BTE Publication Summary

Estimates of Freight Travelling to and from Sydney along the Hume and Pacific Highways

Information Paper

This Paper presents the final results from a BTE survey of trucks passing through checking stations located on the Hume and Pacific Highways in NSW at Marulan and Berowra respectively. The aim of the survey was to obtain information on the quantity and nature of road freight travelling to and from Sydney along these two major highways, for use in BTE research studies. The survey commenced in mid 1972 and terminated in mid 1978. This period is an interesting one as there was considerable growth in tonnage handled by the goods trucking industry, particularly intrastate freight.







Estimates of Freight Travelling to and from Sydney along the Hume and Pacific Highways



AUSTRALIAN GOVERNMENT PUBLISHING SERVICE, CANBERRA 1982

© Commonwealth of Australia 1982 ISBN 0 642 07099 7

Printed by Watson Ferguson and Co., Brisbane

FOREWORD

The Australian road freight industry makes a substantial contribution to the economy. It is an industry characterised by vigorous competition and considerable scope for individual initiative. Unfortunately, organisations and researchers involved in this field of transport have always experienced some difficulty in obtaining reliable data on various aspects of the industry's operations.

In 1972 an opportunity arose to obtain information on road freight travelling to and from Sydney, by means of a survey of trucks. The New South Wales Department of Motor Transport (DMT) agreed to make available to the Bureau of Transport Economics (BTE) some details of a sample of trucks passing through its checking stations at Marulan and Berowra which are located on the Hume and Pacific Highways respectively. These are the most important transport arteries servicing the Sydney metropolitan area.

The aim of the BTE survey was to obtain information on road freight tonnages, dissected by origin and destination and by commodity. The survey spanned the six years between mid 1972 and mid 1978. This exercise was terminated in 1979, following the elimination of road maintenance charges in NSW.

This paper presents and discusses the survey's results. It also outlines the legislation in NSW which affected the operations of the road freight industry at the time of the survey, and describes the survey's methodology.

It should be mentioned that preliminary survey results for the years 1972–77 have previously been published in BTE Information Paper format for limited circulation by DMT. The estimates published in those papers have since been revised and converted to metric units, where necessary, for presentation in this paper, along with the 1977–78 results and estimates of the associated statistical errors.

Dr H.G. Quinlan of the BTE initiated contact with the DMT on the survey and devised its methodology. Acknowledgment is made of the assistance received from officers of the DMT, particularly Mr E. Brennan, who liaised with the BTE for much of the survey period. Mention should also be made of the DMT inspectors at Marulan and Berowra who recorded additional information to that normally required for DMT purposes, for use in the BTE survey. The Australian Bureau of Statistics made an officer available to share the coding of the survey data over a four-year period until October 1977. Mr Ken Creek of the ADP Branch, Department of Transport Australia, designed the data processing system and Ms S.M. Gunner of the Systems and Information Branch of the BTE provided advice on the assessment of statistical errors associated with the survey data.

J. W. MOLL Assistant Director Systems and Information

Bureau of Transport Economics Canberra July 1981

CONTENTS

FOREWORD		iii
SUMMARY		xi
CHAPTER 1	INTRODUCTION Growth of road transport Regulation of road transport Road freight data	1 1 2 4
CHAPTER 2	ROAD TRANSPORT LEGISLATION IN NSW State Transport (Co-ordination) Act, 1931 Road Maintenance (Contribution) Act, 1958	7 7 10
CHAPTER 3	DESCRIPTION OF SURVEY Truck checking stations Coverage Sample selection Information collected	13 13 13 14 16
CHAPTER 4	SURVEY RESULTS Freight overview Analysis of movements between major centres Overview of road-rail competition in NSW Future trends	23 23 26 35 37
CHAPTER 5	CONCLUDING REMARKS	39
APPENDIX I	EXPANSION OF SAMPLE RESULTS AND DERIVATION OF ERROR STATISTICS	41
APPENDIX II	TABULATIONS OF SURVEY RESULTS	59
APPENDIX II	I TRUCK MOVEMENTS THROUGH CHECKING STATIONS IN NSW	85
REFERENCE	S	89
ABBREVIATI	ONS	91
MATHEMATI	CAL SYMBOLS	91

Page

TABLES

		Page
2.1	Revenue from charges payable under the State Transport (Co-ordination) and Road Maintenance (Contribution) Acts 1969-70 to 1978-79	11
3.1	Commodity classifications used in the survey	19
4.1	Estimates of freight passing through Marulan and Berowra	24
4.2	Average loads of trucks passing through Marulan and Berowra	25
4.3	Estimated composition by commodity group of freight passing through Marulan	26
4.4	Estimated composition by commodity group of freight passing through Berowra	27
4.5	Freight tonnages for O-D Pairs processed at Marulan and Berowra, 1977-78	27
4.6	Estimates of road freight between Sydney and Melbourne	28
4.7	Estimates of road freight between Sydney and Brisbane	30
4.8	Estimates of road freight between Sydney and Newcastle	31
4.9	Estimates of road freight between Sydney and Outer Sydney	33
4.10	Estimates of road freight between Sydney and Canberra	34
4.11	Freight carried by ACT railway	35
4.12	Freight carried by NSW railways	37
I.1	DMT broad route categories	43
1.2	Relative standard errors for estimated freight tonnages passing through Marulan 1977-78	50
1.3	Relative standard errors for estimated freight tonnages by commodity group passing through Marulan 1977-78	51
1.4	Relative standard errors for estimated freight tonnages passing through Berowra 1977-78	52
1.5	Relative standard errors for estimated freight tonnages by commodity group passing through Berowra 1977-78	53
l.6	Relative standard errors for estimated freight tonnages passing through Marulan 1976-77	54
1.7	Relative standard errors for estimated freight tonnages by commodity group passing through Marulan 1976-77	55
1.8	Relative standard errors for estimated freight tonnages passing through Berowra 1976-77	56
1.9	Relative standard errors for estimated freight tonnages by commodity group passing through Berowra 1976-77	57
111.1	Trucks passing through NSW truck checking stations: carrying capacity over four tonnes	86
111.2	Trucks passing through NSW truck checking stations: carrying capacity four tonnes or less	87

FIGURES

		0
1.1	Commercial vehicles on register—Australia	3
2.1	Vehicles on register-New South Wales	8
3.1	Location of Marulan and Berowra	15
3.2	Example of survey coding sheet	17
3.3	Survey regions in NSW	21
I.1	Relationship between freight estimates and associated relative standard errors for Marulan 1977-78	47
		40

I.2 Relationship between freight estimates and associated relative standard 48 errors for Berowra 1977–78

Notes on tables

In addition to these tables, four tables are presented in Appendix II for each of the survey years from 1972–73 to 1977–78. For ease of reference the standard tables appearing for each survey year are listed below:

- estimated road freight tonnes passing through Marulan;
- estimated road freight tonnes by commodity group passing through Marulan;
- estimated road freight tonnes passing through Berowra; and
- estimated road freight tonnes by commodity group passing through Berowra.

Page

SUMMARY

This paper presents the final results from a BTE survey of trucks passing through checking stations located on the Hume and Pacific Highways in NSW at Marulan and Berowra respectively. The aim of the survey was to obtain information on the quantity and nature of road freight travelling to and from Sydney along these two major highways, for use in BTE research studies. The survey commenced in mid 1972 and terminated in mid 1978. This period is an interesting one as there was considerable growth in tonnage handled by the goods trucking industry, particularly intrastate freight.

The expansion in intrastate road freight traffic followed the abolition in January 1974 of co-ordination charges and embargoes originally imposed in 1931 to protect the NSW railways from road competition. A secondary aim of the survey was to provide the data to facilitate an assessment of the impact of this change in respect of road freight haulage. This paper presents final results from the survey by origin and destination and by broad commodity grouping. Preliminary results for the years 1972–77 were published in BTE Information Paper form for circulation by DMT. These results have been revised and converted to metric units, where necessary, for inclusion in this paper. The 1977–78 results have not previously been published. This paper also includes estimates of the statistical errors associated with the results for the years 1976–77 and 1977–78. It should be noted that the survey did not attempt to obtain a complete coverage of road freight movements in NSW but it is contended that it provided an acceptable coverage of road freight travelling between Sydney and those intra and interstate origins and destinations located to the north and south-west, along the Pacific and Hume Highways respectively.

In aggregate terms, estimated tonnages of road freight passing through the checking stations at Marulan and Berowra increased by 45 per cent during the six-year survey period to mid 1978. Most of this growth was in the category of intrastate movements which more than doubled at Marulan and increased by 81per cent at Berowra between 1972–73 and 1977–78. Interstate traffic during the survey period peaked at Marulan in 1976–77 at levels 25 per cent higher than in 1972–73 while the peak occurred in 1975–76 at Berowra at levels 20 per cent higher than in 1972–73.

The effects of the abolition of the co-ordination charges and embargoes on intrastate transport of various commodities are apparent in the survey results, particularly in respect of iron and steel and cement.

This paper presents estimates of road freight on the major interstate routes between Sydney and Melbourne and Sydney and Brisbane. Some intrastate routes are also discussed in detail. The method used to assess the accuracy of the survey's results is discussed at length in Appendix I.

CHAPTER 1—INTRODUCTION

The purpose of this paper is to present the results and methodology of a survey of freight carried by trucks passing through two NSW truck checking stations at Marulan and Berowra, situated on the Hume and Pacific Highways respectively. This survey was conducted over a six-year period and the results are of special interest as they cover a period of significant change in road legislation in NSW. As previously stated, the survey's basic aim was to provide estimates of road freight travelling to and from Sydney along the Hume and Pacific Highways. However, it was also intended that the data should provide the basis for an assessment of the impact of the relaxation and eventual abolition of controls on road-rail competition which had been in force since 1931. It is firstly pertinent to obtain some perspective of the road freight industry and legislation affecting that industry. The following section presents a brief overview of these aspects.

The Australian road freight industry has a relatively short history, particularly when compared to rail and sea transport. In the case of NSW, there were only three 'lorries' on the motor vehicle register in 1911 (DMT 1978), whereas the railways commenced hauling passengers and freight between Sydney and Parramatta in 1855. However, the trucking industry has progressed rapidly in terms of technology since those early days. Despite legislative controls involving licensing and, for a period, restrictions on direct competition with the railways, entry and exit from the industry has been relatively easy. The result of this has been vigorous competition and low freight rates. About 75 per cent of the freight tonnes consigned within Australia during 1975–76 are estimated to have travelled by road. The rail and sea shares were estimated at about 18 per cent and 4 per cent respectively, with the remainder travelling by pipeline (BTE 1978a).

GROWTH OF ROAD TRANSPORT

Technological progress in truck design and manufacture during the 1920s resulted in more reliable, mass-produced vehicles. At the same time, significant development of road infrastructure was taking place throughout the country. For example, in 1906 there were over 91 000 km of public roads in NSW. This had increased to 162 700 km by 1924 and 208 000 km in 1970 (DMR 1976). Trucks during the 1920s were basically cars adapted to carry goods but they soon established an advantage over railways in short-distance haulage due to their flexibility in being able to freely operate on an expanding road network. The detrimental effect of this on railway finances led to the introduction of legislation restricting road-rail competition.¹ During the 1930s and until the end of the Second World War each capital city was served by a well developed local cartage industry, subject to control by industry associations.² The railways retained their long-distance transport role. However, the end of the Second World War produced three conditions which led to further expansion of the road transport industry. The conditions which facilitated this expansion were as follows.

- The railways had deferred maintenance and any expansion works not required by the war effort. They were thus unable to cope with the post-war traffic boom and customers sought other means of transport.
- Many ex-servicemen invested their deferred pay in ex-army vehicles to start their own businesses.

^{1.} The regulation of road transport is discussed more fully in the following section.

^{2.} Often known as Master Carriers' Associations.

BTE Information Paper 6

 Some road operators began to offer a door-to-door service involving only one freight invoice. These operators became known as freight forwarders and those who developed a reputation for reliability prospered.

The road transport industry further consolidated its position during a long national rail strike early in 1949. Economic regulation of the road industry was abandoned during the strike and many customers subsequently preferred road to rail, despite the reimposition of economic regulation. An indication of the further progress achieved in vehicle design and road construction since the late 1940s is given by Joy (1964) who estimated that a truck took eighteen hours (in terms of driving time) to travel between Melbourne and Sydney in 1964 compared with thirty hours in 1948.

The number of registered commercial vehicles¹ in Australia is shown for the fifty-year period 1926 to 1976 in Figure 1.1. The graph illustrates three distinct growth phases. The first, during the 1920s and 1930s, was curtailed by World War II. The second phase. during the late 1940s and 1950s, reflects the post-war expansion in road transport as discussed above. Following a slowing down in the growth rate during the 1960s, the rate again increased significantly during the 1970s. The increase can probably be attributed to a gradual deregulation of road transport in some States. This is discussed more fully in the following section.

REGULATION OF ROAD TRANSPORT

A considerable amount of legislation has been enacted to control road freight operations. Although some regulations were primarily aimed at registration and safety. others were aimed at economic regulation of the industry. In the latter case, legislation was enacted or amended by all States during the early 1930s in an attempt to protect their railway systems from the effects of increasing road competition. In general, the regulations prohibited the transportation of certain goods by road outside urban areas. taxed road freight transport competing directly with rail services², and applied a licensing system. Prior to World War II, road-rail competition existed mainly in intrastate trade, as interstate trade was dominated by sea transport. The post-war prosperity generated increased trade between the States, and road operators expanded their operations to cover this. In 1954, the Privy Council decision in the Hughes and Vale case exempted all forms of interstate transport in Australia from economic regulation. The Privy Council ruled that charges levied on interstate road freight movements violated section 92 of the Constitution.³ However, the High Court subsequently sustained the States' argument that interstate road operators should contribute towards the cost of wear and tear caused to the roads by their vehicles, but ruled invalid all regulations levying 'excessive' charges for the use of the roads. It also stated that the proceeds of these charges could only be used for road maintenance purposes.

A ton-mile charge⁴ was introduced by NSW from May 1958. It applied to trucks with a carrying capacity of 4 tons (4.1 tonnes) or more. The road maintenance charge, as it was known, was designed to take account of a truck's size and carrying capacity, and also the frequency of its use on NSW roads. In order to monitor these movements, the DMT established truck checking stations on the Hume and Pacific Highways, and mobile patrols on other routes.

There has been considerable public debate over the incidence of truck overloading. evasion of co-ordination and/or road maintenance charges by some operators, and the desirability of alterations to limits on truck dimensions and weights. This debate arose

^{1.} Commercial vehicles include utilities, panel vans, rigid and articulated trucks, other truck-type vehicles (not designed to carry freight, such as street flushers) and buses. It was not possible to obtain separate data on rigid and articulated trucks for most of the period 1926 to 1976 (ABS 1974, 1979).

^{2.} By means of a 'co-ordination charge'.

^{4.} As provided for in the Road Maintenance (Contribution) Act 1958.



Figure 1.1 Commercial vehicles on register—Australia

BTE Information Paper 6

partly as a result of the expansion in interstate road freight haulage since the previously mentioned 1954 Privy Council decision. This expansion can be attributed in part to the fact that the size of the road maintenance charge was only a fraction of the railway protection tax previously levied on interstate hauliers.¹ It should be emphasised that *intrastate* road transport continued to be constrained by 'co-ordination' legislation protecting the State railways from competition. It was not until 1974 that intrastate transport in NSW was effectively released from this control. A direct consequence was the substantial increase in truck registrations after 1974, as indicated in Figure 1.1.

ROAD FREIGHT DATA

Despite the significant size of the freight task performed by road vehicles and the existence of a regulatory framework controlling various facets of road transport, details of tonnages carried by road operators are difficult to ascertain, particularly on an origin-destination basis. The principal problem is that the industry includes large numbers of small operators. They are not easy to survey, and in any case many do not keep records for other than essential administrative purposes. Aggregate data on tonnages consigned by major freight forwarders along specified interstate routes have been collected by the Australian Bureau of Statistics (ABS) since 1971-72 but, unfortunately, the proportion of the total freight task handled by these companies varies considerably from route to route. As a consequence, information from this ABS collection is circulated only to users of statistical information with a particular interest in and knowledge of the road transport industry. The ABS considers this information more useful as a growth index than as an indicator of absolute tonnages carried.

Another potential source of road freight data is the Survey of Motor Vehicle Usage (SMVU) conducted by the ABS in 1963, 1971, 1976 and 1979. In the 1976 survey (ABS 1978a), the owners of 53 000 vehicles other than buses were approached for information on usage of their vehicles during the twelve months ended 30 September 1976. The main purpose of the survey was to determine total distance travelled by the vehicles, classified by area and purpose of travel. It should be emphasised that the survey was not designed to collect information on an origin-destination basis and its value in this area is limited.²

It is in the area of origin-destination information on road freight movements that the BTE has a continuing requirement. One promising source of data was the NSW Department of Motor Transport (DMT), which operates truck checking stations in NSW on the Hume and Pacific Highways. These checking stations are located at Marulan and Berowra, NSW. The DMT operates these stations and a system of road patrols in order to enforce road transport legislation for which it has responsibility.³

Following a request from the BTE in 1972, the DMT agreed to make data available on a sample of individual truck movements through these stations. To preserve confidentiality, all details enabling identification of truck owners were excluded from this information. The BTE, with the assistance of the DMT and the ABS, commenced collection of data in mid-1972. The survey involved the collection of details of origin and destination, tonnage and type of commodity carried, for all trucks passing through

Rimmer (1970) estimated that the average level of taxation per ton of freight moving between Sydney and Melbourne was reduced from about \$11 per ton (\$10.83 per tonne) to about \$1.50 per ton (\$1.48 per tonne).

The BTE assessed the suitability of SMVU data as part of the broader task of estimating interregional freight movements by all modes during 1975–76. It was found to have substantial limitations for this application (BTE 1978a).

^{3.} This legislation includes the State Transport (Co-ordination) Act, 1931, certain provisions of which were abolished in 1974, and the Motor Transport Regulations, 1935 which include provisions relating to roadworthiness and safety. Until 1979, the DMT also enforced the provisions of the Road Maintenance (Contribution) Act, 1958.

the stations during each of twelve twenty-four hour periods¹ for the first year. In later years, the survey was conducted on six days annually at each station. Origin and destination data for unladen trucks was collected during the initial three years of the survey. On survey days, officers of the DMT adopted special procedures to collect the data for processing by the BTE. The survey terminated as a result of the NSW Government's decision to cease the collection of the road maintenance charge from 1 July 1979. The six-year duration of the survey covers an interesting period in the development of road freight—particularly in NSW, where the co-ordination charge (designed to protect rail from road competition) was phased out over several years and finally abolished on 1 January 1974.

Some knowledge of the legislation affecting road transport in NSW is useful in order to gain an understanding of the survey's results. In particular, prior to 1974, the road transport of some commodities was more constrained than for other commodities. Chapter 2 describes this legislation in general terms and explains the enforcement role of the previously mentioned truck checking stations on the Hume and Pacific Highways. Chapter 3 outlines the methodology of the BTE truck survey and Chapter 4 discusses the results, noting the growth in terms of tonnages carried by road and the implications for competing modes, particularly the railways. Concluding remarks are made in Chapter 5.

^{1.} That is, one day for each station, on a monthly basis.

CHAPTER 2—ROAD TRANSPORT LEGISLATION IN NSW

The control of road transport in NSW is vested in a statutory authority known as the Department of Motor Transport (DMT), headed by a Commissioner. The DMT was formed in 1952 and took over some of the functions of the former Department of Road Transport and Tramways, which in 1930 had assumed responsibility for licensing and registration from the Police Department. Under the Motor Traffic Act, 1909, it is compulsory for most classes of drivers to be licensed and vehicles registered. Figure 2.1 indicates the growth in commercial vehicle registrations *vis a vis* total registrations in NSW.¹ Commercial vehicle registrations increased at a faster rate than overall registrations until about 1951 when they constituted 34 per cent of the total. The subsequent divergence in growth rates is evident from Figure 2.1. In 1976, less than 18 per cent of registrations were in the commercial category.

The growth in commercial vehicle registrations during the 1920s culminated in pressure for protection of the railways from road competition. This situation occurred in all States and the subsequent legislation to protect the railways was generally justified on the basis that road freight operators did not have the same responsibilities as did the railways, who were common carriers.²

It was also argued that loss of traffic to other modes would raise unit operating costs for the remaining rail traffic. This would also make it more difficult for the railways to crosssubsidise the haulage of primary products at low rates.

STATE TRANSPORT (CO-ORDINATION) ACT, 1931

The NSW Parliament passed the State Transport (Co-ordination) Act,1931 which was intended 'to provide for the improvement and for the co-ordination by means of, and facilities for, locomotion and transport'. However, as indicated by the tone of parliamentary debates of the day, its practical intention was to improve the financial situation of the NSW railways, whose \$8.6 million deficit in 1930-31 comprised almost half the total State deficit of \$17.4 million.

