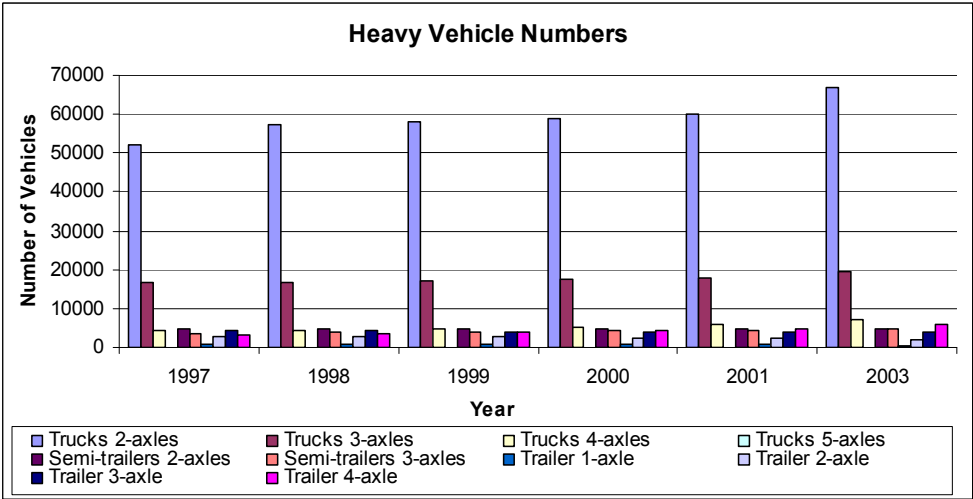


Figure 7. Number of vehicles for which RUC were purchased, 1997 to 2003.

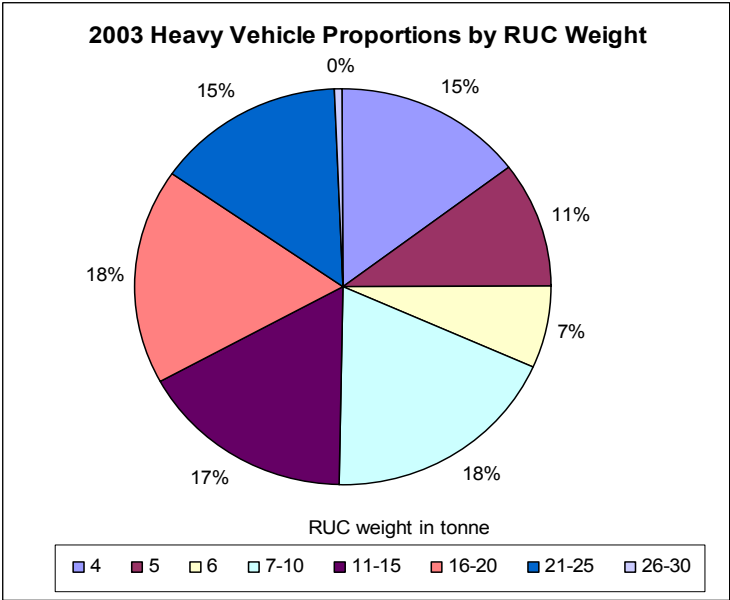


Figure 8. Proportion of vehicles by RUC license weights, 2003.

Payload Transported

The New Zealand commercial road transport industry turn over is estimated to have been \$4 billion dollars in 2003. Freight carriage is a significant contributor to the NZ economy serving all industries operating in NZ. It served the dairy industry with exports worth NZ\$7.0 billion, manufacturing exports of NZ\$5.9 billion, meat exports of NZ\$4.5 billion, and forest products exports of NZ \$3.6 billion. Table 5 shows the volume of freight transported for some of the major producers.

For the year ended March 2000 the transport and communications sectors increased their contribution to the gross domestic product (GDP) by 10.6%. This reflected a rise in the production of primary industries notably farming, dairy products, logs and wood products. Earnings from transport and communications made up 9.5% of New Zealand's GDP and it was estimated that in 1997 road transport made up approximately 70% of the internal transportation task (Baas and Bolitho 2003).

The payload transported by heavy vehicles has been estimated from the RUC data by assuming an average loading of fifty-percent to account for empty or partially-loaded trips and an average tare weight for trucks and trailers of $\frac{1}{3}$ and $\frac{1}{4}$ their gross weights respectively. The payload is measured in tonne-kilometre. A further assumption in processing the data is that the maximum gross weight is equal to the RUC license purchased with no allowance for RUC evasion or avoidance.

Payloads carried by vehicles with different numbers of axles

Total RUC payload-distance purchase for 2003 was 19.45 billion tonne-kilometres. This includes all vehicle classes (not just heavy vehicles). For heavy vehicles with RUC licenses between 4 and 30 tonne and RUC types 1 to 43, the payload-distance was 19.43 billion tonne-kilometres.

Table 6 shows the total payload carried by heavy vehicles with respect to the number of axles.