Section 4 of the Act created a Board which was subject to the control of the Minister. The Board was to consist of four Commissioners and its initial task was to recommend an acceptable means of co-ordination of the following transport bodies:

- Railway Commissioners;
- Transport Trust;
- Commissioner of Road Transport; and

However, where competition exists between the railways and any other mode, the former are allowed to enter into special contracts (at lower rates) for the cartage of goods or passengers (Sections 24(4) and 24(6) respectively).

^{1.} The definition of commercial vehicles is as outlined in Chapter 1. Data for NSW are available from 1921 (ABS 1974). The 2.2 million vehicles registered in NSW at 30 June 1976 included 115 700 rigid trucks and 13 100 articulated trucks (ABS 1979).

Section 33 of the (NSW) Government Railways Act, 1912 states that 'in respect of the carriage of persons, animals and goods, the Commissioners shall be common carriers'. The Act does not explicitly define a common carrier, but Sections 24 and 36 provide some insight:

Section 24(1) indicates that the Commissioners are expected to 'carry and convey all such passengers and goods as are offered for that purpose, and may demand reasonable tolls and charges in respect thereof'; and

Section 35 prohibits the granting of 'undue or unreasonable preference or advantage to any particular person or . . . traffic'.



Figure 2.1 Vehicles on register—New South Wales

Main Roads Board.

The administration and control of the above was to be under one corporate body, and the Board was to provide a draft bill for the legislation necessary to give effect to their report.

The Act required all operators of motor vehicles used for hire and reward to hold licences to operate particular routes. In deciding on the granting of a licence, the Board established under the Act could take into account all factors considered relevant, particularly:

- road and route suitability;
- current servicing of the proposed areas;
- the extent to which the proposed service was necessary or desirable in the public interest; and
- the needs of the whole district in relation to traffic, the elimination of unnecessary services, and the co-ordination of all forms of transport. (There was no specific mention of the desirability or otherwise of road competition with the railways.)

The Act empowered the Board to levy any form of fee on the licensee. If the fee was on a distance basis, it was not to exceed 3 pence per ton of the aggregate weight¹ of the vehicle. This charge was altered to 2.5 cents per tonne in 1965. Exemptions from payment of the ton-mileage charge were made in respect of:

- journeys of less than 20 miles (32 kilometres);
- conveyance of goods to the nearest railway station; and
- journeys to areas where the state of the roads or trapsport facilities were poor.

Payments out of revenue accumulated in the State Transport (Co-ordination) Fund could be made to the Country Main Roads Fund, the Government Railways Fund or to the general fund of any transport trust. In practice, the administration of the Act meant that carriage by road of some commodities in excess of 20 miles was prohibited, while there was a ton-mile charge on others.

Amendments to the Act

In 1932, the NSW government extended the 20 mile (32 kilometre) exemption limit to 50 miles (80 kilometres) but there were few changes over the period until 1954 when interstate road transport was freed from economic regulation. This resulted from the Privy Council's decision in the Hughes and Vale case. As mentioned in the previous chapter, State regulation in this area was held to be contrary to section 92 of the Constitution.

From time to time, the exemption limits were amended in respect of particular commodities. For example, in 1968 movements of sorghum and oats less than 50 miles (80 kilometres) were subject to co-ordination charges, while the relevant distance for sheep and cattle was 100 miles (160 kilometres). In 1973, exemption distances of up to 240 kilometres applied in respect of certain commodities.

The first substantial relaxation of control over intrastate transport in NSW was on 1 July 1971 when all journeys conducted wholly within country areas² were exempted from charges, except for basic bulk commodities such as grain, coal, livestock and cement. A year later, all journeys originating in country areas were exempted, regardless of destination. However, basic bulk commodities (with the exception of livestock and coarse grains) again were not included in this exemption.

^{1.} That is, the sum of the tare weight of a vehicle and its carrying capacity.

^{2.} That is, outside the County of Cumberland. Cities of Newcastle and Wollongong, and Shires of Gosford, Lake Macquarie and Wyong.

BTE Information Paper 6

From 1 January 1974 it was not necessary to obtain a permit to carry goods by road within NSW¹, although vehicles still had to be licensed to carry goods. This change brought to an end a period of over forty years of protection of the NSW railway system from road competition.

ROAD MAINTENANCE (CONTRIBUTION) ACT 1958

During the late 1950s and 1960s the States introduced new charges in order to restore some of the revenue lost as a result of the 1954 Privy Council decision on co-ordination charges in relation to interstate hauliers. The co-ordination charge continued to apply to intrastate hauliers.

In NSW, the *Road Maintenance (Contribution) Act*, 1958 imposed a charge on interstate and intrastate operators which was designed to cover the wear and tear caused to the roads by their trucks. Owners of commercial vehicles of more than 4 tons (4.1 tonnes) carrying capacity were required to pay a charge at the rate of one-third of a penny per ton-mile² travelled on NSW roads. The charge was based on the unladen weight of the vehicle plus 40 per cent of carrying capacity and applied to all journeys, whether laden or empty.

Table 2.1 indicates the revenue raised from road maintenance and co-ordination charges over the past decade. The decline in co-ordination charge collections after the abolition of the permit system in January 1974 is obvious. Road maintenance charges grew significantly around this time as the abolition of the co-ordination charge was accompanied by an intensification of the expansion already occurring in intrastate road transport. Intrastate operators had commonly evaded the co-ordination charge by transporting goods interstate—a practice widely known as 'border-hopping'. Another factor was that customers were increasingly prepared to pay the premium represented by the co-ordination charge where they strongly preferred road transport to rail for commodities liable for the charge but not prohibited from road transport. Road maintenance charges peaked comparatively soon afterwards, during the 1974-75 financial year. The failure of road maintenance charge collections to keep pace with the expansion in road transport was largely a result of evasion by road operators who set up companies outside NSW, with little or no assets. These were known as 'straw' companies. In its 1977-78 Annual Report the DMT noted the existence of about 210 'straw' companies incorporated in South Australia which were estimated to operate over 2000 trucks. Furthermore, the DMT estimated the annual loss of revenue to NSW was in excess of \$2.5 million.

DMT also acknowledged that the increasing evasion 'caused discontent amongst operators who are complying with their obligations under the Act but are often competing against those who are avoiding the payment of charges by this device' (DMT 1978). The number of successful prosecutions for failure to pay road maintenance charges declined from 7681 in 1972–73 to 4329 in 1977–78 (DMT 1973, 1978).

In recent years, owner-drivers have experienced a cost-price squeeze due to the combined effects of inflation and vigorous competition for freight business. Ease of entry into the industry has resulted in an oversupply of carriers³ at a time when demand for transport services has been subdued, due to the recession in the Australian economy. Over several years, owner-drivers had been campaigning for the abolition of the road maintenance tax, and this campaign culminated on 2 April 1979 when a blockade⁴ of truck traffic commenced on the Hume Highway at Razorback Mountain.

The blockade spread rapidly to other centres in NSW and interstate. All States

4. The background to the dispute is documented elsewhere in BTE (1979).

^{1.} Except for over-width or over-length loads, etc.

^{2.} Later converted to five-eighteenths of a cent per ton-mile and finally 0.17 cents per tonne-kilometre. At no time was the charge increased.

^{3.} Marginal operators found it difficult to leave the industry as the price of second-hand trucks had fallen as a result of the investment allowance available on purchase of new trucks.

subsequently agreed to abolish their road maintenance taxes with effect from 1July 1979. In NSW this loss of revenue was not restored by introduction of a fuel tax. Instead, vehicles which had previously been subject to charges under the Road Maintenance (Contribution) Act were to pay the full rate of registration weight tax¹ from 1 January 1980 (DMR 1980). This measure was estimated to result in an average increase in registration charges of \$300 per commercial vehicle per annum, raising about \$6 million revenue per annum.

TABLE 2.1 — REVENUE FROM CHARGES PAYABLE UNDER THE STATE TRANSPORT (CO-ORDINATION) AND ROAD MAINTENANCE (CONTRIBUTION) ACTS, 1969-70 TO 1978-79

Year ended 30 June	State Transport (Co-ordination)	Road Ma (Contribu	intenance Ition) Act ^b	Total
	Acta	Intrastate	Interstate	
1970	4 599	15 8	B72°	20 471
1971	4 950	16 8	841°	21 791
1972	5 387	17 (687°	23 074
1973	5 694	12 449	5 928	24 071
1974	2 509	12 965	6 807	22 281
1975	2	14 448	6 375	20 825
1976	1	14 064	6 262	20 327
1977	-9 ª	14 398	5 459	19 848
1978	e	14 247	4 823	19 070
1979	e	14 888	4 876	19 675

(\$'000)

NOTE: Interstate traffic is that crossing State borders. Intrastate traffic includes State/Territory traffic (for example, NSW to ACT).

 Net charges levied on intrastate transport of goods. Excludes licence and miscellaneous fees, and receipts from fines and penalties.

b. Net charges after deduction of refunds.

c. No intra/interstate breakdown available.

d. Indicates that refunds exceeded receipts.

e. Less than \$1000.

Source: NSW Department of Motor Transport, Annual Reports.

Prior to the introduction of the road maintenance charges in May 1958, all vehicles not used substantially for private purposes were subject to a tax calculated on their tare weight. From May 1958 a reduction of 50 per cent of the weight tax was allowed in respect of primary producers' vehicles and this reduction applied after January 1960 to all other trucks liable for the road maintenance charge. In January 1972 the concession was reduced to 33'/a per cent, and it was abolished entirely on 31 December 1979.

CHAPTER 3—DESCRIPTION OF SURVEY

In 1972 the BTE initiated discussions with the DMT with a view to obtaining details of a sample of trucks passing through the Department's two truck checking stations. These were considered to be ideal survey points as they are located to maximise the interception of truck traffic into and out of Sydney. They provide a reasonable cordon for traffic to and from the south-west and north of the State.

One truck checking station is located at Marulan, 180 kilometres south-west of Sydney on the Hume Highway and the other is at Berowra, almost 40 kilometres north of Sydney on the Pacific Highway. Figure 3.1 indicates the stations' positions on the major highways leading out of Sydney. This chapter elaborates on the stations' functions and defines their areas of influence. The selection of the sample and other aspects of the survey design and management are also discussed.

TRUCK CHECKING STATIONS

The DMT maintains surveillance over road transport activities throughout NSW. Departmental inspectors are allocated to regional districts and are responsible for ensuring that operators comply with the appropriate transport regulations. The main means of enforcement are the vehicle sightings reported by road patrols and departmental checking stations. The functions of the checking stations include the following:

- check of drivers' logbooks to ensure that regulations concerning the balance between driving and rest hours is observed;
- weighing of trucks to detect overloading (that is, exceeding permissible vehicle and axle loads);
- collection of information for each truck including ownership, origin, destination, commodity carried, tare and aggregate or gross weight¹; and
- the conduct of random safety checks.

COVERAGE

These checking stations are continuously manned by DMT officers. All trucks and buses weighing more than two tonnes travelling past these stations on the Hume and Pacific Highways are required to call at them. The stations were therefore well situated for the collection of data on road freight movements, and the information collected during their normal checking procedures constituted most of the information required for the BTE survey. The transport routes covered by each of the two checking stations are discussed below in more detail.

Marulan

The Marulan truck checking station intercepts the following major categories of traffic:

- Hume Highway traffic from Sydney and north coastal locations to south-western NSW and Victoria¹, and vice versa; and
- Illawarra and Hume Highway traffic from Wollongong/Port Kembla to southwestern NSW and Victoria², and vice versa.

2. Also traffic intending to take the Sturt Highway via Narrandera to South and Western Australia.

^{1.} This information was collected until the abolition of the road maintenance charge.

BTE Information Paper 6

Interstate traffic predominates, with traffic between Sydney and Melbourne (and vice versa) accounting for almost half the estimated total tonnage through Marulan. It should be noted that there are 'leakages' of traffic around Marulan which affect the validity of some of the survey estimates. For example, traffic from Sydney to South Australia and Mildura can travel through Lithgow via the Great Western Highway¹, although this is a slower route than via the Hume Highway. As far as intrastate traffic is concerned, there is almost no coverage at Marulan of trucks travelling between Sydney and the Central West and Far West regions of NSW.

In the case of traffic from Sydney and Wollongong to Melbourne, a small proportion may travel via the Princes Highway, but again this is a slower route and would only be attractive to carriers of loads destined for pick-up or drop-off *en route*. In fact, Joy (1964) estimated that at least 95 per cent of road freight between Sydney and Melbourne travelled through Marulan.

Berowra

In contrast to Marulan, about three-quarters of the traffic through Berowra checking station is intrastate traffic. The major categories are as follows:

- Sydney and Wollongong/Port Kembla to Gosford, Newcastle, the NSW North Coast and Northern Tablelands, and vice versa;
- Sydney and Wollongong/Port Kembla to Brisbane and vice versa; and
- Newcastle to south-western NSW and Victoria, and vice versa.

The most important 'leakage' around Berowra is the Putty Road between Sydney and Singleton. Although narrow and hilly, it is understood that some truck operators use this route to avoid the Berowra truck checking station.²

The reasons why operators might try to avoid Berowra or Marulan would include:

- availability of a shorter route to their destination or a more circuitous one offering revenue loads;
- avoidance of regulatory checks at the stations, including inspection of the driver's logbook (to detect excessive driving hours) and weighing of the vehicle (to detect overloading); and
- evasion of co-ordination of road maintenance charges while these were imposed.

SAMPLE SELECTION

Although the checking stations intercepted all trucks with an unladen (tare) weight in excess of 2 tonnes, detailed information was collected only on trucks with a *carrying capacity* of 4.1 tonnes or more.³ It was therefore practical to sample trucks only in this category. The BTE initially arranged to sample these trucks over a twenty-four-hour period once a month at each checking station. Assuming the particular twenty-four-hour period was chosen at random, this would represent an approximate 3.3 per cent sample of annual traffic with carrying capacity of 4.1 tonnes or more. The first survey days chosen were 19 July 1972 at Marulan and 24 July 1972 at Berowra. After discussions with DMT and appraisal of the results from the first four months' sample days, it was decided to set sample days at Marulan on Tuesdays, Wednesdays or Thursdays. The greatest daily traffic movements occurred on these days. Thus a significant improvement in the sample size could be achieved by avoiding low traffic

^{1.} Choice of this Highway would of course be influenced by the availability of loads en route.

^{2.} Nevertheless, trucks might still encounter a mobile DMT or DMR patrol along the Putty Road.

^{3.} Trucks of a lesser carrying capacity were not subject to the road maintenance charge. In practice these were very small trucks which would normally be engaged in local deliveries.



15

BTE Information Paper 6

days around weekends and public holidays.¹ Care was taken to ensure that each year's sample dates were distributed relatively evenly through the first to fourth weeks of the survey months.

At Berowra, it was evident that truck flows were relatively even throughout the week from Monday to Friday. Sample dates were therefore selected on these days and (as at Marulan) they were spread through the first to fourth weeks of the survey months.

After the first survey year, staff constraints made it necessary for the BTE to reduce the frequency of the survey to one sample day at each checking station every second month (that is, six sample days per year instead of twelve). An ABS officer assisted with the data coding from the beginning of the second year of the survey and this arrangement continued until October 1977, when DMT personnel took over the complete coding task. It was not possible to conduct the survey on the dates scheduled in April and June 1979, as a truck blockade² of the major highways early in April resulted in the abolition of the road maintenance charge and associated procedures such as the completion of truck checking slips.

INFORMATION COLLECTED

'Goods Vehicle Checking Slips' were designed by DMT to provide the information necessary for administration of the co-ordination charge and road maintenance charge. In addition to basic information such as the names of the truck owner and driver, truck registration number, truck type (for example, semi-trailer, tipper), and details from the driver's logbook³, the slips had provision for collection of the following details relevant to the BTE survey:

- date and time observed;
- number of axles;
- tare weight;
- aggregate weight⁴;
- scale weight⁵:
- commodity carried⁶;
- origin; and
- destination.

Each of these items will be discussed at greater length below. It should be noted that at no time did the sampled 'goods vehicle checking slips' leave the DMT offices. The survey data were transcribed from these slips to coding sheets (Figure 3.2) designed by the ADP Branch of the Department of Transport Australia to facilitate input of data to the survey processing system.

Survey dates and times

The selection of sample days at Marulan and Berowra was discussed earlier. All

For the purposes of random selection, this procedure assumed comparable distribution of truck characteristics over all days. It should be noted that the scaling factor used to raise the survey's results to population levels was based on the ratio of the trucks in the sample to those recorded as passing through the checking stations during the whole twelve-month period. Thus high traffic movements on sample days would not result in overestimates of total tonnages.

^{2.} Described in Chapter 2.

^{3.} No details enabling identification of particular truck owners or operators were collected for the BTE survey. This was in accordance with DMT policy regarding confidentiality of truck records.

^{4.} Aggregate weight is the total of the tare weight and carrying capacity.

^{5.} Scale or recorded weight is that actually observed while the truck is over the station weighbridge. The road maintenance charge was computed on the basis of the truck's tare weight plus 40 per cent of its carrying capacity. Therefore DMT officers ordinarily had no need to record the scale weight on the checking slip except where overloading was evident. Special arrangements were made on BTE survey days to have the scale weight inserted on all slips.

^{6.} After December 1976, trucks travelling empty were not included in the BTE survey. This action was taken because truck numbers had increased considerably since the commencement of the survey and both the BTE and ABS were unable to allocate additional staff to the survey.

						DESCRIP	TION OF DATA										
	L)	DEPARTM	ENT OF	TR A	NSPORT	STATID SAMPL		9/2/6	178 178			SC			DPSS	60 °	12
	F	RANSA	CTION (CODINC	S SHEET	IMPORTA	NT; 0-ZERO Ø-ALPHA 0 Use secon	1 and ev	Pincon Tracond TVHAT TONE	Z-TWO Z-ALPHA Z Hine, Print clear	2	PUNCHING CO	ре с л яр о V H	OLOUR.TYPE	INTERPRET	DATE 28/6/	36
NOITA	DATE		1E Nº EEL Nº	же	ש א ד ב גבו	AGGREGATE	ERECORDED	YTIGOMM	N 0 I T A N I T 2 N 0 I T A N I T 2	COLUN	MNS 36 t	o 77 N	01 10	BE PL	NCHED		МАЯВО .ти Эо
15 -	M M Q Q	> <u>-</u> > -	HS .		A WEIGHT 14 15 16 17 18 14	WEIGHT	W E I G H T	00 10	2 33 34 35 E	L	COMMODITY		ORIGIN	DESTI	ATION		я а н
1				ļ Ē,							بالصالي الرير لم سالسال			- - -			
1				17	6 17.0.0%	13.0505	201110	265	20202						 		Rio, I
				32	2 81.00	321,000	19600	2	93.0	- 111L							
				121	1211		1123,00	475	930								LIOIA
			11	125	2 40.00	227.0.00	24900	22	1930								R I OI I
İ.	1 1			776	1345	3491811	15200	3	222			-					RIOI
t I				200	613456	3,600,6	30300	24	243.0								Roll
				- - -		<u>איטימכואן</u>	11111	<u>ا الا</u>	2-7								R1011
				21	514541	36417	249,00	<u>4,5/5</u> / 5/5	930								Riet
				10	10, 0, 0,			10									
11			1-1	32	1223	335400	24.200		202								RICII
1-1	 			-8			33500	245	920								R. 0
			-	22	15000	360.00	33.800	5.	030								R.O.I
				20	6 234	1010	33,300	425	930								Riol
t	>		-]		200216	012101210	11.7.0.0.0	222	020								RIOI
Ē	515		11 01 6	12	14 25 16 17 18 19	20 21 22 23 24	25 26 27 28 29	16 32	33 34 35 35	37 38 39 46 41	42 43 44 45 46 47 4	1 49 50 51 52 53	54 55 54 57 58 59	10 11 12 13 14	15 64 67 68 69 78 7	1 22 24 24 25 24 27	7 17 18
Σ	374																

Figure 3.2 Example of survey coding sheet

checking slips for trucks with a carrying capacity of four tonnes or more which passed through the stations during the twenty-four hour period were set aside for coding and subsequent processing. The checking slip for each vehicle indicated the time as well as the date of contact so it was also possible, if necessary, to determine the hourly truck traffic density on sample days.

Number of axles

The major objective of the BTE survey was to estimate tonnages carried by road between various origins and destinations along two major highways in NSW. Another useful product of the survey was an indication of the distribution by number of axles of the truck fleet involved in the carriage of goods to and from Sydney. In cases where scale weight had not been recorded¹, it was possible to statistically impute the scale weight by relating the truck's tare weight to those of other trucks in the same axle/commodity group and to their scale weights.

Scale weight

The actual weight of the truck with its load was recorded by DMT inspectors for the BTE survey. The road maintenance charge is not related to scale weight, but inspectors normally watch for overloading by comparing the scale weight with the registered maximum permissible weight (that is, the aggregate weight).

Tare weight

Tare weight was collected for all trucks in the survey in order to ascertain the weight of the truck's load. The latter weight is the difference between the scale and tare weights. All trucks weighing 2 tonnes or more when unladen are required to display their tare weights. Older trucks often displayed pre-metric weights (in hundredweights) which were three-digit figures. These were converted to kilograms (four or five digits) by the processing system. A few pre-metric weights appear in Figure 3.2.

Aggregate weight

Trucks are also required to display their aggregate or maximum permissible weight when laden. This is also known as gross weight. The difference between the aggregate and tare weight gives the truck's maximum carrying capacity—a factor influencing the size of the road maintenance charge payable. The BTE survey covered trucks with a carrying capacity of 4 tonnes or more because, as previously mentioned, checking slips were completed in sufficient detail only for trucks of this category.

Commodity

The nature of loads carried by road varies considerably according to the route, particularly in situations where the NSW co-ordination charge was applied to restrict road competition with the railways. To assist analysis, a system of commodity codes was devised by the BTE after assessment of a pilot sample of checking slips. Special attention was given to the terminology used by the DMT inspectors at the checking stations in order to minimise misunderstanding when coding their descriptions. For example, the term 'metal' invariably referred to blue metal (crushed stone, often used in concrete) rather than iron and steel or other metals. Table 3.1 shows the commodity classification devised for the survey. The examples shown next to the categories are those commodities most frequently encountered.² Some problems were encountered

^{1.} It was occasionally difficult to decipher figures on individual truck checking slips when preparing data, and some slips did not contain all details,

The survey results discussed in this paper have been aggregated to the major single-digit categories (that is 1-9) as sample sizes for many of the subcategories (those with two-digit codes) were not sufficiently large to give meaningful results.

with ambiguous or unclear commodity descriptions¹ on the checking slips and those which could not be resolved were coded as 'not known'.

Origin and destination

Towns cited as origins or destinations on checking slips were coded on a regional basis using 1971 Census subdivisions. Figure 3.3 shows the New South Wales regions and their principal centres. A separate region was created to cover the Albury-Wodonga regional growth centre. All interstate origins and destinations were also coded according to a system based on 1971 Census subdivisions.² On four of the sample days during 1976-77, a special coding operation was undertaken to identify suburban origins and destinations within the Sydney subdivision. This operation was possible since drivers often specify major suburban locations within Sydney when supplying origin or destination information to DMT inspectors at the checking stations. A description of the Sydney subregions and the results of this part of the survey were produced separately (BTE 1978b). Chapter 4 discusses the results of the main survey with emphasis on the interesting trends evident over the period from 1972-73 to 1977-78.

TABLE 3.1—COMMODITY CLASSIFICATIONS USED IN THE SURVEY

00 Empty vehicles

- 1. Livestock
 - 11 Cattle
 - 13 Sheep
 - 15 Poultry
 - 19 Other

2. Foodstuffs

- 21 Potatoes
- 22 Other fruit and vegetables (unprepared)
- 23 Other unprocessed products (eg frozen vegetables, eggs)
- 24 Milk and other liquids (eq wine, beer, fruit juice)
- 25 Meat and fish (including oysters)
- 26 Processed foods (eg butter, flour, ice-cream, smallgoods, cordials, frozen chickens, dog food)
- 28 Prepared foods (eg groceries, tobacco, glucose, honey, sugar, confectionery) 29 Not stated
- 3. Other farm products
 - 31 Unprepared (eg grain, wool, chaff, bones, skins, turf, tallow, peanuts, offal, stockfeed, seed, plants)
 - 32 Prepared (eg gluten, starch, safflower oil, soya bean meal, meat meal, malt)39 Not stated

4. Minerals, metals and metal products

- 41 Coal and coke
- 42 Other minerals (eg lime, limestone, crude asbestos, salt)
- 43 Scrap metal
- 44 Iron and steel products (including pipes)
- 45 Other metals
- 46 Metal products (eg bearings, wire cable, caravans)
- Machinery and equipment 48
- 49 Not stated

^{1.} One example was the commodity description: 'chicken'. It could be coded as live poultry (code 15) or as processed frozen chicken (code 26). In practice it was possible to determine the appropriate code from the slip after checking the name of the truck's owner (often a well-known company) or the type of truck (for example, refrigerated van).

^{2.} However, sample sizes on interstate routes to Victorian centres outside Melbourne (in the case of trucks sampled at Marulan) and Queensland centres outside Brisbane (in the case of Berowra) were insufficient to justify presentation of detailed interstate results.

TABLE 3.1-COMMODITY CLASSIFICATIONS USED IN THE SURVEY (con't)

5. Building materials

- 51 Natural materials (eg loam, sandstone, blue metal, clay, ash, shale)
- 52 Bricks
- 53 Timber and timber products (including masonite)
- 54 Tiles and pipes (earthenware)
- 55 Fibro products and cement
- 56 Glass
- 57 Building sections (eg roofing, trusses)
- 58 Fittings (including paint but not furniture)
- 59 Not stated

6. Petroleum products and chemicals

- 61 Petroleum products (including bitumen)
- 63 Superphosphate
- 65 Chemicals (including unspecified fertiliser)
- 66 Plastics
- 67 Gases

7. Paper, rubber and miscellaneous goods

- 71 Rubber and rubber goods (eg tyres)
- 73 Paper (not waste)
- 75 Furniture and furnishings (eg carpets)
- 77 Domestic appliances
- 78 Electrical (unspecified)
- 79 Other goods (eg consumer goods such as toys, boats, textiles, fibreglass, yarn, foam, hardware)

8. Outside packages

- 81 Empty bottles and cans
- 83 Empty containers, pallets, crates, kegs, drums, tanks
- 85 Empty bags and cartons
- 87 Waste paper

9. Unidentified goods

- 91 General (including mixed goods, loaded containers etc.)
- 95 Parcels
- 99 Not known

NOTE: Codes 12, 14, 16, 17, 18 etc. not allocated.



21

CHAPTER 4—SURVEY RESULTS

The purpose of this chapter is to present a summary of the results obtained from the truck surveys at Marulan and Berowra truck checking stations. Preliminary results for the years 1972-73 to 1976-77 have previously been published (BTE 1975, 1976a, 1976b, 1978c) for limited circulation by DMT. These results have since been revised and converted to metric units where necessary, for inclusion in this paper. The 1977-78 results have not previously been published, nor have estimates of the survey's accuracy. Sample figures have been expanded to annual estimates for movements through the checking stations. The expansion procedures are detailed in Appendix I. However, the reader should be cautioned that expansions of distributional results (that is, commodity movements and movements by destinations) are fairly crude. Consequently care should be taken when interpreting these figures and reference should be made to the relevant statistical errors of these estimates.

For most estimates relating to 1977–78, corresponding relative standard errors (RSE) have been calculated.¹ The RSE expressed in percentage terms is shown in brackets under the relevant tabulated estimate where available. The derivation of the RSE² and its application to the survey data are described in detail in Appendix I. Expanded results based on the survey data are summarised in the form of four tabulations for each survey year in Appendix II.

Some of the RSEs associated with the estimates contained in this paper are quite high. However, any limit on RSEs for publication purposes would have been arbitrary and it was therefore decided to publish the figures, leaving it to users to exercise the necessary caution in applying the statistics for their particular purposes.

The basic analyses carried out in this study were analyses of the amount of freight, and the sampling unit was the truck. Actual truck movements are tabulated in Appendix III.

FREIGHT OVERVIEW

Table 4.1 indicates the tonnages estimated to have travelled through the checking stations during the six years of the survey. Total tonnages of road freight passing through the checking stations at Marulan and Berowra increased by 45 per cent from 1972–73 to 1977–78. Most of this growth was in the intrastate category which more than doubled at Marulan and increased by 81 per cent at Berowra. Interstate traffic growth was subdued in comparison, reaching a peak at Berowra in 1975–76, just over 20 per cent higher than in 1972–73 and a peak at Marulan in 1976–77, almost 25 per cent higher than in 1972–73.

The nature of the freight and length of haul differed greatly between the two stations. In 1977–78, about 64 per cent of the tonnage processed at Marulan was carried interstate while at Berowra the interstate proportion was only 20 per cent.³ The explanation for this is that Berowra is closer to Sydney than Marulan, and it processes a considerable amount of short-haul freight traffic between Sydney and the comparatively densely populated central coast region of NSW which includes Newcastle and Gosford-Wyong.

^{1.} RSEs were also calculated for 1976-77 as a check on their stability between the two years. The 1976-77 RSE estimates are shown in Appendix I.

^{2.} Briefly, the RSE is defined as the ratio of the standard error of an estimate (mean) to the value of the estimate (mean).

^{3.} In 1972-73 the respective proportions of interstate traffic at the respective stations were 77 per cent and 27 per cent.

BTE Information Paper 6

On the other hand, Marulan processes traffic between Australia's two largest cities, Sydney and Melbourne. In the intrastate category the principal routes processed at Marulan are from Sydney to Goulburn, Canberra and centres in the Riverina.

TABLE 4.1—ESTIMATES OF FREIGHT PASSING THROUGH MARULAN AND BEROWRA

Year	·	Marulan		<u> </u>	Berowra	
ended 30 June	Interstate	Intrastate®	Total	Interstate	Intrastateª	Total
1973	2 643	785	3 428	646	1 718	2 364
1974	2 876	986	3 862	715	2 501	3 216
1975	2 813	1 062	3 875	741	2 818	3 559
1976	3 135	1 498	4 633	781	2 861	3 642
1977	3 300	1 564	4 864	765	3 060	3 825
1978	2 926	1 616	4 542	762	3 112	3 874

a. Includes traffic between NSW and ACT.

Average load per truck

In recent years larger trucks have been appearing on the roads in increasing numbers. The tendency towards larger and more efficient trucks has been encouraged by several factors, the most important of which are that:

- individual operators have had to meet competition by maximising the productivity of labour and equipment; and
- the existence of an investment allowance in recent years which allowed tax benefits to be derived from purchases of capital equipment.¹

The BTE survey covered trucks with a carrying capacity² of 4.1 tonnes or more. Information on very small trucks and utilities was not available as these small vehicles were not liable for the road maintenance charge, and would in any case tend to be used mostly in an urban or local delivery role. Table 4.2 indicates that average loads in the survey increased during the period from 1972–73 to 1976–77, and that there was an overall decline during 1977–78. This decline reflected the increased number of trucks available to carry the cargo available. The only average load category to increase during 1977–78 was intrastate loads passing through Marulan.

The next two sections provide a summary of the intra and interstate traffic (in terms of major origins and destinations) which was processed through Marulan and Berowra checking stations during the most recent survey years 1977–78. Changes in the intrastate-interstate split for each station during the years 1972–73 to 1977–78 were summarised in Table 4.1.

Intrastate road freight patterns

In 1977–78 about 37 per cent of the intrastate³ road tonnage passing through Marulan was consigned from Sydney and about 27 per cent was consigned to Sydney. The corresponding figures for Berowra are 46 per cent and 48 per cent respectively. The lower percentages in the case of Marulan reflect the substantial road movements from

^{1.} The allowance applied to new capital equipment ordered between January 1976 and June 1978. The investment allowance effectively lowered the cost of entry into the trucking industry. There was a significant increase in the number of trucks leased between 1977 and June 1978 in order to take advantage of the allowance.

^{2.} That is, the difference between aggregate and tare weight.

^{3.} Including traffic between NSW and the ACT.

Wollongong-Port Kembla and Berrima to the Goulburn-Yass district and the ACT. These road movements pass through Marulan.

		(tonnes)			
Year		Marulan			Berowra	
ended 30 June	Interstate	Intrastate ^b	Overall	Interstate	Intrastate ^b	Overall
1973	14.3	7.2	11.7	13.7	6.9	8.0
1974	14.4	7.7	11.8	13.2	7.5	8.3
1975	14.3	7.2	11.2	13.5	7.8	8.6
1976	15.2	8.6	12.2	13.9	7.8	8.6
1977	15.3	8.7	12.3	13.1	7.9	8.6
1978	13.2 (0.9)	9.0 (1.1)	11.3 (0.7)	12.4 (1.8)	7.8 (0.8)	8.4 (0.8)

TABLE 4.2—AVERAGE LOADS OF TRUCKS® PASSING THROUGH MARULAN AND BEROWRA

a. Laden trucks with a carrying capacity of 4.1 tonnes or more. Those with a lesser capacity were excluded from the survey.

b. Includes traffic between NSW and ACT.

NOTE: Figures in brackets are relative standard errors for the 1977-78 estimates.

About 34 per cent of the road freight consigned from Sydney and passing through Marulan is intrastate traffic (including, in the present context, traffic to the ACT). The major destinations are the Goulburn-Yass district, the ACT and the Murrumbidgee district including Wagga and Griffith. This trade out of Sydney largely consists of processed foodstuffs, iron and steel products, building materials, petrol and chemicals. The trade in the other direction (to Sydney) mainly consists of foodstuffs and building materials (mainly timber).

A very high proportion of intrastate traffic through Berowra in 1977–78 was short-haul, consigned mainly between Sydney and the Central Coast and Hunter districts. These areas account for 86 per cent of tonnages consigned from Sydney through Berowra, and the North Coast accounts for a further 10 per cent. The percentages are almost identical in the reverse direction.

The short-haul traffic through Berowra is dominated by haulage of heavy building materials (for example, sand and blue metal) and minerals and metals—the latter mainly in both directions between Newcastle and Sydney.

Interstate road freight patterns

As previously mentioned, interstate freight constituted about 64 per cent of total tonnages passing through Marulan in 1977–78. Traffic between Sydney and Melbourne (in both directions) accounted for 76 per cent of this interstate tonnage, while Sydney-Adelaide traffic was ranked next at only 7 per cent.

At Berowra, two-way traffic between Sydney and Brisbane constituted 77 per cent of interstate tonnages in 1977–78. Trade between the Hunter district (mainly Newcastle) and Victoria accounts for a further 12 per cent. A considerable proportion of the latter traffic comprises iron and steel products.

The characteristics of trade between Sydney and Melbourne, and Sydney and Brisbane, are discussed later in this chapter.

Assessment by commodity

In 1977-78, the most significant commodities passing through Marulan were

chemicals, iron and steel products and parcels, which accounted for 7 per cent, 6 per cent and 5 per cent of the total tonnage respectively. The results tabulated in this chapter and which appear in Appendix II are aggregated for convenience into the broader commodity groupings given in Table 3.1. Table 4.3 indicates the change in the relative importance of commodity groups during the period of the survey.

In the context of the abolition of the co-ordination charge, the growth in road haulage of building materials through Marulan is significant, even though 1977-78 was not noted as a prosperous year for the building industry. This growth is partly attributable to the gain of cement traffic from rail, particularly during 1975-76¹.

	(per ce	nt)				
Commodity group			Year ende	d 30 Jun	e	
	1973	1974	1975	1976	1977	1978
Foodstuffs	22	19	18	22	21	21
Minerals and metals	18	19	21	18	18	16
Building materials	9	12	12	15	13	16
Petroleum products and chemicals	16	16	14	12	14	14
Paper, rubber and miscellaneous	12	11	10	10	11	11
Livestock	4	2	3	4	3	4
Other farm produce	3	3	3	3	3	4
Outside packaging	3	2	2	3	3	2
Unidentified freight	13	16	17	13	14	12
TOTAL	100	100	100	100	100	1 0 0

TABLE 4.3—ESTIMATED COMPOSITION BY COMMODITY GROUP OF FREIGHT PASSING THROUGH MARULAN

At Berowra, the most significant commodities in 1977–78, were those associated with construction. The subgroup of 'natural materials' (Table 3.1) which in this case consists largely of sand and gravel, accounted for almost 11 per cent, while timber and timber products amounted to 7 per cent. Iron and steel from Newcastle accounted for a further 6 per cent. Taking once again the broader commodity groupings, Table 4.4 shows some growth in minerals and metals traffic relative to other categories after 1972–73², and a decline in relative growth of building materials movements after 1973–74.

ANALYSIS OF MOVEMENTS BETWEEN MAJOR CENTRES

Comprehensive tabulations covering each checking station and survey year appear in Appendix II. These tables show estimated road freight tonnages by origin and destination and by broad commodity groupings. It is possible to identify several important origin-destination (O-D) pairs, and Table 4.5 indicates those estimated to account for more than 250 000 tonnes on a two-way basis in 1977-78.

The five most significant O-D pairs are discussed at greater length in this section as together they account for two-thirds of estimated tonnages passing through the two checking stations. The two O-D pairs involving interstate transport are discussed initially.

Sydney-Melbourne

The survey results indicated that the balance of road freight trade was in Sydney's

2. The railways lost some of their iron and steel traffic to road during the survey period (PTC 1974, 1979).

^{1.} Public Transport Commission (PTC) of New South Wales (1976). The decline in rail cement traffic is discussed later in more detail.

	(per ce	nt)		_		
Commodity group			Year ende	d 30 Jun	9	
	1973	1974	1975	1976	1977	1978
Building materials	30	35	30	29	28	27
Minerals and metals	13	15	16	16	14	18
Foodstuffs	17	15	17	16	17	18
Petroleum products and						
chemicals	11	11	10	9	10	8
Paper, rubber and miscellaneous	7	6	6	7	8	8
Other farm produce	5	6	6	7	8	7
Outside packaging	2	2	3	3	4	3
Livestock	3	2	2	3	2	3
Unidentified freight	12	8	10	10	9	8
TOTAL	100	100	100	100	100	100

TABLE 4.4—ESTIMATED COMPOSITION BY COMMODITY GROUP OF FREIGHT PASSING THROUGH BEROWRA

favour for four of the six survey years.¹ However the average annual rate of growth of the amount of freight carried from Melbourne to Sydney was almost twice the corresponding growth rate for freight carried from Sydney to Melbourne. Analysis of the data from the six years of the survey indicates that northbound tonnages increased annually by an average of 7.5 per cent. In comparison, southbound tonnages increased by only 4.4 per cent per annum on average. Table 4.6 shows petrol and chemicals as the major commodity category in the southbound direction accounting for some 17 to 20 per cent of the tonnages moving from Sydney to Melbourne. Chemicals dominate the category. In 1977–78, motor vehicles, parts and accessories comprised over 30 per cent of the second–ranked minerals and metals category.

TABLE 4.5—FREIGHT TONNAGES FOR O-D PAIRS PROCESSED AT MARULAN AND BEROWRA 1977-78

Origin-destination pair	Tonnageª (′000)	Processing station
Svdnev-Melbourne	2 214	Marulan
Sydney-Newcastle	1 496	Berowra
Sydney-Outer Sydney	943	Berowra
Sydney-Brisbane	565	Berowra
Sydney-Canberra ^b	396	Marulan
Sydney-Murrumbidgee	334	Marulan
Sydney-North Coast	311	Berowra
Sydney-South Coast	270	Marulan

a. Summation of tonnage in both directions.

b. Includes Queanbeyan.

Foodstuffs were the major category in northbound freight, increasing from 22 per cent of the total in 1972–73, to 25 per cent in 1977–78. The second-ranked commodity grouping, paper, rubber and miscellaneous² accounted for 18 per cent of the total northbound freight in both 1972–73 and 1977–78. In 1977–78, paper (excluding waste) constituted 50 per cent of the paper, rubber and miscellaneous category, up from 40 per cent in 1972–73.

1. In other words, Sydney exported more freight to Melbourne by road than vice versa during four of the six years.

2. See Table 3.1 for an indication of the goods included in this category.

Year ended 30 June				Con	nmodity grou	p				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	
				SYDNEY	TO MELBOU	RNE				
1973	5	123	15	155	59	165	138	33	191	884
1974	1	146	12	167	70	190	143	31	224	984
1975	· 3	135	18	175	60	163	124	28	238	944
1976	6	190	17	195	75	184	164	62	219	1112
1977	4	192	19	171	79	245	178	66	244	1 1 9 8
1978ª	12	162	16	177	71	202	152	47	194	1 0 3 3
	(26.1)	(6.7)	(21.9)	(6.1)	(10.4)	(6.1)	(6.3)	(11.6)	(5.3)	(1.1)
	-			MELBOU	RNE TO SYD	NEY				
1973	2	177	17	136	43	110	151	23	161	820
1974	2	172	14	149	70	129	150	15	223	924
1975	1	192	11	198	50	143	137	19	247	9 98
1976	_	269	18	166	95	160	162	25	200	1 0 9 5
1977	1	307	22	173	66	151	200	31	214	1 165
1978ª	6	297	27	154	112	142	218	21	204	1 181
	(36.7)	(4.9)	(16.9)	(6.3)	(8.4)	(7.5)	(5.5)	(17.3)	(5.4)	(1.1)

TABLE 4.6-ESTIMATES OF ROAD FREIGHT BETWEEN SYDNEY AND MELBOURNE

('000 tonnes)

a. RSEs expressed in percentage terms are shown in brackets below the 1977-78 tonnage estimate to which they refer. NOTE: Figures may not add to totals due to rounding.