Table 5. Products and quantities that make at least one journey by road transport (Baas and Bolitho 2003).

Product	Quantity
Butter	391,000 tonne
Cheese	254,000 tonne
Meat	1,209,000 tonne
Wool	178,000 tonne
Saw logs	7,220,000 m ³
Pulp logs	3,566,000 m ³
Export logs	6,149,000 m ³
Other logs	2,204,000 m ³
Pulp and paper	3,029,367 tonne
Wood panels	1,651,309 tonne
Coal	3,911,396 tonne
Steel products	200,000+ tonne

The results indicate that vehicles with three or more axles transport 80% of the total payload. Figure 9 illustrates that 89% of the payload transported was carried by vehicles using RUC licenses greater than 10 tonnes.

Number of larger heavy vehicles

As in previous years, a small number of the larger, high-use heavy vehicles account for a large proportion of the payload transported and RUC purchased. The percent of RUC purchased and the number of heavy vehicles is compared in Table 7.

In 2003, 72% of the vehicles that purchased RUC were heavy vehicles weighing 10 tonne or greater and travelling more than 10,000 kilometres per year. This is consistent with the previous years. Similarly vehicles 10 tonne or more and travelling over 20,000 kilometres per year accounted for 68% of the vehicles purchasing RUC. This is also comparable to previously examined years.

Vehicles carrying more than 10 tonne and travelling more than 20,000 kilometres per year carry the bulk of the payload transported. Figure 10 indicates that 85% of the payload in 2003 was transported by vehicles with 10 tonne licenses or more and travelling 20,000 kilometres a year (or more). In 2001 this figure was 84% and the 1997 percentage was 82%.

Table 6. Heavy vehicle payloads by number of axles (million tonne-kilometres).

Number of Axles	Truck Payload	Trailer Payload	% truck	% trailer
1	0	20		0%
2	3065	980	25%	14%
3	5275	2705	43%	37%
4+	3833	3552	31%	49%
Total	12173	7257	100%	100%
	Grand Total	19430		

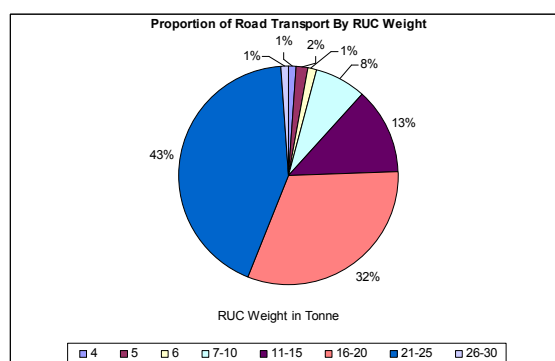


Figure 9. Proportion of the road transport task in million tonne-kilometres, 2003.

Table 7. Number of larger heavy vehicles, by year.

	Year	Trucks	Trailers	totals	% HV RUC Purchased
All HV's					
	1997	76,868	19,604	96,472	100%
	1998	78,248	19,985	98,233	100%
	1999	80,058	20,163	100,221	100%
	2000	81,733	20,603	102,336	100%
	2001	84,092	21,169	105,261	100%
	2003	93,899	22,427	116,326	100%
HV's 10 tonne and over 10,000 kms					
	1997	26,299	13,248	39,547	71%
	1998	26,472	13,390	39,862	70%
	1999	27,247	13,704	40,951	71%
	2000	28,272	14,237	42,509	72%
	2001	29,369	14,786	44,155	72%
	2003	32,696	16,185	48,880	72%
HV's 10 tonne and over 20,000 kms					
	1997	19,803	10,408	30,211	67%
	1998	19,678	10,523	30,201	66%
	1999	20,559	10,805	31,364	67%
	2000	21,588	11,401	32,989	68%
	2001	22,521	11,925	34,446	68%
	2003	25,061	13,099	38,160	68%

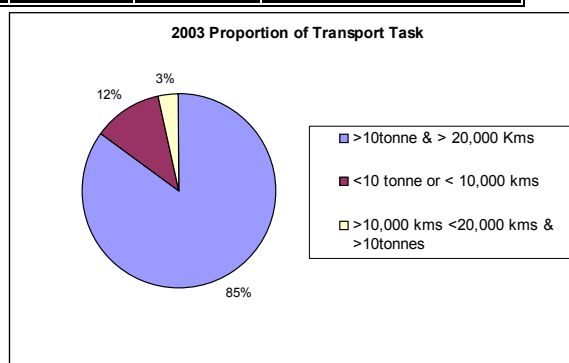
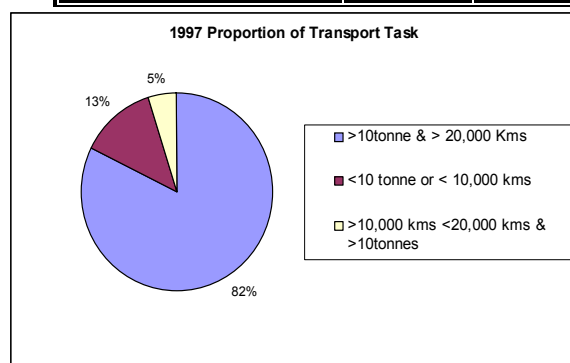


Figure 10. Proportion of transport task by vehicles carrying more than 10 tonne.

Specific Industry Groups¹

Car Transporters

The number of car transporters has dropped from 175 in 1997 to 115 in 2002. Operators have moved from having four and six car transporters to having 20-metre, eight car carriers. The eight car carriers are large enough to accommodate eight "large" cars reducing the number of transporters required to carry out the transportation of cars and light trucks.

Milk Tankers

In the production year ended 30 May 2002 approximately 13.1 million tonnes of liquid milk were produced on New Zealand farms (Fonterra figures). This milk was picked up by an estimated 470 milk tankers. Fonterra, New Zealand's biggest milk processor, has a fleet of approximately 440 truck and trailer units and 25 A-trains. B-trains are used to move product from processing site to processing site. The number of tankers is considered to have levelled off as the growth in the dairy industry has slowed down.

Logging Trucks (Log Transport Safety Council Data)

There were approximately 1,263 logging trucks in the fleet at the end of 2002. This number is expected to rise to as many as 3,000 by the end of 2006. The volume of logs carted in 2002 was approximately 21 million cubic metres. The estimated volume for 2006 is 29 million cubic metres. The distance travelled per trip will increase since the forests coming into production are more remote from the ports and processing facilities.

Livestock Haulage

By the end of 2002, there were approximately 1,650 hire and reward livestock truck and truck-trailer combinations. Table 8 shows the number of combinations with respect to effluent tanks. Since the stock haulage industry has accepted voluntarily a move towards vehicles with effluent tanks, the number of combinations without effluent tanks by 2006 is expected to be a very small percentage of the fleet. The "truck only" combinations are mostly used for gathering stock for further transport by a larger vehicle. Farmers tend to have multipurpose vehicle combinations with removable stock crates and these are not included in Table 8.

Heavy Duty Bitumen Tank Wagons

Industry sources suggest that there has been no significant change in the number of bitumen tank wagons since the 1999 report and that the number of these vehicles remains in the order of 155. There has been no survey or industry update. It is possible that this figure is at the top end of the range as the industry has undergone a certain amount of restructuring through mergers and acquisitions.

New Zealand Defence Forces

According to New Zealand Defence Force sources, there have 1095 heavy vehicles. The details of the combinations are tabulated in Table 9.

¹ The information on specific industry groups is reproduced from the previous fleet update report Baas, P. and H. Bolitho (2003). It was obtained through telephone surveys.

Table 8. Stock truck and trailer numbers (Baas and Bolitho 2003).

Livestock Haulage Combination Type	Number
Truck and trailer units with effluent tanks	1100
Truck and trailer units without effluent tanks	400
Truck only	150
Total	1650

Table 9. New Zealand Defence Force heavy vehicles (Baas and Bolitho 2003).

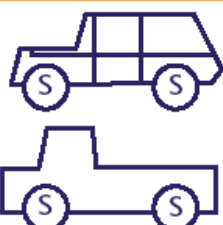
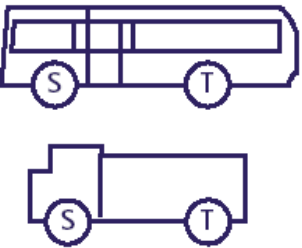
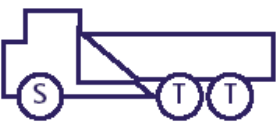
Vehicle Combination	Number
2-axle 4x2 trucks	45
2-axle 4x4 trucks	441
3-axle 6x4 trucks (inc. tractor units)	73
3-axle 6x6 trucks (inc. recovery trucks)	24
1-axle trailers	347
2-axle trailers	111
2-axle semi-trailers	15
3-axle trailers	35
4-axle trailers	4
Total	1095

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Appendix A RUC Vehicle types

Powered Vehicles

No. of Axles	Types of Axles	Example Vehicles	Vehicle Type No.
2	2 axles, both single tyred		1
	2 axles, 1 single tyred and 1 twin tyred		2
	Any other configuration		1
3	3 axles, one single tyred and two twin tyred		6
	Any other configuration		5
4	Any configuration		14
5 or more	Any configuration		19

Unpowered Vehicles

No. of Axles	Types of Axles	Example Vehicles	Vehicle Type No.
1	Any configuration		24
2	2 spaced axles, both single tyred		27
	1 group of 2 close axles, both twin tyred		29
	2 spaced axles, both twin tyred		30
	Any other configuration		28
3	1 group of 3 close axles all twin tyred		33
	Any other configuration		37
4 or more	Any configuration		43