As previously mentioned, Joy (1964) estimated that at least 95 per cent of road freight between Sydney and Melbourne passes through Marulan. Taking the year 1975–76 as an example and scaling the survey estimates up to include the 5 per cent of freight said to use other routes, total tonnages travelling by road between Sydney and Melbourne in each direction would approximate 1.2 million tonnes. In contrast, rail haulage between Sydney and Melbourne in 1975–76 was estimated at 325000 tonnes southbound with 475000 tonnes travelling in the opposite direction (BTE 1978a).

Sydney-Brisbane

The dependence of Brisbane on inputs from Sydney of manufactured goods and processed foodstuffs is apparent and supports conclusions made by Rimmer (1970). The manufactured goods include tyres, paper, glass and refrigerators; these are well represented in the broad 'Paper, rubber and miscellaneous' category in Table 4.7. In the years from 1972–73 to 1976–77, Sydney sent an average of about 30 per cent more goods to Brisbane than vice versa, but the difference increased to almost 80 per cent in 1977–78. Northbound tonnages increased by an annual average of about 8.3 per cent during the survey period. On the other hand, there was no evidence of a significant trend in southbound road freight. The backloading problem affecting road hauliers on this route is obvious, but the situation is worse on rail where 278 000 tonnes travelled northwards and only 125 000 tonnes southwards between the two cities. Several intrastate regions north of Sydney are estimated to export more to Sydney than they receive, but this excess does not provide sufficient backloading opportunities for road trucks returning empty from Brisbane to Sydney. However, opportunities may exist for trucks to carry loads at least from Brisbane to centres in Northern NSW.

The most significant component of the southbound trade is processed agricultural products (frozen meat and smallgoods), other farm products, and a few reciprocal movements of items such as paper and motor vehicles.

Three major intrastate O–D pairs are now discussed, particularly with reference to the impact of the relaxation and final abolition of the restrictions on competition between road and rail.

Sydney-Newcastle

The two routes examined so far in this chapter have both been interstate routes; an additional and particularly important influence in the Sydney-Newcastle situation is the abolition of the co-ordination charge on intrastate road transport in January 1974. The figures in Table 4.8 indicate the resultant growth in road tonnages. Northbound tonnages have increased by an annual average of 10.5 per cent over the survey period while the average increase in southbound tonnage has apparently been of the order of 16 per cent per annum.¹ The most significant increases have been in the minerals and metals categories, indicating the impact of the prohibition of the transport of iron and steel intrastate by road from Newcastle or Wollongong prior to January 1974. Road tonnages of foodstuffs in both directions have more than doubled during the survey period.

Sydney-Outer Sydney

Major centres located in the Outer Sydney region include Gosford, Wyong and Woy Woy. Figure 3.3 indicates the extent of this region, which adjoins Sydney on the north and west. It contains a number of population centres with a significant proportion of the workforce commuting to jobs in Sydney.

As indicated in Table 4.9, the region's exports to Sydney were dominated by the 'building materials' category which in this case consists mainly of sand, gravel and blue

^{1.} A large component of the latter increase is attributable to the quadrupling of southbound building material tonnages between 1976-77 and 1977-78. No reason is apparent for this increase.

Year ended 30 June				Con	nmodity grou	p				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Unidën- tified freight	
				SYDNEY	TO BRISBA	NE				
1973		47	1	23	16	28	52	7	62	237
1974		42	1	34	33	41	52	12	46	261
1975		46	2	37	20	33	- 57	6	81	282
1976		43	7	29	28	41	74	7	95	324
1977	-	43	4	31	25	36	79	17	86	321
1978ª	2	68	2	47	30	40	81	22	70	362
	(71.8)	(11.4)	(11.0)	(14.9)	(17.9)	(15.5)	(9.7)	(20.8)	(10.2)	(2.3)
<u> </u>				BRISBA	NE TO SYDN	IEY				
1973	3	66	21	15	16	. 5	22	6	28	182
1974	1	68	19	18	31	7	21	7	33	205
1975		81	15	22	22	6	24	15	51	236
1976	<u> </u>	75	31	25	35	7	27	9	50	259
1977		74	34	29	21	7	34	10	30	239
1978ª	1	54	28	24	29	10	30	5	22	203
	nc	(11.3)	(16.7)	(17.6)	(16.4)	(27.9)	(15.5)	(32.3)	(15.3)	(3.5)

TABLE 4.7-ESTIMATES OF ROAD FREIGHT BETWEEN SYDNEY AND BRISBANE ('000 tonnes)

a. RSEs expressed in percentage terms are shown in brackets below the 1977-78 tonnage estimate to which they refer. nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

NOTE: Figures may not add to totals due to rounding.

30

Year ended 30 June	Commodity group									Total
	Liv e - stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	
				SYDNEY	TO NEWCAS	TLE				
1973	11	74	16	46	78	57	31	10	76	399
1974	5	103	25	80	105	81	43	13	70	525
1975	4	120	21	98	112	106	55	23	71	610
1976	10	123	21	95	112	88	64	28	83	624
1977	5	131	22	93	108	108	73	33	76	649
1978ª	2	162	32	114	135	83	76	28	73	705
	(64.4)	(6.7)	(15.5)	(7.9)	(7.2)	(10.4)	(8.6)	(13.7)	(9.4)	(2.6)
				NEWCAS	TLE TO SYD	NEY			**	
1973	6	40	17	62	43	57	8	8	51	292
1974	8	45	18	147	71	58	11	15	49	422
1975	8	68	33	219	69	70	28	14	48	512
1976	6	67	44	198	68	58	19	17	35	512
1977	5	76	46	181	52	73	23	25	43	524
1978ª	23	91	82	251	198	51	30	17	47	791
	(19.7)	(8.8)	(10.5)	(5.7)	(6.7)	(13.1)	(19.1)	(17.9)	(12.7)	(2.6)

TABLE 4.8-ESTIMATES OF ROAD FREIGHT BETWEEN SYDNEY AND NEWCASTLE

('000 tonnes)

a. RSEs expressed in percentage terms are shown in brackets below the 1977-78 tonnage estimate to which they refer. NOTE: Figures may not add to totals due to rounding.
BTE Information Paper 6

metal. On the other hand, building materials were also the largest component of the region's imports from Sydney. However, in this case it includes a higher proportion of bricks, fibro products and cement.

It should be emphasised that only some of the tonnages shown as moving between the Sydney and Outer Sydney regions and vice versa were subject to the co-ordination charge prior to its abolition on 1 January 1974. A truck travelling between the two regions was subject to the charge if:

- it was carrying a specified taxable commodity;
- its journey included a distance directly competitive with rail of 80 kilometres¹ or more; and
- it did not qualify for an exemption which was available for certain origins or destinations and commodity combinations.

A truck carrying a chargeable commodity between, say, Hornsby and Gosford was not subject to the co-ordination charge as the competitive distance with rail is less than 80 kilometres. However, a truck travelling from central Sydney to Gosford would be likely to exceed this distance and be liable for the charge.

The commodities most likely to have been affected by the co-ordination charge in the case of trade between Sydney and Outer Sydney were iron and steel, cement, timber, oats and wheat. Table 4.9 shows increases since 1972–73 in most categories and in both directions. However, the only notable long-term increases were in the northbound foodstuffs, other farm produce, minerals and metals, and outside packaging categories, plus the paper, rubber and miscellaneous category in the southbound direction. There were apparent decreases in fourteen of the eighteen north and southbound categories in 1977–78. Likely explanations include a downturn in construction and the state of the economy in general. Southbound movements of building materials decreased by 209000 tonnes in 1977–78 possibly due to the completion of a construction project or supply contract².

Sydney-Canberra

The backloading problem facing road hauliers was mentioned earlier in the context of trade between Sydney and Brisbane. The situation is far worse in the case of trade between Sydney and Canberra-Queanbeyan.³ in 1977-78, freight tonnages from Sydney to Canberra were almost five times as large as those in the reverse direction. As practically no secondary industry is located in the Canberra-Queanbeyan district there is little scope for backloading. The principal movements into Canberra-Queanbeyan shown in Table 4.10 are foodstuffs and building materials. The decline of 23 per cent in building materials between 1976-77 and 1977-78 reflects cutbacks in government spending and a decrease in the rate of growth of Canberra's population. Canberra's only significant exports are in the building materials category, mainly timber. The composition of trade between Sydney and Canberra is similar to that between Sydney and most intrastate cities and towns. It is worth pointing out that the NSW co-ordination charge applied to trade between NSW and the ACT (Rimmer 1970) as the latter is not a State in terms of the Constitution and was thus unaffected by the 1954 decision relating to interstate trade.⁴

The abolition of the co-ordination charge in 1974 therefore had a considerable impact on the rail share of Sydney-Canberra trade. Rail tonnages from Sydney to Canberra-Queanbeyan declined from 360 000 tonnes in 1971-72 to 229 000 tonnes in

4. Previously discussed in Chapter 1.

^{1.} A minimum distance of 160 or 240 kilometres applied in respect of some commodities.

As previously mentioned an increase of 146 000 tonnes was recorded in 1977-78 for southbound movements from Newcastle. The fluctuation may represent a survey coding error.

^{3.} In coding data for the Marulan-Berowra survey Queanbeyan was included in the Canberra region.

Year ended 30 June				Сол	nmodity grou	p				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	
<u></u>				SYDNEY TO	OUTER SY	DNEY				
1973	21	54	32	18	139	61	11	5	14	355
1974	28	63	46	37	185	80	15	7	24	485
1975	27	77	53	27	139	97	18	11	11	460
1976	37	78	53	37	166	84	23	13	43	534
1977	32	94	60	47	178	88	22	13	31	565
1978ª	31	89	56	42	158	72	19	13	21	501
	(15.3)	(8.0)	(12.2)	(14.1)	(6.7)	(11.2)	(14.3)	(23.6)	(17.1)	(3.3)
				OUTER SYL	ONEY TO SY	DNEY ^b				
1973	5	44	13	60	334	4	4	10	7	481
1974	5	51	16	32	488	6	5	10	10	623
1975	5	63	30	29	457	3	9	12	21	629
1976	16	57	42	26	379	1	8	18	7	554
1977	11	64	75	18	448	5	9	24	16	670
1978ª	7	58	24	72	239	З	14	14	20	451
	(22.7)	(9.7)	(17.3)	(11.4)	(6.0)	(42.3)	(33.5)	(18.0)	(19.0)	(3. 9)

TABLE 4.9—ESTIMATES OF ROAD FREIGHT BETWEEN SYDNEY AND OUTER SYDNEY

('000 tonnes)

 a. RSEs expressed in percentage terms are shown in brackets below the 1977-78 tonnage estimate to which they refer.
 b. Includes some intraregional (Sydney to Sydney) traffic. The northern border of the Sydney region is at Hawkesbury River. As Berowra is located 8 kilometres south of the river some intraregional traffic between Brooklyn, Cowan and areas south of Berowra has been recorded. This totalled 9000 tonnes in 1977-78. NOTE: Figures may not add to totals due to rounding.

Year ended 30 June		·····		Corr	modity grou	p				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	<u>.</u>
				SYDNEY	TO CANBER	RRA	<u> </u>			
1973		36	1	25	56	23	11	2	27	181
1974	2	47	1	34	64	29	16	—	38	231
1975	1	59	1	44	94	35	16	2	28	280
1976	4	82	1	55	107	43	20	4	36	352
1977		86	_	50	112	32	27	4	41	352
1978ª	1	83	4	45	85	56	21	7	25	328
	nc	(9.0)	(45.4)	(12.6)	(9.4)	(13.0)	(14.1)	(37.2)	(14.6)	(3.8)
				CANBER	RA TO SYDI	NEY				
1973	1	2	2	6	4	1	2	1	2	21
1974	_	3	1	8	15	_	3	3	5	38
1975	_	7	3	4	16	_	4	4	9	61
1976	_	8	4	13	13	1	7	9	6	61
1977	_	3	3	14	28	_	5	10	9	72
1978ª	_	5	2	11	33	2	5	4	6	68
	nc	(31.1)	(53.9)	(23.8)	(15.9)	(71.3)	(33.2)	(42.8)	(27,9)	(9.5)

TABLE 4.10-ESTIMATES OF ROAD FREIGHT BETWEEN SYDNEY AND CANBERRA ('000 tonnes)

a. RSEs expressed in percentage terms are shown in brackets below the 1977-78 tonnage estimate to which they refer. nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

NOTE: Figures may not add to totals due to rounding.

1975-76. The respective figures for the reverse direction were 17 000 tonnes and 13 000 tonnes (BTE 1976, 1978a).

The above discussion was confined to road and rail traffic between Sydney and Canberra-Queanbeyan. It is also appropriate to consider traffic along other routes to and from Canberra. A particularly significant import into Canberra is cement, much of which originates from Berrima. Berrima is located on the Hume Highway in the Illawarra survey region. Substantial tonnages of cement from Berrima to Canberra were transferred from rail to road during 1973-74. The co-ordination charge applied up to 1 January 1974 on all road movements of cement in excess of 80 kilometres, except journeys from places of manufacture (such as Berrima or Lithgow). Carriage of cement by road from places of manufacture were prohibited, irrespective of distance.

It is therefore not surprising that the survey of trucks passing through Marulan in 1972-73 did not record any road cement traffic between Berrima and Canberra-Queanbeyan, However, in 1977-78 cement accounted for 72 per cent of the estimated 131000 tonnes1 of road traffic from the Illawarra district to Canberra-Queanbevan. This is one of the most striking examples of the changes in road-rail shares which followed the abolition of the co-ordination charge and embargo system in NSW. In fact, special mention was made of rail's loss of cement traffic between Berrima and Canberra in the railway's Annual Report for 1973-74 (PTC 1974). Table 4.11 shows traffic handled on the Australian National Railways line into and out of Canberra. These rail figures differ from those mentioned earlier in this section because they include tonnages to and from places other than Sydney and they naturally exclude traffic consigned into or out of Queanbeyan from places other than Canberra. The railway's loss of cement traffic is evident, with some of the remaining cement traffic continuing to come from Geelong in specialised bogie-exchangeable wagons. On the other hand, petroleum product traffic has increased in absolute terms since 1972-73. This category accounted for 74 per cent of total movements by rail into and out of Canberra in 1978-79. Total traffic declined by an annual average of 8.4 per cent over the seven-year period indicated in Table 4.11.

('000 tonnes)														
Year ended 30 June	1973	1974	1975	1976	1977	1978	1979							
Agricultural produce	b	2	4	1	b	na	na							
Cement	135	112	83	40	24	32	30							
Timber	6	5	4	3	3	na	na							
Petroleum products	128	147	156	139	155	164	152							
Other commodities	47	45	31	27	28	30°	230							
TOTAL	321	311	278	210	210	226	205							

TABLE 4.11—FREIGHT CARRIED BY ACT RAILWAY^a

a. Connects Canberra with NSW railway system at Queanbeyan.

b. Less than 1000 tonnes.

c. Includes agricultural produce and timber.

Sources: 1972-77, ABS (1978b).

1977-79, Information supplied by Australian National Railways.

OVERVIEW OF ROAD-RAIL COMPETITION IN NSW

Chapter 2 outlined the purpose and structure of the *State Transport (Co-ordination) Act*, 1931. The Act was basically intended to protect the NSW railways from road competition. Many of the restrictions on road transport of particular commodities were

1. See Table II.11 in Appendix II.

BTE Information Paper 6

eased or altered prior to 1974 when the co-ordination charges and embargoes on road transport were finally abolished. However, the principal change came in January 1974 when embargoes on the road transport of the following commodities between certain origins and/or destinations were lifted:

- iron and steel
- cement
- wool.

Charges applying to the road transport of the following commodities over certain distances or routes were also abolished at this time:

- fruit and vegetables¹
- cattle and sheep
- liquid fuels and chemicals
- sorghum.
- oats
- wheat.

The survey results provide an interesting indication of the extent of the swing from rail to road for these commodities after 1973. It should be emphasised that the results can only be used as a general indicator due to the survey's broad commodity categories and limited sample size.

The immediate impact of the abolition of the charges and embargoes is evident from a comparison of the survey's 1972–73 and 1973–74 results, particularly those relating to Berowra.² The main changes were in the mineral and metals, building materials and petrol and chemicals categories. There was, for example, an increase of 76 per cent in intrastate movements of minerals and metals (primarily iron and steel) through Berowra, and there were overall increases (including interstate traffic) of 60 per cent in minerals and metals and 59 per cent in building materials (including timber) passing through Berowra. The respective overall increases in the latter two categories at Marulan were 21 per cent and 46 per cent. Minerals, metals and building materials together accounted for 70 per cent of the increase in total freight passing through Berowra and 62 per cent of the increase through Marulan. Intrastate trade increased by 46 per cent overall through Berowra³ and 26 per cent through Marulan⁴ between 1972–73 and 1973–74.

The overall increase in intrastate tonnages through Berowra between 1973-74 and 1974-75 was 13 per cent, while at Marulan it was only 8 per cent. Although the Public Transport Commission (PTC) noted that road competition had affected rail traffic in cement, fertilisers, fruit and vegetables and meat during 1973-74 (PTC 1974), it was only in 1974-75 that a decline in non-bulk rail traffic began to appear. Table 4.12 summarises the most comprehensive rail data available for the period 1972-73 to 1977-78.

Road competition for iron and steel loading in 1973-74 effectively accommodated the increase in tonnages available, as the railways had insufficient wagons available to cater for extra traffic (PTC 1974). However, a decline commenced during 1974-75 in the 'iron and steel' and 'other' rail categories shown in Table 4.12 and has continued through to 1977-78.

During 1975-76, there were large increases in road freight tonnages passing through

^{1.} After 1969, charges only applied to fruit and vegetables travelling between Griffith and Sydney.

^{2.} See Tables II.14 and II.16 in Appendix II.

^{3.} From 1.718 million tonnes in 1972-73 to 2.501 million tonnes in 1973-74.

^{4.} From 0.785 million tonnes in 1972-73 to 0.986 million tonnes in 1973-74.

Marulan; intrastate tonnages rose by 41 per cent over 1974–75 levels but at Berowra the increase was less than 2 per cent. Intrastate tonnages originating from the Wollongong-Port Kembla district rose by 48 per cent to 284 000 tonnes, reflecting the growth of steel movements¹ through Marulan.

	('000 tonnes)														
Year ended 30 June	1973	1974	1975	1976	1977	1978									
Coal	13.4	14.2	15.8	14.6	16.1	16.4									
Wheat	1.6	2.3	3.1	3.5	4.7	5.1									
Containers	1.9	2.0	2.2	2.2	2.7	2.5									
Iron and steel	2.9	3.2	2.3	2.3	1.9	1.7									
Coarse grain	0.4	0.3	0.8	0.7	0.5	0.2									
Wool	0.1	0.1	0.1	0.1	0.1	0.1									
Other	10.5	10.5	9.1	7.9	7.8	7.3									
TOTAL	31.1	32.7	33.5	31.2	33.8	33.4									

TABLE 4.12-FREIGHT CARRIED BY NSW RAILWAYS^a

a. Excludes private railways.

NOTE: Figures may not add to totals due to rounding.

Source: PTC (1979).

In 1976–77 Marulan and Berowra recorded increases of only 4 per cent and 7 per cent in intrastate tonnages, while in 1977–78 the increases were of the order of 3 per cent and 2 per cent respectively.

With the exception of the abnormally high increase in intrastate tonnages through Marulan during 1975–76, it is apparent that the growth experienced by intrastate road hauliers occurred mainly in the period 1972–75, with a consolidation phase thereafter.

FUTURE TRENDS

The inherent flexibility of road freight operations provides road with a significant advantage over rail. However, the rapid increases in fuel prices may be tempering this advantage. The railways are currently rationalising their intrastate services, using road contractors to deliver to and from regional rail freight centres. Provided track and rolling stock can be upgraded to provide a more efficient line-haul capability, future growth of the road freight industry may well be concentrated in the shorter haul segment leaving long-distance and interstate haulage increasingly to freight forwarders with rail contracts. In practice, the final result will depend on customers' perceptions of road's flexibility and reliability in comparison with rail.

Some of this increase was due to the construction of the natural gas pipeline to Sydney, so the large overall increase in intrastate tonnages through Marulan during 1975–76 is at least partially attributable to temporary influences.

CHAPTER 5—CONCLUDING REMARKS

Although most aspects of transport are characterised by a lack of reliable, publicly-available statistics, the road industry is perhaps the best example of this problem. As mentioned previously, the industry is still highly individualistic. This, together with the vigorous competition in the industry, provides some of the explanation for the scarcity of data.

The BTE survey of trucks passing through Marulan and Berowra checking stations was aimed at obtaining reliable data on major flows along two significant highways in NSW. The resources available precluded a larger sample which would have enabled more accurate estimates of flows between Sydney and centres smaller than, say, Canberra. Nevertheless, good estimates have been obtained for major routes including Sydney-Melbourne, Sydney-Brisbane, Sydney-Newcastle and Sydney-Canberra. The survey represents a significant breakthrough in this respect, providing a useful data base for future transport studies.

While the survey did not cover freight movements on all routes out of Sydney, it did allow an examination of freight travelling along the Hume and Pacific Highways which are the most important freight routes. Useful conclusions in aggregate terms were made concerning the effects of the abolition of the co-ordination charge and embargoes in 1974. Road freight increased particularly through Berowra, notably between Sydney and the Central Coast and Newcastle areas. Significant increases were also recorded between Sydney and Canberra.

The survey also provides an insight into the road freight patterns existing within the northern and south-western areas of NSW located along the Hume, Pacific and various connecting highways. The existence of data relating to freight movements in the period immediately before the abolition of the road maintenance charge in NSW in July 1979 also may assist in the future assessment of the impact of this decision. Researchers studying the effect after 1974 of rapidly increasing petrol prices on the competitive position of road transport versus rail may also find the data contained in this paper of value.

APPENDIX I-EXPANSION OF SAMPLE RESULTS AND DERIVATION OF ERROR STATISTICS

Any parameter measurements obtained from a sample survey need to be expanded to provide estimates of the parameters for the population as a whole. These parameter estimates will have errors of estimation associated with them. Consequently, some assessment of the accuracy of the estimate as derived from a sample survey needs to be made to obtain some indication of the accuracy or reliability of any particular population estimate. It may be noted in passing that often a trade-off has to be made between the level of accuracy of the estimate on the one hand and the resources available for the survey on the other hand. Clearly the level of resources available partly determines the size of the sample which can be accommodated in a survey and the sample size in turn influences the accuracy of any results derived from the survey.

The inaccuracies of the population estimates derived from a sample survey result from a number of causes. Among these causes are:

- biases inherent in the sampling procedures;
- inadequacies in the 'a priori' knowledge of the distribution of certain population parameters; and
- sampling error which is determined by the variation from one individual sampling unit¹ to another within the population and the size of the sample.

There are three sources of likely bias in the results presented in this paper. These sources of bias can be classified as:

- bias in sample selection;
- bias in reporting; and
- bias in measurement of sample parameters.

The first source of bias may arise because the days on which the survey was held may not have produced a representative sample of the population of all trucks passing through the respective weighing stations. To reduce this possibility, the periods during which the survey was carried out were selected to take account of seasonal factors. However, as a consequence of the relatively small sample, it was not possible to satisfactorily accommodate the variations in truck traffic caused by public holidays and weekends.

The second source of bias may arise from response errors due to misreporting of information by respondents in the survey. For example, the respondent may misunderstand a question, may exaggerate information or may only make estimates of certain requested data. In the case of this survey it was also possible, in some instances, that the surveyed driver may not have driven the truck for the entire journey. In this case, the origin and/or final destination might not have been known and intermediate loadings or off-loadings could have affected the composition of freight carried. These reporting errors may occur in any enumeration, whether it be total (as in a census) or partial (as in a sample) and should not be confused with the imprecision due to sampling variability. In order to account for biases due to errors in reporting, separate control surveys would have been necessary. It was considered unwarranted to expand the survey task to this extent as the biases due to misreporting were considered to be minor.

1. In the present context an individual truck represents a sampling unit.

BTE Information Paper 6

Finally, biases may arise due to errors in measurement during the survey. This may occur due to inappropriate specifications of categories or incomplete provision for all categories likely to be encountered in the population. In the present case these biases were considered relatively insignificant.

The *major* source of estimation error in the present situation is sampling error. As a result of deriving parameter estimates from only a sample of trucks on a number of days spread throughout the year, these estimates have a certain accuracy tolerance associated with them. The 'true' value of a parameter is of course not known but it is possible to state that the 'true' value lies within a certain interval with a given degree of confidence. The standard unit for specifying these so-called confidence intervals is the 'standard error of the estimate'. Under fairly broad conditions it may be assumed that the 'true' value of a parameter lies within one standard error above or below the estimated value, with a probability of around 67 per cent. Furthermore there is a 95 per cent chance that the 'true' value lies within two standard errors either side of the estimate.

The following sections detail the methodology used to derive estimates of freight movements and their associated standard errors.

EXPANSION OF SURVEY RESULTS

Estimates of tonnage of freight by route

The tonnage of freight (t_i) carried on by route i¹ by trucks in the sample can be expressed as:

$$\mathbf{t}_{i} = \sum_{k=1}^{n_{i}} \mathbf{X}_{ik} \tag{1.1}$$

where n_i is the number of trucks in the sample travelling route i and X_{ik} refers to the tonnage of freight carried by the kth truck on route i.

Assuming the random sample is representative of the total population of trucks the annual tonnage of freight is proportional to the tonnage obtained in the sample. The constant of proportionality is known as the expansion factor (ef_i). Thus an estimate of the annual tonnage carried on route i (\hat{T}_i) is given by:

(1.2)

$$\hat{\mathsf{T}}_i = \mathsf{ef}_i \cdot \mathsf{t}_i$$

The assumption that the random sample is representative of the total population of trucks implies that the expected value of the sample average tonnage of freight carried per truck equals the population average tonnage of freight carried per truck. Therefore the expansion factor can be expressed as the ratio of the number of trucks in the population to the number of trucks in the sample. That is:

$$ef_i = \frac{N_i}{n_i}$$
(1.3)

where N_i is the total number of laden trucks travelling a specific route i for the year and n_i is the number of laden trucks travelling a specific route i during the survey.

However, it was not possible to calculate ef_i as the values of N_i are not known for each route i. An effective surrogate ratio was required. The DMT records the number of trucks passing through each weighing station on a daily basis and classifies them into

^{1.} Note that route i refers to a particular origin-destination pairing and not to the particular roads traversed by the trucks. Each truck had to pass through either Marulan or Berowra weighing stations.

broad route categories (see Table I.1). Thus the annual number of laden trucks (N_d) can be calculated for each broad route category d. As detailed origin-destination truck movements were not known for the population, the use of these broader route categories was necessary. As a result, various routes investigated in the survey are contained in a certain broad route category d. The sample data were then aggregated into the same categories to produce a proxy expansion factor, ef_d:

$$ef_{d} = \frac{N_{d}}{n_{d}}$$
(1.4)

where N_d is the annual number of laden trucks travelling on all routes contained in broad route category d

and n_d is the number of laden trucks in the sample travelling on all routes contained in the broad category d.

This expansion factor was then used for all the specific routes i within a particular broad category d. One implicit assumption here is that the survey sampled the same proportion of trucks for each route within a given broad category. In additon, the expansion factor presumes that the sample and population distributions of load size per truck are the same.¹

TABLE I.1—BROAD ROUTE CATEGORIES USED BY THE DEPARTMENT OF MOTOR TRANSPORT

Marulan	Berowra	
Intrastate, southbound	Intrastate, southbound	
Intrastate, northbound	Intrastate, northbound	
Sydney to Melbourne	Sydney to Brisbane	
Melbourne to Sydney	Brisbane to Sydney	
Sydney to Adelaide	Newcastle to Melbourne	
Adelaide to Sydney	Melbourne to Newcastle	
Sydney to Perth	Newcastle to Adelaide	
Perth to Sydney	Adelaide to Newcastle	

For any route i which did not fit into one of the broad route categories (d), the expansion factor from the category considered the most appropriate was used. For example, there is no broad route category directly applicable to trucks passing through Marulan and destined for Queensland. Therefore, it was decided that the expansion factor for the Melbourne to Sydney route would be used as this route was also a northbound interstate route.

Substituting for t_i and ef_d , Equation 1.2 becomes:

$$\hat{T}_{i} = \frac{N_{d}}{n_{d}} \sum_{k=1}^{n_{i}} X_{ik}$$
(1.5)

where $N_{d^{i}} n_{d^{i}} X_{ik}$ and T_{i} are as defined earlier. Alternatively, Equation 1.5 can be written as:

$$\hat{\mathbf{T}}_{i} = \frac{\mathbf{X}_{i} \cdot \mathbf{n}_{i} \cdot \mathbf{N}_{d}}{\mathbf{n}_{d}}$$
$$= \mathbf{X}_{i} \cdot \mathbf{p}_{i} \cdot \mathbf{N}_{d}$$
(1.6)

^{1.} This assumption was necessary as no details of load size distribution were known. Consequently, truck numbers have been used in the expansion factors.

where p_i is the ratio of n_i : n_d

 \dot{X}_i is the average tonnage of freight carried per truck on route i; and n_i , n_d and N_d are as defined earlier.

From Equation 1.6 it is clear that \hat{T}_i depends on two sample variables—the average tonnage of freight carried per truck on route i (X_i), and the proportion of trucks (p_i) accounted for by route i from the total number of laden trucks in the sample travelling on all routes in the broad category d.

Commodity estimates

The above discussion has been expressed in terms of *total* freight measures. The survey also produced measures of freight classified by commodity group.¹ The estimates for annual freight tonnages by commodity are calculated in a similar manner to those for total tonnages on an origin-destination basis by use of Equation 1.7.

$$\hat{\mathsf{T}}_{ci} = \mathsf{X}_{ci} \cdot \mathsf{p}_{ci} \cdot \mathsf{N}_{d}$$

(1.7)

where \hat{T}_{ci} is the estimated annual tonnage of commodity c carried on route i

- X_{ci} is the average tonnage of commodity c carried per truck on route i
 - p_{ci} is the ratio of n_{ci} : n_{d}
 - $n_{ci}^{}$ is the number of trucks in the sample carrying commodity c travelling over route i
- and n_d N_d are respectively the number of laden trucks in the sample and the annual number of laden trucks travelling on all routes in broad category d. Note however that because of sample size limitations, the origin-destination regions are at a more aggregated level for estimates by commodity groups than for the estimates of tonnage for all freight. Hence the actual routes (that is, the origin-destination pairs) and broad route categories may differ from those used earlier.

DERIVATION OF RELATIVE STANDARD ERRORS OF THE ESTIMATES

By choosing a sample from which a certain parameter is estimated for a population, there is a probability that the resulting estimate will differ from the result which would have been obtained from a complete enumeration. As mentioned in the introduction to this appendix this difference can be estimated statistically for any given probability level.

An error statistic, called the standard error, is used to provide an indication of the likely difference between the estimate and the true value.

It was considered most convenient to estimate the precision of the freight figures produced in this analysis in terms of relative standard errors expressed in percentage terms. The relative standard error is thus defined as:

Relative standard error =
$$\frac{\text{Standard error}}{\text{Estimated mean}} \times 100$$

For example, if a relative standard error of (say) 10.0 per cent is ascribed to a value of 10 000 tonnes, then there are approximately two chances in three that the correct tonnage lies between 9000 tonnes and 11 000 tonnes.

Before the relative standard errors for this study were calculated, a test was conducted to determine whether the sample selected was a random sample or a clustered sample. This problem arose because the sample selected was not strictly a random sample of

^{1.} The publication of more detailed commodity information (as opposed to commodity groups) was considered inappropriate in view of the smaller sample sizes involved.

laden trucks passing through the weighing stations throughout each year. Rather, it was a complete count of all trucks from a sample of six single days during each year. A preliminary analysis of variance was performed on selected routes to determine if the differences between the average tonnage of freight carried per truck on each of the sampled days of the week were significant. The results showed that the differences were not significant and so the sample was treated as a random sample. If there had been significant differences in the average tonnage per truck on the sampled days, it would have been more appropriate to treat the sample as stratified by days of the week.

Calculation of the relative standard errors

In order to calculate the relative standard errors it was necessary to make the following assumptions:

- the tonnage of freight carried per truck is a random variable with a distribution which approximates a Normal distribution;
- the type and tonnage of freight carried, and the route taken by each truck are independent, and consequently;
- the average tonnage of freight carried per truck, and the proportion of trucks accounted for by a specific route i from the total numbers of trucks travelling on all routes in a broad category d, are independent.

That is, X_i is independent of p_i , and, X_{ci} is independent of p_{ci} .

When an estimate of a parameter (for example, \hat{Z}) is the product of two independent random variables (say, X and Y), then the relative standard error of $\hat{Z}(RSE(\hat{Z}))$ may be expressed as.¹

$$RSE(\hat{Z}) = \sqrt{\frac{\sigma_X^2}{\chi^2} + \frac{\sigma_Y^2}{\gamma^2}}$$
(1.8)

Equations I.6 and I.7 show that \hat{T}_i and \hat{T}_{ci} are each derived as the product of two random variables. These have been assumed to be independent and so Equation I.8 can be used to calculate the required relative standard errors.

After appropriate substitution in Equation 1.8 the relative standard error for \hat{T}_i can be written as:

$$RSE(\hat{T}_{i}) = \sqrt{\frac{\sigma_{X_{i}}^{2}}{X_{i}^{2}} + \frac{\sigma_{p_{i}}^{2}}{p_{i}^{2}}}$$
(1.9)

where
$$\sigma_{X_i}^2 = \frac{\sum_{k=1}^{n_j} (X_{ik} - X_j)^2}{n_j(n_j - 1)}$$

$$\sigma_{p_i}^2 = \frac{p_i(1-p_i)}{n_d}$$

and all other variables are as defined earlier. Similarly, the relative standard error for \hat{T}_{ci} is:

^{1.} See Kish (1965).

RSE(
$$\hat{T}_{ci}$$
) = $\sqrt{\frac{\sigma_{X_{ci}}^{2}}{X_{ci}^{2}} + \frac{\sigma_{P_{ci}}^{2}}{p_{ci}^{2}}}$

where $\sigma_{X_{ci}}^{2} = \frac{\sum_{k=1}^{n_{ci}} (X_{cik} - X_{ci})^{2}}{n_{ci}(n_{ci} - 1)}$

$$\sigma_{p_{ci}}^{2} = \frac{p_{ci}(1-p_{ci})}{n_{d}}$$

and all other variables are as defined earlier.

ANALYSIS OF THE RELATIVE STANDARD ERRORS

Relative standard errors of annual tonnages have been calculated for the years ended 30 June 1977 and 30 June 1978 and are set out in Tables I.2 to I.9. To determine the actual standard error SE(\hat{T}_i) or SE(\hat{T}_{ci}), the estimates (\hat{T}_i or \hat{T}_{ci}) are multiplied by the relative standard errors presented in the tables. For instance:

$$SE(\hat{T}_{i}) = \frac{\hat{T}_{i} \cdot RSE(\hat{T}_{i})}{100}$$

Relative standard errors were not calculated for previous years as the data required were not readily accessible by the BTE, and it was considered that relative standard errors calculated for 1976-77 and 1977-78 would provide an acceptable indication of the accuracy of the estimates derived for previous years. An idea of the magnitude of the relative standard errors for estimates from previous years can be obtained from Figures I.1 and I.2. These graphs (for Marulan and Berowra, respectively) show a curve fitted through points obtained by plotting the relative standard error (vertical axis) against the estimates of total tonnes carried (horizontal axis) for 1977-78 data.

Results are shown for all routes estimated to account for 1000 tonnes or more of freight per year. An examination of these results indicates that interstate routes generally had smaller relative standard errors than intrastate routes with similar levels of freight traffic. This was attributed to two main factors:

- Trucks on interstate runs tended to have similar carrying capacity as most were heavy articulated vehicles, whereas intrastate runs were serviced by all types and sizes of trucks, generally of smaller carrying capacity. It should also be noted that interstate routes were generally longer routes than intrastate ones. Interstate operators therefore had more incentive to minimise empty and partially laden running. This greater similarity between trucks on interstate routes meant smaller deviations from the mean carrying capacity and hence smaller standard errors.
- There were generally a smaller number of interstate routes that had to be aggregated into any broad category¹ (used to derive expansion factors) than intrastate routes. Fewer routes in a broad route category meant that the main routes in the category constituted a higher proportion of the total number of trucks in the category than did the main routes in an intrastate category. Consequently, the expansion factors were more accurate for the major routes in an interstate broad route category. As the main routes from an interstate broad route category constituted such a large proportion of the trucks, the proportionality component of the standard error was smaller than for an equivalent intrastate route. This is because as $p_i \rightarrow 1$, $\sigma_n \rightarrow 0$.

^{1.} These categories are listed in Table I.1.



'000 Tonnes

Figure I.1 Relationship between freight estimates and associated relative standard errors for Marulan 1977-78



'000 Tonnes

Figure I.2 Relationship between freight estimates and associated relative standard errors for Berowra 1977-78

This difference between interstate and intrastate routes can be illustrated by an example from Table I.2 which shows relative standard errors (expressed in percentage terms) for estimated freight tonnages passing through Marulan for 1977-78. The estimate for the Sydney to Western Australia route was 3000 tonnes with a relative standard error of 8.9 per cent. Intrastate routes with the same size estimates had relative standard error (8.9 per cent) was South-East to Illawarra Region. However, the estimate of tonnage for this route was 122 000 tonnes, a far higher figure than that for Sydney to Western Australia. An important factor contributing to the low relative standard error for the Sydney to Western Australia route was that it was the only route contained in its broad route category. This illustrates the uncertainty introduced by using N_d instead of N_i to obtain the expansion factors. Not only did the variability of truck size affect the relative standard error, but the grouping of routes into broad route categories also contributed to the errors of the estimates.

A comparison of the results for 1976–77 and 1977–78 indicate that routes which had relative standard errors of less than 10 per cent tended to have similar relative standard errors in both years. These routes generally had a large number of trucks observed during the surveys and the variation in truck numbers and size from year to year was relatively insignificant. Consequently, these relative standard errors may be applied to estimates for the same route for different years with some confidence that the true relative standard error would be of similar size.

Estimates which had relative standard errors in the 10 to 30 per cent range tended to have fluctuating relative standard errors for the two years, although the relative standard errors for both years remained within the 10 to 30 per cent range. Generally, the relative standard errors for any route within this range were still considered acceptable for use as indicators of relative standard errors relating to estimates of previous years.

However, routes which had large standard errors (greater than 30 per cent) associated with their estimates generally had a low observed truck count. With this group, a small change in the actual number of trucks observed from year to year can mean a relatively large change in truck numbers and average weight. Consequently, the associated relative standard errors vary considerably from year to year. Thus, rather than try and apply an actual relative standard error to estimates for previous years, it may be more meaningful to define the relative standard error of estimates for earlier years as 'large; greater than 30 per cent'.

TABLE 1.2—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES PASSING THROUGH MARULAN 1977-78

Origin									D	estinat	ion re	gion						-		
region						Intr	astate									Inte	orstate			-
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	АСТ	Melbourne	Other Vic.	Queensland	Adelaide	Other SA	WA	Not known	All origins aggregated
Intrastate																				
Sydney	_	_	_		_	_	49.7	6.9	7.7	22.2	3.8	4.1	1.4	19.9	.—	4.7	58.4	8.9	36.1	1.0
Outer Sydney	_	_	_	_	_	_	_	54.1	nc	_	48.5	_	30.2	nc	_	nc	_	_	_	23.8
Hunter	_	_	—	_		_	_	29.3	64.0	nc	25.6	38.3	13.4	50.1	_	59.8	_	_	69.8	10.7
Illawarra	_	_	_	_	_	_	41.2	8.5	12.4	57.7	6.1	8.4	8.4	37.2	_	27.9	_		25.5	1.5
North Coast	_		_		_		_	_	_	nc	nc	96.9	55.9	_	_	_	_	_	_	42.3
Northern		_	_	_	_	-	_	_	_		_		_	_	_	·	_	_	_	
Central West	nc	nc	_	39.8	_		_		_	_	34.7		_	_		_		_	_	33.5
South-east	7.6	27.1	39.2	8.8	nc	_	_	33.1	_		4.9		nc	_	_	<u> </u>	—	_	<u> </u>	4.9
Murrumbidgee	5.8	56.1	32.7	12.7	_	-	_	_	_	_	4.8	_	_	_		_	-	_	61.8	4.8
Murray	23.7	_	59.1	61.4		_	_	_	_	_	20.6	_	_	_	-	_	_	_	nc	20.2
Total NSW	3.5	23.5	22.8	6.5	nc	_	31.7	4.8	6.3	19.9	1.3	3.4	1.0	16.2	_	3.3	58.4	8. 9	8.6	0.7
ACT	9.8	_	47.0	26.5	_	_	nc	_	_	_	8.8	_	_	_	_	—	_	-	nc	8.8
Interstate																				
Melbourne	1.2	36.7	17.4	14.2	nc	_	_		_	_	1.1	_	_	_	62.5	-	_	_	nc	1.1
Other Vic.	9.3	_	70.9	70.7	nc		_	_		_	9.1	_		_	_		_		nc	9.1
Queensland	_		_	—	_	_	_	_	-	nc	42.8	67.3	39.2	_	_	nc	_	_	—	29.9
Adelaide	5.6	70.4	nc	50.5	_		_	_	_	_	5.2	_	_	_		_	_	—		5.2
Other SA	17.3	_	nc	nc	-	_	. —	-	_	_	16.6	-	_	_	_	_	_	_	—	16.6
WA	_		_		—		-	_		_		_	_	_	_	—	_	_	_	_
Not known	_	-	—	-	—	-	_	_	_	_	_	_	69.8	nc	—	—	-	_	47.9	19.9
All origins																				
aggregated	0.9	18.2	12.9	3.3	58.2	_	30.3	4.8	6.3	19.7	0.7	3.4	1.0	16.0	57.9	3.3	58.4	8.9	7.8	0.5

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

50

(per cent)

Origin and destination				C	commodity g	roup		······································		Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Other NSW & ACT	41.1	6.2	23.1	8.1	7.6	8.8	10.6	20.2	11.5	1.8
Melbourne	26.1	6.7	21.9	6.1	10.4	6.1	6.3	11.6	5.3	1.1
Other Victoria		48.9	nc	33.3	73.9	42.5		55.2	nc	19.9
Other Interstate ^a	57.2	28.1	101.7	21.1	30.1	34.9	20. 9	45.7	12.2	3.3
Subtotal	20.2	4.5	15.5	4.7	6.1	4.9	5.3	9.7	4.6	0.9
To Sydney from—										
Other NSW & ACT	15.8	7.6	11.8	13.2	7.8	38.6	19.0	30.5	20.1	1.9
Melbourne	36.7	4.9	16.9	6.3	8.4	7.5	5.5	17.3	5.4	1.1
Other Victoria	_	12.7	50. 9	42.6	28.8	40.8	26.7	71.0	37.9	9.3
Other Interstate ^a	nc	13.7	nc	18.6	25.7	57.9	23.8	58.1	13.9	3.1
Subtotal	14.7	3.7	9.6	5.4	5.6	7.3	5.1	14.4	4.9	0.8
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	9.6	16.7	13.2	13.7	5.4	8.9	23.5	33.1	34.0	1.7
Interstate ^a	30.4	15.0	32.6	6.6	21.4	19.7	26.0	58.6	35.3	1.7
Interstate ^a to— ACT & NSW other										
than Sydney	71.4	17.3	31.3	16.0	26.3	33.3	28.7	75.5	37.9	3.4
Interstate ^a	nc	38.3		72.5	70.7	nc	52.2	71.0	56.3	10.4
Subtotal	9.2	9.4	11.4	6.3	5.3	7.9	14.5	26.8	19.4	1.2
All origins/ destinations	7.4	2.8	6.7	3.1	3.3	3.7	3.6	7.7	3.4	0.5

TABLE I.3—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES BY COMMODITY GROUP PASSING THROUGH MARULAN. 1977-78 THROUGH MARULAN, 1977-78

a. Includes tonnages from unknown origins or destinations as appropriate.
 nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

TABLE I.4—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES PASSING THROUGH BEROWRA 1977-78 (per cent)

Origin					••		~	Des	stinatio	on					~~~~			·
region				In	trastate	e								Inte	rstate			
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Victoria	Brisbane	Other Qld	SA	Not known	All origins aggregated
Intrastate															·			
Sydney	28.9	3.4	2.6	54.2	7.0	14.6	65.3	62.5	_	nc	1.3	_	_	2.3	51.4	_	56.9	1.1
Outer Sydney	4.0	54.3	65.8	48.4			83.6	_	—		3.9		26.4	89.9	_	_	71.2	3.8
Hunter	2.5	45.6	_	15.2			43.0	38.2	46.7	86.9	2.4	57.4	6.6	_	_	nc	22.9	2.3
Illawarra	46.6	55.8	14.4	_	nc	—		-	_		13.2	—	_	nc		—	-	13.1
North Coast	7.0	nc	_	50.2			nc		_		6.8	57.8	56.9	_	_	_	60.7	6.7
Northern	16.2	_		nc	_		—		—	-	16.0		_	_	—	_	_	16.0
Central West	_	24.9	34.2	<u> </u>	58.6	_	_		_		18.9	_	· _	_		_	_	18.9
South-east		34.5	74.6	—	nc	_			—		29.7	_		nc	_	_	-	28.6
Murrumbidgee	—	40.2	79.7	—		—	_		—		35.7	—	—		—	—	_	35.7
Murray	—	—	57.9	_		_			_		57.9	_		_	—	_	—	57.9
Total NSW	1.3	3.2	2.4	13.2	6.9	14.6	31.4	31.0	46.7	64.8	0.8	40.5	3.5	2.2	51.4	nc	7.3	0.8
ACT	—		75.2	—	nc	_	-				52.9	—	_		—	—		52.9
Interstate																		
Victoria	70.3	46.3	7.5	—	67.4	nc	_		_		5.2	_	_		_			5.2
Brisbane	3.1	_	—	—		—	—	nc	—		3.0		66.3	—		_	43.9	3.0
Other Qld	20.9	_	_	—	_		_		_	·	20.9	—		—	_	—		20.9
SA	nc	49.8	27.9	—	_	—			—		11.9	—			—	-		11.9
Not known	15.2	nc	74.5	_	_	_			_	-	8.5	_	_		_	-	71.5	8.0
All origins					_												L.	
aggregated	1.2	3.2	2.4	13.2	6.9	14.4	31.4	29.8	44.5	64.8	0.8	40.5	3.7	2.2	51.4	nc	6.6	0.7

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

TABLE I.5—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1977-78

Origin and destination				0	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Outer Sydney	15.3	8.0	12.2	14.1	6.7	11.2	14.3	23.6	17.1	3.3
Newcastle ^a	64.4	6.7	15.5	7.9	7.2	10.4	8.6	13.7	9.4	2.6
Other NSW & ACT	49.8	13.5	28.2	14.5	12.2	22.0	15.4	32.2	16.5	5.6
Interstate ^b	71.8	11.2	71.0	14.5	17.9	15.2	9.6	20.8	10.2	2.1
Subtotal	13.9	4.3	8.9	5.6	4.2	6.4	5.6	9.9	6.0	1.1
To Sydney from—				••••••••••••••••••••••••••••••••••••••						
Outer Sydney ^c	22.7	9.7	17.3	11.4	6.0	42.3	33.5	18.0	19.0	3.9
Newcastlea	19.7	8.8	10.5	5.7	6.7	13.1	19.1	17.9	12.7	2.6
Other NSW & ACT	41.0	12.3	16.4	22.4	8.4	65.3	26.1	33. 5	28.5	5.5
Interstate ^b	70.7	10.1	14.9	15.2	14.7	27.9	13.8	30.8	14.2	2.4
Subtotal	14.7	4.9	6.9	4.6	3.5	11.3	10.4	11.0	8.1	1.1
ACT & NSW other than Sydney to— ACT & NSW other					- <u></u>					
than Svdnev	18.9	25.1	57.5	12.4	11.8	19.3	38.4	54.3	33.5	31
Interstate ^b	38.3	20.2	44.1	13.4	29.0	26.5	43.3		45.3	3.0
Interstate ^b to— ACT & NSW other					2010	20.0	1010			010
than Sydney	_	15.9	44.0	34.9	37.6	115.9	22.7	53.2	34.8	4.8
Interstate ^b	—	nc	_	65.6	nc	_	37.4	nc	_	14.9
Subtotal	17.2	11.6	26.9	8.9	10.7	15.6	16.8	38.6	21.3	2.1
All origins/ destinations	8.8	3.1	5.4	3.3	2.6	5.3	4.8	7.3	4.7	0.7

(per cent)

a. Excludes rest of Hunter region.

b. Includes tonnages from unknown origins or destinations as appropriate.

c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

53

TABLE I.6—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES PASSING THROUGH MARULAN 1976-77

(per cent)

BTE Information Paper 6

Origin	• ,								De	estinat	ion reg	jion								
region						Intra	astate									Inte	rstate			
	Sydney	Outer Sydney	Hunter	llawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Melbourne	Other Vic.	Queensland	Adelaide	Other SA	WA	Not known	All origins aggregated
Intrastate	- · ·													;	-					
Sydney Outer Sydney Hunter Illawarra North Coast Northern Central West South-east Murrumbidgee Murray Total NSW ACT			 35.5 51.3 28.2 52.4	 24.8 6.7 17.6 54.9 5.6 11.7			46.3 	7.5 27.8 42.5 6.6 55.5 nc 17.6 4.3	7.7 	21.4 58.5 — — — — 20.2	4.2 25.9 30.1 5.2 55.4 21.8 3.7 5.2 18.2 1.2 4.9	3.7 43.6 4.1 nc 3.0	1.4 28.6 10.5 9.3 45.2 — — — — 1.1	9.8 nc 23.4 20.9 8.2		4.8 nc 35.9 4.1	43.6 	nc 		0.9 18.4 8.8 1.6 32.0 21.8 3.7 5.2 18.1 0.7 4.9
Interstate Melbourne Other Vic. Queensland Adelaide Other SA WA Not known	1.4 5.8 4.9 18.6 	29.5 — — — — —	16.3 27.5 	16.4 34.1 51.2 nc	54.2 — — — — — —						1.3 5.6 nc 4.6 18.2 nc —		 54.7 		67.4 — — — —				 69.4	1.3 5.6 48.7 4.6 18.2 nc 16.4
All origins aggregated	0.8	15.4	12.1	2.7	39.4		27.9	4.3	6.6	20.2	0.7	3.0	1.1	8.2	45.2	4.1	36.8	31.5	10.9	0.5

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

<u></u>

TABLE I.7-RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1976-77

Origin and destination				0	commodity gi	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Other NSW & ACT	29.4	6.4	36.7	8.6	7.1	10.6	9.5	20.8	6.8	1.7
Melbourne	43.2	6.2	20.1	6.3	10.2	5.6	6.0	10.5	4.6	1.1
Other Victoria		33.6	58.0	21.4	37.0	25.4	26.9	33.7	21.1	9.8
Other Interstate ^a		24.2	-	18.4	32.6	29.3	20.8	50.0	13.4	3.5
Subtotal	23.6	4.4	16.8	4.7	5.7	4.8	5.0	8.9	3.6	0.8
To Sydney from-				····			<u></u>			
Other NSW & ACT	14.5	7.2	11.3	9.4	9.5	28.5	24.2	17.0	5.5	1.7
Melbourne	69.2	4.7	20.0	6.0	11.2	7.3	5.6	13.8	4.8	1.3
Other Victoria	50.8	7.8	31.8	30.8	20.6	31.8	16.8	42.8	29.3	5.8
Other Interstate ^a		12.3	70.4	20.9	26.3	66.9	16.9	72.4	14.8	3.0
- Subtotal	13.9	3.3	9.4	4.8	6.6	7.0	5.0	10.3	3.6	0.8
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	9.3	17.4	13.1	8.9	5.8	8.4	22.0	39.7	6.5	1.5
Interstate	43.4	18.6	72.0	5.5	20.4	15.6	27.3	62.8	25.8	1.6
Interstate ^a to— ACT & NSW other										
than Sydney	64.8	16.9	54.3	15.0	22.9	33.6	31.0	28.0	26.8	3.2
Interstate	_	65.5	nc	40.9		_	64.0			12.1
- Subtotal	9.2	10.4	12.5	5.1	5.5	7.3	14.9	21.8	6.3	1.1
All origins/ destinations	7.4	2.6	6.9	2.9	3.4	3.5	3.5	6.5	2.4	0.4

(per cent)

a. Includes tonnages from unknown origins or destinations as appropriate.
 nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

TABLE 1.8—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES PASSING THROUGH BEROWRA 1976-77 (per cent)

BTE Information Paper 6

Origin							Des	tinatio	n regi	on								
region				Intras	state									Inters	tate			
																		gated
· · · · · ·									е									gre
		ney			st		est		dge		-	-					~	ag
		Syd		g	Coa	E	Š	eas	nbid		ISM			e	pld		INO	jins
	ney	er	ter	varı	ц Ц	the	tral	Ę.	run	ray			oriá	bar	er (Ę,	orig
	Syd	Out	Hun	Illav	Nor	Nor	Cen	Sou	Mur	Mur	Tota	ACT	Vict	Bris	Oth	SA	Not	Alle
Intrastate																		
Sydney	12.1	2.5	2.3	_	6.7	13.9	75.9		_	_	1.0		_	2.1	28.0	34.0	52.4	0.9
Outer Sydney	2.6	17.0	50.0	30.5	_	_	52.9	60.0	_	—	2.5	_	35.1	_			42.5	2.5
Hunter	2.5	68. 9		12.7	_	<u> </u>	25.2	31.6	35.8	58.1	2.3	39.9	6.3	_	_		·	2.2
Illawarra	nc	24.9	11.0	_	57.9	_	· ·	_	_	_	9.8		_	65.7	nc	_	_	9.7
North Coast	6.6	_	_	35.6	—	_	_	70.8	_	_	6.4	_	55.7	—	—		_	6.4
Northern	13.4	_	_	—			_	—		<u> </u>	13,3		_	_	—	_	_	13.3
Central West	—	24.2	34.6	nc		—	_		_	_	18.9			_	_	_	-	18.9
South-east	83.0	71.1	38.8	_	62.1	_	_		_		29.0	_	_		· <u> </u>	_	_	29.0
Murrumbidgee	nc	48.3	42.3	_	_		_	_			29.6				_	_	-	29.6
Murray	_		_	—		_	_	_	—	_	_	_		_	_	—	—	
Total NSW	1.1	2.4	2.2	10.9	6.6	13.9	22.1	26.3	35.8	58.1	0.7	37.5	4.2	2.0	27.0	23.1	16.7	0.6
ACT	_	_	81.5	_	97.4	_	_		_	_	56.3	_	_	—	_	_	_	49.0
Interstate																		
Victoria	49.1	36.1	7.7	—	43.1	_	—	_	_	_	5.1	_	_	92.0	-		_	5.1
Brisbane	3.2	—	-	nc			_		_	_	3.1	_	55.0	_		_		3.1
Other QId.	16.0	_	_	_	_		_	_	_		16.0	_	_	_	_	-	_	15.8
SA	-	73.0	34.4	_	_	—	_	_		_	5.7	_	_	_	_	_		5.8
Not known	26.7	—			_		—	_	_	—	13.8	_	—	_	_		_	12.8
All origins												_	-					
aggregated	1.0	2.4	2.1	10.8	6.5	13.9	22.1	26.3	35.8	58.1	0.6	37.5	4.2	2.0	27.0	23.1	14.9	0.6

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

TABLE I.9—RELATIVE STANDARD ERRORS FOR ESTIMATED FREIGHT TONNAGES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1976-77

Origin and destination				C	commodity gi	roup				Total
	Liv e - stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-				<u> </u>		·				
Outer Sydney	13.6	7.3	10.8	11.3	6.0	9.2	12.4	14.5	5.6	2.5
Newcastle ^a	36.8	6.3	18.2	8.0	7.4	8.3	7.8	12.3	5.8	2.3
Other NSW & ACT	25.0	13.0	33.5	15.8	12.7	22.2	18.1	26.8	10.4	5.2
Interstate ^b	_	13.3	47.5	14.8	15.8	15.6	9.1	21.4	7.9	1.8
Subtotal	11.4	4.1	8.7	5.5	4.0	5.4	5.3	8.8	3.2	0.9
To Sydney from-			······································							
Outer Sydney ^c	17.9	8.2	9.7	17.2	4.0	31.9	19.0	13.2	5.3	2.4
Newcastle ^a	37.0	8.5	12.1	6.0	11.3	10.4	14.0	13.2	5.3	2.6
Other NSW & ACT	39.3	10.3	16.3	21.4	8.4	nc	23.6	27.0	13.8	4.9
Interstate ^b		8.8	13.9	14.7	17.9	31.5	15.0	20.9	10.2	2.1
Subtotal	15.4	4.4	6.1	5.1	3.2	9.4	8.7	8.1	3.3	0.9
ACT & NSW other								·		
than Sydney to— ACT & NSW other										
than Sydney	18.9	26.9	26.0	9.9	9.1	15.0	36.1	64.7	15. 1	2.4
Interstate ^b	nc	22.5	86.6	17.2	49.8	23.4	39.6	_	19.7	4.2
Interstate ^b to— ACT & NSW other										
than Sydney	70.4	18.6	nc	31.3	25.4	nc	29.0	42.9	18.8	4.8
Interstate ^b	_	52.3		93.6			65.5		_	19.2
Subtotal	18.1	12.7	23.9	8.3	8.6	12.7	19.3	32.3	10.1	1.9
- All origins/										
destinations	8.3	2.9	4.9	3.4	2.4	4.4	4.4	5.9	2.2	0.6

(per cent)

a. Excludes rest of Hunter region.

b. Includes tonnages from unknown origins or destinations as appropriate.

c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

nc Estimate is derived from one observation and therefore no relative standard error could be calculated.

APPENDIX II—TABULATIONS OF SURVEY RESULTS

The results for each of the survey years are summarised in four tabulations, two each for Marulan and Berowra checking stations. The results appear in the following formats:

- · by origin and destination region; and
- by broad origin-destination and commodity groups.

Tabulations in the first-mentioned format are odd-numbered (for example, II.1, II.3). The regions in NSW were based on combinations of 1971 Census subdivisions and they are shown in Figure 3.3. It should be emphasised that the ACT region was defined to *include* Queanbeyan.

Tabulations in the second format are even-numbered and present results in terms of the single-digit broad commodity groups shown in Table 3.1. Due to space and sample size limitations, these tabulations contain only a small range of origin-destination combinations. Readers requiring commodity information relating to the Sydney-Brisbane and Sydney-Canberra routes are referred to Tables 4.7 and 4.10 respectively.

The results for Marulan are presented in Tables II.1 to II.12 while those for Berowra appear in Tables II.13 to II.24. Readers are advised to consult Appendix I to determine the relative standard errors associated with individual results. Certain routes estimated to account for small tonnages and traversed by few trucks of variable size (as often occurs on intrastate routes) are likely to have high relative standard errors associated with their freight estimates and it would be unwise to place any reliance on absolute values or changes in their magnitude from year to year. On the other hand, most of the important routes identified in the results have low relative standard errors. Relative standard error estimates are available in AppendixI for all results shown in this Appendix I relating to 1976-77 and 1977-78.¹ These estimates also provide a good indication of the reliability of tonnage figures shown in corresponding cells for the earlier survey years.

^{1.} Except where the tonnage estimate is derived from one observation. In this case no relative standard error is calculable. Asterisks on the tabulations for 1976–77 and 1977–78 indicate cells where tonnage estimates were derived from one observation.

BTE Information Paper 6

TABLE II.1-ESTIM	ATED R	IOAD	FREI	GHT -	TONN	AGËS	PASS ('000')	SING T	rHROI weigh	UGH N	MARU	ILAN 1	972-73						
Origin									Destir	nation I	region								
region						Intrast	ate								Inters	tate			
	Sydney	Onter Sydney	Hunter	וואאגווא	North Coast	Northern	Central West	Jage-dituo2	Murrumbidgee	Murray	WSN IstoT	Melbourne	Other Vic.	Queensland	əbisləbA	AS 1941O	AW	Not known	betsgerggre anigiro IIA
Intrastate							0		5	r c	1	0	U U U		141	~	٧	0	1353
Sydney	I	1	I	ļ	I	I	Ņ	49		5		00	+ · ·	1	Ē	-	۲	J	2
Outer Sydney	i	١	ļ		I	.I	1	I	÷	I	-	-	-	I		1	l	۱	00
Hunter	ł	١	1	I	ł	١	1	4	8	-	20	-	1	١	12	-	I	I	N
lliawarra	I	I	ļ	I	1	I	~	35	53	1 16	5	20	2 13	I	23	-	1	1	000
North Coast	١	Ι	ł	i	1	I	·1	I	-		-	1	-	ļ	ļ	I	L	-	ι Ω
Northern	ł	ł	I	Ι	ļ	١	- 1	ļ	1	•	í	1	 -	1	I	I	I	۱	- (
Central West	e	-	I	2	I	ľ	ł	I	ł	T	9	I I	1	Ι	I	ļ	I	I	ים ו
South-east	103	2	ო	99	-	-	ł	-	ł	-	-	1	1	I	I	I	I	ļ	
Murrumbidgee	72	7	ო	ი	1	I	i	ł	I		<u>ب</u>	1	1	I	I	ł	ł	ł	5
Murrav	2	1	١	-	I	I	ł	I	ł	I	ო	•	1	١	I	1	1.	Ì	
Total NSW	180	9	9	78	-	-	4	189	54	4	27 23	33 1 00	8 85	1	177	თ	4	ო	2046
ACT	21	I	l	ო	ł	1	ł	-	I	1	22	י ו		-	1	I	I	I	92
Interstate										č	2			C					965
Melbourne	820	-	5	20	-	ł	I	ļ	ł	₩ 		•	1	N	I	ļ	I	ļ	
Other Vic.	283	ო	6	7	-	۱	١	I	ł) 8	8	י י	 -	l	ł	I	1	I	405
Queensland	1	١	I	I	I	ł	١	2	1	I	2	-		I	ļ	I	I	i	4 0
Adelaide	111	i	4	S	ļ	١	I	ł	I	₽ 	ຊ	' 	1	ł	I	I	ļ	I	
Other SA	55	1	١	ļ	I	١	١	ļ	I		22	1	1	l	I	ł	I	I	ŝ
WA	4	١	l	ļ		I	I	I	ł	I	4	' 	1	I	ļ	I	١	۱	4 •
Not known	က	ł	1	I	I	I	I	1	I	1	e			1	L	1	ı	-	4
All origins aggregated	1 477	14	41	113	ю		4	192	54	4 1 9(03 5	34 1 00	9 85	c	177	ი	4	4	3 428

Origin and destination				C	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Other NSW & ACT	3	53	4	34	66	46	15	5	30	256
Melbourne	5	123	15	155	59	165	138	33	191	884
Other Victoria	1	21	1	9	4	7	5	5	6	59
Other Interstate ^a	—	15	1	42	11	18	30	4	33	154
Subtotal	9	212	21	240	140	236	188	47	260	1 353
To Sydney from										
Other NSW & ACT	41	65	17	47	18	2	4	3	4	201
Melbourne	2	177	17	136	43	110	151	23	161	820
Other Victoria	15	164	31	14	17	6	24	5	7	283
Other Interstate ^a	1	72	2	34	9	7	25	3	20	173
Subtotal	59	478	67	231	87	125	204	34	192	1 477
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	51	22	9	25	57	156	5	2	1	328
Interstate ^a	4	9	7	98	17	32	16	2	5	190
Interstate ^a to— ACT & NSW other										
than Sydney	7	19	3	23	8	3	5	6	2	76
Interstate ^a	_	1	—	1	1	—			1	4
Subtotal	62	51	19	147	83	191	26	10	9	598
All origins/ destinations	130	741	107	618	310	552	418	91	461	3 428

TABLE II.2—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1972–73 ('000 tonnes weight)

a. Includes 'Not known'.

Appendix II

TABLE II.3—ESTIMATED ROAD FREIGHT TONNAGES PASSING THROUGH MARULAN 1973-74

('000 tonnes weight)

Origin									Desti	inatio	n regi	on 🗌								
region					1	Intrast	ate									Interst	tate			
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Melbourne	Other Vic.	Queensland	Adelaide	Other SA	MA	Not known	All origins aggregated
Intrastate																				
Sydney		—	_	—		—	1	63	52	2	118	231	984	73	—	180	12	3	2	1 603
Outer Sydney	_	—	·	_	-	_		2	1	_	3	-	5		—		—	—	_	8
Hunter	_	—	_	_		_		3	4	-	7	1	67	9		7	1	_	2	94
Illawarra	—		_	1		_	1	147	26	2	177	71	57	14	<u> </u>	29	2	1	—	351
North Coast	_	—	—	_	-		—	1	—	-	1	1	2	_			_	—	_	4
Northern	_	—	—		-	—			—	—	—	-		—	—	_	-	—	-	-
Central West	2	1	—	3	-	-		_	—		6	-	_	—		_		_	_	6
South-east	113	6	1	64	-	—		3	_	-	187	-		_	1	_		_		188
Murrumbidgee	115	3	4	11		—	—		—	-	133	-	—	-		—	—	—		133
Murray	4			2		—	—	—	—		6	—	—			—	-		—	6
Total NSW	234	10	5	81	—	—	2	219	83	4	638	304	1 1 1 5	96	1	216	15	4	4	2 393
ACT	38	1	1	4					—		44	—		—	—			—	—	44
Interstate																				
Melbourne	924	3	28	33	1	1	_	—			990		—	_	3			_	_	993
Other Vic.	197	—	6	5	1	_			-	-	209	—		—		—		_		209
Queensland	_	—		_		—	—	2	—		2	-	2		_			—		4
Adelaide	175	—	2	4	—				—		181	—	_	—	—	<u> </u>		_		181
Other SA	35	<u> </u>	_		_	_	—		—	-	35	_	_	—	—	_		_		35
WA	1	_			<u> </u>	—	—	_			1	—	—		-		-	—		1
Not known	1	_		_	—		—	—	_		1	_		_	_			_	1	2
All origins		_										·					<u> </u>			
aggregated	1 605	14	42	127	2	1	2	221	83	4 2	2 101	304	1 1 1 7	96	4	216	15	4	5	3862

Origin and destination				C	commodity g	roup				Total
	Liv e - stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-	7	66	0	C 4			05		, , , , ,	
Melbourpo	1	146	10	167	83	50	25	6	46	349
Other Victoria		140	12	16	70	190	143	31	224	984
Other Interstate ^a	1	15	1	63	13	17	38	4	4 45	197
Subtotal	9	238	21	310	176	267	218	45	319	1 603
To Sydney from—										
Other NSW & ACT	39	69	31	51	55	6	7	4	10	272
Melbourne	2	172	14	149	70	129	150	15	223	924
Other Victoria	7	117	5	9	18	9	22	2	8	197
Other Interstate*		71	1	54	10	11	18	3	44	212
Subtotal	48	429	51	263	153	155	197	24	285	1 605
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	37	14	16	26	108	150	8	2	4	365
Interstate ^a	1	19	4	115	12	30	13	1	2	197
Interstate ^a to— ACT & NSW other										
than Sydney		28	5	29	4	4	7	3	6	86
Interstate ^a		2		2	—	-	1		1	6
Subtotal	38	63	25	172	124	184	29	6	13	654
All origins/ destinations	95	730	97	745	453	606	444	75	617	3 862

TABLE II.4—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1973-74 ('000 tonnes weight)

a. Includes 'Not known'.

TABLE II.5—ESTIMATED ROAD FREIGHT TONNAGES PASSING THROUGH MARULAN 1974-75

('000 tonnes weight)

Origin								_	Dest	inatio	n regio	on								
region						Intrast	ate									Inters	ate			
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Melbourne	Other Vic.	Queensland	Adelaide	Other SA	WA	Not known	All origins aggregated
Intrastate												-					_	_		
Sydney	-	—		_	—	—	1	67	63	5	136	280	944	60	_	148	15	2	1	1 586
Outer Sydney		_	—	_	—			—	—	—	—	4	3	6	—		—	—	—	13
Hunter	_	_	—	—	_	_		7	7	—	14	2	101	24	—	9	—	_	—	150
Illawarra	_	—		—		—	2	67	13	2	84	107	63	12	—	20	1	—	5	292
North Coast	—	<u> </u>	—	_	—	_	—	1	—	—	1		2	2		_	—	_	-	5
Northern	—	_	—	_	—	_	—	_	—	_	—	_	_	_	—	_	—	—	—	_
Central West	. 4	1	_	1	_	—		—	_	—	6	-	_	_	—	<u> </u>		_	—	6
South-east	136	7	2	79			—	7	_	—	231	_	_	—	2			—	—	233
Murrumbidgee	117	1	3	11	—	—	_	2	—	_	134	_	—	_	—	_	—	_	—	134
Murray	9	-	—		—	—		_	_	_	9		_	_	—	_	_	_		9
Total NSW	266	9	5	91		_	3	151	83	7	615	393	1 1 1 3	104	2	177	16	2	6	2 4 2 8
ACT	47	_	2	5	—		—		-	—	54	_		—	_	—	_	—		54
Interstate																				
Melbourne	998	_	15	27	4	1		—	_		1045	_	_		1	_	—	_	_	1046
Other Vic.	147	_	_	1	_	·	—	_		_	148	_	_	_	_	_		_	_	148
Queensland	_	—		_	_	_	—	2		-	2	3	5	_	_	_	-		_	10
Adelaide	154		_	3	-	—	—	_	_	_	157	_	_	—	_	_	_	_	—	157
Other SA	27	_	—	_	_		_			_	27	_	_	_	—	_	_	_	_	27
WA	1	_	_	_	-	_	-	-			1	_		_	_	_		_	_	1
Not known	2	_		2	—	_		_		_	4	_	_	_			—			4
All origins																				
aggregated	1642	9	22	129	4	1	3	153	83	7 :	2 0 5 3	396	1118	104	3	177	16	2	6	3875

BTE Information Paper 6

Origin and destination	_			C	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-	8	85	3	86	109	55	24	11	35	416
Melbourne	3	135	18	175	60	163	124	28	238	944
Other Victoria	_	11	2	16	ğ	7	5	3	200	60
Other Interstate ^a	_	17	2	47	9	27	21	3	40	166
Subtotal	11	248	25	324	187	252	174	45	320	1 586
To Sydney from—					17 mr (128.)					
Other NSW & ACT	43	79	57	69	37	2	7	7	12	313
Melbourne	1	192	11	198	50	143	137	19	247	998
Other Victoria	_	89	7	12	8	4	20	4	3	147
Other Interstate ^a		59	—	33	9	6	21	3	53	184
Subtotal	44	419	75	312	104	155	185	33	315	1 642
ACT & NSW other than Sydney to— ACT & NSW other						_				
than Sydney	51	13	25	34	129	66	2	2	11	333
Interstate ^a Interstate ^a to— ACT & NSW other	—	29	2	118	27	56	11	2	5	250
than Sydney	1	9	6	20	3	7	9	1	2	58
Interstate ^a	_	3		_	_		1	_	2	6
Subtotal	52	54	33	172	159	129	23	5	20	647
All origins/ destinations	107	721	133	808	450	536	382	83	655	3875

TABLE II.6—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1974–75 ('000 tonnes weight)

a. Includes 'Not known'.

All origins aggregated	ACT Interstate Melbourne Other Vic. Queensland Adelaide Other SA WA Not known	Intrastate Sydney Outer Sydney Hunter Illawarra North Coast Northern Central West South-east Murrumbidgee Murray Total NSW	TABLE II.7ESTI Origin region
1 922	1095 202 143 27 27 27	221 215 4 390	Sydney
35	<i></i> თ {	8-11-11	Outer Sydney
58	0 8 4	μ – μ – Ι π	Hunter
165		109	Illawarra
ω	-	N N	North Coast
I			Northern Intras
თ	111111	თ ა ა	Central West
196		196	South-east
135		106 135 22 7 6	Murrumbidgee
12 :		10 1 1 1 1 1 1 1 1 1 1	Murray Murray
2 531	1 180 220 146 27 2	213 8 100 100 226 226 226 250 250 250 250	Total NSW
546	-	545 2 352 352 352 352 352 352 352 352 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 355 35	ACT
1 259		1112 8 70 57 57 57 1252	Melbourne
120		120 29	Other Vic.
N			Queensland
153		153 2 _ 38	Adelaide
8		∞ → →	Other SA
ω		ω ω μ	WA
Ħ	N	ဖ _ ၊ տ _ ဂ်	Not known
4 633	70 1181 220 8 146 27 5	1 902 10 98 389 8 13 290 250 2574	All origins aggregated

99

8 TE Information Paper 6

Origin and destination				C	Commodity g	roup				 Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Other NSW & ACT	7	135	5	107	143	80	26	11	51	565
Melbourne	6	190	17	195	75	184	164	62	219	1112
Other Victoria	—	13	3	18	4	8	13	9	9	77
Other Interstate ^a		15	1	31	10	14	26	8	43	148
Subtotal	13	353	26	351	232	286	229	90	322	1 902
To Sydney from—										
Other NSW & ACT	67	158	46	65	61	12	12	14	16	451
Melbourne	_	269	18	166	95	160	162	25	200	1095
Other Victoria	6	115	8	9	18	6	25	1	14	202
Other Interstate ^a		65	4	25	16	6	20	4	34	174
Subtotal	73	607	76	265	190	184	219	44	264	1 922
ACT & NSW other									· · · · · · · · · · · · · · · · · · ·	
than Sydney to— ACT & NSW other										
than Sydney	76	22	26	61	221	54	7	3	12	482
Interstate [*]	3	23	4	120	20	19	12	2	6	209
Interstate ^a to— ACT & NSW other										
than Sydney	3	23	3	41	12	7	13	3	3	108
Interstate ^a		1	_	2	1	1	1		4	10
Subtotal	82	69	33	224	254	81	33	8	25	809
All origins/ destinations	168	1 029	135	840	676	551	481	142	611	4 633

TABLE II.8—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1975–76 ('000 tonnes weight)

a. Includes 'Not known'.

Origin	_					_		-	Dest	inatio	n regio	n							-	
region						Intrast	ate									Interst	ate			
		dney	-		ast		/est	st	dgee		. 2		ē		pu				ŗ	s aggregated
	Sydney	Outer Syd	Hunter	illawarra	North Co	Northern	Central M	South-ea	Murrumbi	Murray	Total NSV	АСТ	Melbourn	Other Vic	Queensla	Adelaide	Other SA	MA	Not know	All origins
Intrastate																				
Sydney	_	_				—	1	103	94	12	210	352 1	198	68	—	109	4	2ª		1943
Outer Sydney	—	_			—	—	_	8	_		8		11	2ª		1 ª	_	—	—	22
Hunter	-	—	_	_	- .			3	3	3	9	3	82	16	_	—	1 ª	—	1 ª	112
Illawarra	_		—	-		—	2	119	41		162	158	104	21	—	9	. 1 ª	3ª	1	459
North Coast	_	—	<u> </u>		—	_	—	2		—	2		5	—	—			_		7
Northern	_	_	-		—	—	—	_			_	_	—	—	—		_	—	—	_
Central West	3	1ª	_	9		_		1 ª	—		14	_	_	—	—	_	_		1	15
South-east	149	10	7	130	1	—	_	15	_	_	312	1 ª	_	_	_					313
Murrumbidgee	191	8	3	24		-			_	—	226	_						—	_	226
Murray	17			2	_		_		_		19				_		_	_	_	19
Total NSW	360	19	10	165	1	—	3	251	138	15	962	514 1	400	107		119	6	5	3	3116
ACT	72	1	1	14	_	_	_			_	88	_	_	_			_		—	88
Interstate			••	~~											•					1 005
Melbourne	1165	8	30	28	2	-	_	_	—		1233		_		2	_			_	1235
Other Vic.	222	_	12	4	_	_			_	_	238	_	_	_			_	_	_	238
Queensiand	450	_		_	_	_	_	١ª	-	_	150	_	2		_	_	_	_	_	150
Adelaide	152	_	۱ª	3	-			_			100	_	_		_	_	_	_		100
Uther SA	26	_	_	—			_		_	_	20	_	_	_			_		_	20
VVA Not known		_		_	_		_	_	_				_		_	_	_	_	<u>_</u>	
NUL KHUWH																				2
All origins																		_		
aggregated	1 997	28	54	214	3	-	3	252	138	15 :	2704	514 1	402	107	2	119	6	5	5	4864

TABLE II.9—ESTIMATED ROAD FREIGHT TONNAGES PASSING THROUGH MARULAN 1976-77 ('000 tonnes weight)

a Estimate is derived from one observation.

Origin and destination			· · · · · · · · · · · · · · · · · · ·	C	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-						······	<u> </u>			
Other NSW & ACT	7	135	5	91	141	75	39	13	56	562
Melbourne	4	192	19	171	79	245	178	66	244	1 1 98
Other Victoria	_	8	3	18	7	12	10	4	6	68
Other Interstate ^a	-	15		19	7	12	22	4	36	115
Subtotal	11	350	27	299	234	344	249	87	342	1943
To Sydney from-										
Other NSW & ACT	40	119	53	79	82	10	9	18	22	432
Melbourne	1	307	22	173	66	151	200	31	214	1 165
Other Victoria	4	132	9	8	19	10	31	2	7	222
Other Interstate ^a		56	8	21	18	4	27	4	40	178
Subtotal	45	614	92	281	185	175	267	55	283	1 997
ACT & NSW other										
than Sydney to ACT & NSW other										
than Svdnev	86	19	35	89	200	104	18	2	17	570
Interstate	5	23	2	152	21	35	8	2	11	259
Interstate [®] to-							-			
than Sydney	-1	22	3	97	13	6	6	6	4	80
Interstate ^a		23	1 ^b	2			1	_		6
Subtotal	92	67	41	270	234	145	33	10	32	924
All origins/ destinations	148	1 031	160	850	653	664	549	152	657	4 864

TABLE II.10---ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1976-77 ('000 tonnes weight)

a. Includes 'Not known'.

b. Estimate is derived from one observation.

TABLE II.11—ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH MARULAN 1977-78 ('000 tonnes weight)

Origin									Desti	natior	regio	on								
region						ntrast	ate									Interst	ate			
																				gated
									۵.											gre
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidge	Murray	Total NSW	ACT	Melbourne	Other Vic.	Queensland	Adelaide	Other SA	MA	Not known	All origins ag
Intrastate															_					
Sydney	<u> </u>		·			_	3	136	117	15	271	328	1 033	21		102	2	3	7	1 767
Outer Sydney	_		_				_	3	1 ª		4		10	1 ª	—	1 ª	—		—	16
Hunter	-		—	_	_	_	—	11	2	1 a	14	6	47	4	_	2			2	75
Illawarra	_		_			—	5	111	59	3	178	131	123	6		14			11	463
North Coast			·			_				1 ª	1 a	1	3		—		-		_	5
Northern	. <u> </u>	-	<u> </u>	_		_	_	_	_		—		—	—		-	-			
Central West	1 ª	1 ª	_	5			—		—		7	_	—		—			-	—	7
South-east	134	13	6	122	1 a	—		5			281	—	1ª	—	·		-		_	282
Murrumbidgee	217	3	10	59		—	—	_			289	-		—	—	_			2	291
Murray	15		3	2		_		_	<u> </u>		20	_			_	—	—		1 ª	21
Total NSW	367	17	19	188	1 a	—	8	266	179	20 1	065	466	1217	32		119	2	3	23	2927
ACT	68	—	3	13		—	1 ª	—			85				_	—			1 a	86
Interstate																				
Melbourne	1 181	6	27	42	1 ª	—	—		_	1	257	-	—	—	2	—	-		1 ª	1 260
Other Vic.	97	—	2	2	1 ª	_			_		102	—				—			1 a	103
Queensland					_		—			1 ª	1	1	5		—	1 ª			<u> </u>	8
Adelaide	110	2	. 1 ª	6				—	—		119	_			—				_	119
Other SA	31	—	1 a	1ª			—	—	—		33	_	<u> </u>			-	—		—	33
WA	_			-	—				—			—		—	_				—	
Not known	_	—		—		_	—	_				-	2	1	_		_		3	6
All origins	<u> </u>		·												- <u> </u>					
aggregated	1 854	25	53	252	3	`	9	266	179	21 2	2662	467	1 224	33	2	120	2	3	29	4 542

BTE Information Paper 6

a. Estimate is derived from one observation.
Origin and destination				C	commodity gi	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-								*		
Other NSW & ACT	4	154	14	102	119	114	37	16	39	599
Melbourne	12	162	16	177	71	202	152	47	194	1 0 3 3
Other Victoria		3	1 ^b	9	1	5		1	1 ^b	21
Other Interstate [*]	3	13	1	17	9	8	19	3	41	114
Subtotal	19	332	32	305	200	329	208	67	275	1767
To Sydney from—										
Other NSW & ACT	38	123	53	45	121	7	16	8	24	435
Melbourne	6	297	27	154	112	142	218	21	204	1 181
Other Victoria		56	3	4	11	5	12	1	5	97
Other Interstate ^a	1 ^b	47	1 ^b	20	16	3	14	1	38	141
Subtotal	45	523	84	223	260	157	260	31	271	1 854
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	109	27	43	44	226	104	17	5	7	582
Interstate ^a	11	37	6	116	17	23	11	1	7	229
Interstate ^a to— ACT & NSW other										,
than Sydney	2	25	8	26	11	7	7	2	6	94
Interstate ^a	1 b	4		2	2	1 ^b	3	2	1	16
Subtotal	123	93	57	188	256	135	38	10	21	921
All origins/ destinations	187	948	173	716	716	621	506	108	567	4542

TABLE II.12—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH MARULAN, 1977-78 ('000 tonnes weight)

a. Includes 'Not known'.

7

b. Estimate is derived from one observation.

Appendix II

TABLE II.13—ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1972-73

('000 tonnes weight)

Origin	f						Dest	inatior	n regio	n								
region				Intrasi	ate									Interst	tate			
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Victoria	Brisbane	Other Qld	SA	Not known	All origins aggregated
Intrastate																		
Sydney	22	355	413		37	7	_	_	—	_	834	_		237	23	_	4	1 098
Outer Sydney	459	_					1	_	_		460		3	—		1		464
Hunter	323			8	_	—	2	3	3	—	339	1	65	_	_	15	_	420
Illawarra		5	23	_	2	_	—	-	-		30	_	_	2	—		_	32
North Coast	26	1	_	1			_	_	_		28	-	1		_		_	29
	4		_	_		_		_			4	_	1	_		_	_	5
South-cost	I	1	0			_	_	_			9		_			_	_	9
Murrumbidgee	_	6	3 2	_		_			-	_	0		_	-	_		_	2 9
Murray	_	_	~	_	_		_	_	_	_	°	_	_	_		_	_	-
Total NSW	835	370	447	9	40	7	3	3	3		1717	1	70	239	23	16	4	2070
ACT	_	_		_		<u> </u>	_		_	_		_	_			_	_	
Interstate																		
Victoria	8	42	_	_	_	_		_			50	_		1				51
Brisbane	182	_		2			_	1	_	_	185		1		_		_	186
Other Qld.	40	-	_	3	<u> </u>			_		_	43	1				_		44
SA		1	3	_	1	_		_	_	—	5	_		_	_		_	5
Not known	4		1	_	—	_		_	_		5	_		_	—	—	3	8
All origins																		
aggregated	1 069	413	451	14	41	7	3	4	3	- 2	2 005	2	71	240	23	16	7	2 364

Origin and destination				C	Commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Outer Sydney	21	54	32	18	139	61	11	5	14	355
Newcastle ^a	11	74	16	46	78	57	31	10	76	399
Other NSW & ACT	1	11	2	9	18	6	4	1	6	58
Interstate ^b		49	2	31	19	34	56	7	66	264
Subtotal	33	188	52	104	254	158	102	23	162	1076
To Sydney from-			······				··			
Outer Sydney ^c	5	44	13	60	334	4	4	10	7	481
Newcastle*	6	40	17	62	43	57	8	8	51	292
Other NSW & ACT	2	15	7	2	29	1	2	1	3	62
Interstate ^b	3	88	34	19	24	5	24	7	30	234
Subtotal	16	187	71	143	430	67	38	26	91	1 0 6 9
ACT & NSW other than Sydney to—										
AUT & NSW other	-	10				10	•		•	
than Sydney		10	1	15	15	18	2	1	2	/1
Interstate ^b to ACT & NSW other	3	12	3	29	4	21	1	1	8	88
than Sydney	2	15	2	10	7	2	٩	2	6	55
Interstate ^b	_	_		1	1				3	5
- Subtotal	12	37	6	55	27	41	18	4	19	219
All origins/ destinations	61	412	129	302	711	266	158	53	272	2 364

TABLE II.14-ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1972-73 ('000 tonnes weight)

a. Excludes rest of Hunter region.

b. Includes tonnages from unknown origins or destinations as appropriate.
 c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

BTE Information Paper 6

Synney 590 5 1 Junter Junter 590 5 1 Junter Junter 9 5 1 Junter North 76 2 1 Junter 76 2 1 2 North 32 1 32 1 3 Northern 32 1 32 1 3 South-east 2 4 1 3 Murray 1 2 4 1 3 Murray 1 2 4 4 3 Murray 1 2 4 4 4 ACT 1 1 2 1 2 ACT 1 2 1 2 1 2 Other Qld. 1 2 4 4 3 3 Murray 1 2 1 2 4 3 ACT 1 2 4 4 3 4 3 Other Qld	8		tsse-ftuo2 ∞ <u>−</u> ∞ 0 1 0 1 0 1 1	eeppidmumuM ω ω η ω ω η	W2N 1610T 2592 24 26 25 24 26 26 26 26 26 26 26 26 26 26 26 26 26	TDA 4 400 -		Brisbane Brisbane Brisbane		AS ∞−5 10 10	Not Known
Jot known 2 - 1	1	1	1	1	ო 	1	1	ı	1	ı	ן מ

.

IMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1973-74 Ì 1 :

74

Origin and destination	·······			C	Commodity g	roup				Total
	Li ve- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-									···	
Outer Sydney	28	63	46	37	185	80	15	7	24	485
Newcastle ^a	5	103	25	80	105	81	43	13	70	525
Other NSW & ACT	2	23	5	15	64	11	9	4	6	139
Interstate ^b		43	2	41	47	53	53	12	50	301
Subtotal	35	232	78	173	401	225	120	36	150	1 450
To Sydney from—							· · · · · · · · · · · · · · · · · · ·			· <u> </u>
Outer Sydney ^c	5	51	16	32	488	6	5	10	10	623
Newcastle [*]	8	45	18	147	71	58	11	15	49	422
Other NSW & ACT	2	34	23	6	78	2	3	5	5	158
Interstate ^b	2	81	40	20	40	7	23	8	35	256
Subtotal	17	211	97	205	677	73	42	38	99	1 459
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	15	7	3	56	36	25	3	1	3	149
Interstate ^b	3	14	5	34	11	13	4	i	5	90
Interstate ^b to— ACT & NSW other	Ū.		Ū	01			-	·	U	00
than Sydney	2	21	1	13	5	2	7	2	9	62
Interstate ^b		1	-	2	_		2	_	1	6
Subtotal	20	43	9	105	52	40	16	4	18	307
All origins/ destinations	72	486	184	483	1 130	338	178	78	267	3216

TABLE II.16-ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1973-74. ('000 tonnes weight)

a. Excludes rest of Hunter region.
b. Includes tonnages from unknown origins or destinations as appropriate.
c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

BTE Information Paper 6

-					b b	00 tonn	Iew Se	ght)									
Origin							Des	tinatio	n regic	5							
region				Intra	state								5	terstate			
•																	regated
		, Aque		E	tsso	u	tsəW	tse	əəɓpiq		MS			piq		UM	66e su
· .	Yanby2	S neter S	Hunter	nsweill	Ионћ С	Norther	Central	South-e	munuM	Murray	N IbjoT	ACT	NCIOIOR Brisban	Other C	AS	Not kno	IIA origi
Intrastate																	
Sydney	37	460	640	-	124	29	ო	' 	' 	-	4 6	I	1 28:	16	I	24	1617
Outer Sydney	592	ო	I	-	١	I	Ι	I	' 1	ی ۱	96	1	9		Ι	1	603
Hunter	612	თ	ł	31		ł	ო	2	' ∞	u I	65	+	4	1	~	1	747
Illawarra	Ι	4	52	I	1	-	1	ļ	ì	1	57	' 1		-	I	1	99
North Coast	133	ო	I	ო	I	1	2	N	' 1	-	43 100	ī		1	ł	-	145
Northern	34	ł	Ι	I	۱	1	1		Ì	1	8 7	' 1	1	1	I	1	34
Central West	I	4	e	I	ł	1	1	I	1	1	15	' 1	1	1	1	I	15
South-east	1	2	4	١	I	Ι	Ι	1		I	ő		1		1	I	9
Murrumbidgee	2	-	2	ł	I	I	Ι	i	1	ī	ŝ	1	1	1	Ι	I	ŝ
Murray	-	I	۱	I	I	Ι	Ι	1	I	I	-	' 	1	1	I	I	-
Total NSW	1411	494	701	36	124	30	œ	4	∞	5	16	-	2 5 8 7	5 17	7	52	3 233
ACT	I		ļ	I	I		ł	1	I	ī	-	I.	•	1	I	Ι	-
Interstate																	1
Victoria	Ι	~	26	l	I	Ι	Ι		•	1.	33	1	! 	1	1	I	eee
Brisbane	236	I	1	Ι	I	I	I		1		36	I	່ ຕ		Ι	ł	239
Other Qld.	31	I	ļ	-	I	I	I	•	1	I	32	' 	1	1	ļ	I	32
SA	-	-	2	I	١	I	I		, I	ł	4	' 	1		1	ł	4
Not known	10	ļ	ო	I	ł	ł	ł		1	I	4	' 	1	1	ļ	e	17
All origins aggregated	1 689	503	732	37	124	30	8	5	8	ι σ	36		5 28	2 17	-	58	3 559

76

TABLE II.17---ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1974-75

Origin and destination				C	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-							. <u></u> .			
Outer Sydney	27	77	53	27	139	97	18	11	11	460
Newcastle ^a	4	120	21	98	112	106	55	23	71	610
Other NSW & ACT	2	33	15	36	53	10	9	7	22	187
Interstate ^b		50	3	44	25	40	63	8	90	323
Subtotal	33	280	92	205	329	253	145	49	194	1 580
To Sydney from—					<i>,.</i>					
Outer Sydney ^c	5	63	30	29	457	3	9	12	21	629
Newcastle ^a	8	68	33	219	69	70	28	14	48	557
Other NSW & ACT	4	52	25	12	116	1	3	5	7	225
Interstate ^b	1	96	26	24	25	7	24	17	58	278
Subtotal	18	279	114	284	667	81	64	48	134	1 689
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	16	4	5	51	53	14	1	2	4	150
Interstate	1	11	4	31	11	18	5	1	11	93
Interstate ^b to				_		-				
than Sydney	1	15	2	8	7		5	1	2	41
Interstate ^b	<u> </u>	1		-	1	1	1		2	6
Subtotal	18	31	11	90	72	33	12	4	19	290
All origins/ destinations	69	590	217	579	1 068	367	221	101	347	3 559

TABLE II.18-ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1974-75 ('000 tonnes weight)

a. Excludes rest of Hunter region.
b. Includes tonnages from unknown origins or destinations as appropriate.
c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

 TABLE II.19—ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1975-76

 ('000 tonnes weight)

Origin							D	estina	tion re	gion								
region —				Int	trastate									Inter	state	_		
																		ated
									_									reg
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Total NSW	ACT	Victoria	Brisbane	Other QId	SA	Not known	All origins agg
Intrastate					-		_	-		_	·							
Sydney	17	534	654		124	37	_		—	—	1 366			324	9	1	2	1 702
Outer Sydney	537	9	3	1	1	1	_				552		6					558
Hunter	576	1		43	—	—	4	5	5	2	636	5	68		-	2	1	712
Illawarra	2	5	66	_	1	_	—		—	_	74	_	-	4	-	-		78
North Coast	134	2	—	4	—	_		1	1		142	—	1				4	.147
Northern	39		_	—		_	_		—		39	-	—	—			_	39
Central West		11	8	_	_	_			<u> </u>	_	19	· _	_	_		-	—	19
South-east	_	9	4	—	1	-	—		—		14		1	1			—	16
Murrumbidgee	2	4	з		_	_	—		_		9		—	—	—			9
Murray		1	2		—	-	_		-		3			—				3
Total NSW	1 307	576	740	48	127	38	4	6	6	2	2 854	5	76	329	9	3	. 7	3 283
ACT	_		2	—	—	_	-		_	_	2	_	—	_	—		1	3
Interstate																		
Victoria	—	7	46			-	_		_	—	53			1				54
Brisbane	259			_	_	—			—	1	260	—	—	_	—		1	261
Other Qld.	29		_	4	_	_	—				33		1		—			34
SA	—		5	-		_				—	5	-	—	_	—			5
Not known	2		-	-	_		_		—	_	2		_		-		_	2
- All origins									·		· · · ·							
aggregated	1 5 9 7	583	793	52	127	38	4	6	6	3	3 209	5	77	330	9	3	9	3642

78

BTE Information Paper 6

Origin and destination				0	Commodity g	roup				Total
	Liv e - stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Outer Sydney	37	78	53	37	166	84	23	13	43	534
Newcastle ^a	10	123	21	95	112	88	64	28	83	624
Other NSW & ACT	6	30	7	26	54	19	15	8	26	191
Interstate ^b	—	44	7	31	30	45	75	7	97	336
Subtotal	53	275	88	189	362	236	177	56	249	1 685
To Sydney from										
Outer Sydney ^c	16	57	42	26	379	1	8	18	7	554
Newcastle	6	67	44	198	68	58	19	17	35	512
Other NSW & ACT	3	48	36	17	122	2	3	6	4	241
Interstate ^b		91	35	29	42	7	28	9	49	290
Subtotal	25	263	157	270	611	68	58	50	95	1 597
ACT & NSW other										
ACT & NSW other										
than Sydney	27	13	5	72	63	16	2	1	6	205
Interstate ^b		20	ĩ	34	13	14	6	_	1	89
Interstate ^b to— ACT & NSW other		20	·	01	10		Ŭ		·	
than Sydney	1	18	_	20	11		7	3	3	63
Interstate ^b	—	1	~	_		—	1	-	1	3
Subtotal	28	52	6	126	87	30	16	4	11	360
All origins/			051							
destinations	106	290	251	585	1 060	334	251	011	355	3642

TABLE II.20-ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1975-76 ('000 tonnes weight)

a. Excludes rest of Hunter region.

b. Includes tomages from unknown origins or destinations as appropriate.
 c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.

TABLE II.21-ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1976-77 ('000 tonnes weight)

Origin							D	estina	tion re	gion								
region				Int	råstate									Inter	state			
- - -	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Totaî NSW	ACT	Victoria	Brisbane	Other Qld	SA	Not known	All origins aggregated
Intrastate				_										·		·		
Sydney Outer Sydney Hunter Illawarra North Coast Northern Central West South-east Murrumbidgee Murray Total NSW ACT	23 647 587 1ª 136 35 — 1 1ª 1431 	565 27 1 10 13 2 3 621 	686 3 64 5 3 4 765 1	6 43 6 1ª 56 	118 2 3 123 1	26 — — — — — — — — — — — — — — — — — — —	2 1 12 15 	1 6 2 9		2	1 420 685 657 77 144 35 19 9 8 3 054 2	4 4		321 	11 		2 1 	1755 692 727 81 148 35 19 9 8 3474 2
Interstate Victoria Brisbane Other Qld. SA Not known	2 239 34 3	6 _2 	48 5 	1ª — —	5 			 			61 240 34 7 3			1 				62 243 34 7 3
All origins aggregated	1 709	629	819	57	129	26	15	9	6	2	3 401	4	79	325	12	1	3	3 825

a. Estimate is derived from one observation.

Origin and destination				С	commodity g	roup				Total
	Live- stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Outer Sydney	32	94	60	47	178	88	22	13	31	565
Newcastle ^a	5	131	22	93	108	108	73	33	76	649
Other NSW & ACT	13	37	7	21	43	14	14	7	27	183
Interstate ^b		44	4	34	30	37	81	17	88	335
Subtotal	50	306	93	195	359	247	190	70	222	1732
To Sydney from—		<u></u>					·····			
Outer Sydney ^c	11	64	75	18	448	5	9	24	16	670
Newcastle ^a	5	76	46	181	52	73	23	25	43	524
Other NSW & ACT	3	57	28	18	104	1 ^d	11	8	7	237
Interstate ^b	—	88	43	35	26	8	37	10	31	278
Subtotal	19	285	192	252	630	87	80	67	97	1709
ACT & NSW other than Sydney to-										
ACT & NSW other										
than Sydney	19	12	11	65	75	33	6	1	10	232
Interstate ^b	1 d	14	2	25	3	17	6	_	13	81
Interstate ^b to—										
ACT & NSW other										
than Sydney	2	19	1 d	9	13	1	6	4	12	67
Interstate ^b		2		1	—	—	1	—	—	4
Subtotal	22	47	14	100	91	51	19	5	35	384
All origins/ destinations	91	638	299	547	1 080	385	289	142	354	3 825

TABLE II.22—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1976-77 ('000 tonnes weight)

a. Excludes rest of Hunter region.
b. Includes tonnages from unknown origins or destinations as appropriate.
c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.
d. Estimate is derived from one observation.

81

TABLE II.23—ESTIMATED ROAD FREIGHT TONNES PASSING THROUGH BEROWRA 1977-78 ('000 tonnes weight)

Origin							D	estina	tion re	gion								
region	 			Int	rastate									Inter	state			
	Sydney	Outer Sydney	Hunter	Illawarra	North Coast	Northern	Central West	South-east	Murrumbidgee	Murray	Totai NSW	ACT	Victoria	Brisbane	Other Qld	SA	Not known	All origins aggregated
Intrastate																		
Sydney	9	501	734	3	145	36	2	2		1	1 433	—	_	362	4	—	3	1 802
Outer Sydney	442	4	2	4	—	—	1	—	—	—	453	—	8	1	—	—	2	464
Hunter	845	5		40	_	_	5	7	5	2	909	3	48		-	1ª	15	976
Illawarra	4	3	49	—	1 a	_	—	—	—	—	57	—		1 ª	—	—	—	58
North Coast	166	- 1 ª	_	3	_	—	1 a	—	—	—	171	3	2	—	—	—	3	179
Northern	31	—	—	1			—	—		—	32	—	—	_	—	_ .		32
Central West	_	. 15	8	—	3	—	—	—	—	—	26	—	—	—		<u> </u>	—	26
South-east	_	7	2	_	1 a	_	—	—	—	_	10			1 ª	—	_	—	11
Murrumbidgee	—	8	1	—	—	—	—	—	—		9	—	—	—	—			9
Murray	—	—	3	—	—	—	—	—	—	—	3	—	—	—	—		—	3
Total NSW	1 497	544	799	51	150	36	9	9	5	3	3 103	6	58	365	4	1 ª	23	3 560
ACT	—	_	2		1 ª	—	—	—	—	—	3	—	—		—	—	—	3
Interstate																		
Victoria	1	3	42	—	2	1 a	—	—	—	—	49	—	—	—	—		—	49
Brisbane	203	—		—	—		—	1ª	_		204	_	2		—	_	4	210
Other Qld.	18	_				_		—	—	_	18	—	—	—	—	—	—	18
SA	1 ª	2	5	_	_	_	—	—	—	—	8		_	_	—	_	—	8
Not known	22	1 a	1	—			_	—	—	—	24	—	-		—	—	2	26
All origins	 										Ē				,			
aggregated	1742	550	849	51	153	37	9	10	5	3	3 409	6	60	365	4	1	29	3874

a. Estimate is derived from one observation.

Origin and destination	Commodity group									Total
	Liv e - stock	Food- stuffs	Other farm produce	Minerals and metals	Building materials	Petroleum products, chemicals	Paper, rubber & misc.	Outside packaging	Uniden- tified freight	All com- modities
Sydney to-										
Outer Sydney	31	89	56	42	158	72	19	13	21	501
Newcastle ^a	2	162	32	114	135	83	76	28	73	705
Other NSW & ACT	3	42	11	35	56	17	24	7	23	218
Interstate ^b	2	6 9	2	48	34	43	79	20	,72	369
Subtotal	38	362	101	239	383	215	198	68	189	1 793
To Sydney from—										
Outer Sydney ^c	7	58	24	72	239	3	14	14	20	451
Newcastle ^a	23	91	82	251	198	51	30	17	48	791
Other NSW & ACT	3	52	33	14	128	2	8	6	9	255
Interstate ^b	1	66	35	32	35	10	35	5	26	245
Subtotal	34	267	174	369	600	66	87	42	103	1742
ACT & NSW other than Sydney to— ACT & NSW other										
than Sydney	24	15	3	51	55	27	6	1	9	191
Interstate ^b	5	15	4	32	8	11	3		4	82
Interstate ^b to—										
ACT & NSW other										
than Sydney		23	4	5	5	1	11	2	7	58
Interstated	-	1ª		2	1d		3	1 ^d		8
Subtotal	29	54	11	90	69	39	23	4	20	339
All origins/ destinations	101	683	286	698	1 052	320	308	114	312	3874

TABLE II.24—ESTIMATED ROAD FREIGHT TONNES BY COMMODITY GROUP PASSING THROUGH BEROWRA, 1977-78 ('000 tonnes weight)

a. Excludes rest of Hunter region.
b. Includes tonnages from unknown origins or destinations as appropriate.
c. Includes southbound traffic from part of Sydney Statistical Division located north of Berowra.
d. Estimate is derived from one observation.

APPENDIX III—TRUCK MOVEMENTS THROUGH CHECKING STATIONS IN NSW

This appendix presents details of the number of trucks in the '4 tonnes and less' and 'over 4 tonnes' carrying capacity categories recorded as passing through Marulan and Berowra truck checking stations. The data were supplied by DMT on a monthly basis, but only annual figures are provided here as monthly figures are readily available in the magazine *Truck and Bus.* Empty trucks are included.

Statistics of trucks with a carrying capacity of over 4 tonnes are presented in Table III.1 while details of smaller trucks appear in Table III.2. Information kept by DMT on movements of smaller trucks is not as comprehensive as that on trucks with a carrying capacity of over four tonnes. Table III.2 contains no details on smaller interstate trucks by broad route category in the case of Marulan. After April 1979 the collection of statistics at Marulan relating to all trucks of 4 tonnes and less carrying capacity were discontinued and the 1978-79 figures therefore include BTE estimates for the months of May and June 1979.

At Berowra no information is collected on interstate movements of trucks with a carrying capacity of 4 tonnes and less, but it is understood that the numbers in this category are insignificant.

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
		M	ARULAN				
Northbound From Vic. From SA, WA	80 860 11 479	84 937 13 546	86 902 11 613	91 894 10 568	96 585 8 890	100 012 8 647	111 373 10 994
Total Interstate Intrastate	92 339 53 302	98 483 63 187	98 515 74 098	102 462 87 302	105 475 89 559	108 659 89 017	122 367 93 991
Total Northbound	145 641	161 670	172 613	189 764	195 034	197 676	216 358
Southbound To Vic. To SA, WA	80 275 11 825	86 335 14 744	86 808 11 662	93 747 10 236	101 641 9 012	104 611 8 620	114 190 11 646
Total Interstate Intrastate	92 100 55 800	101 079 64 460	97 470 74 305	103 983 86 857	110 653 90 890	113 231 90 043	125 836 95 651
Total Southbound	147 900	165 539	172 775	190 840	201 543	203 274	221 487
TOTAL TRUCKS	293 541	327 209	345 388	380 604	396 557	400 950	437 845
		BE	ROWRA				
Northbound To Qld. Vic., SA to	19 031	22 162	22 419	23 040	23 499	25 057	26 904
Newcastle	44 113	3 910	3 859	4 3/8	4 837	5 163	6 065
Interstate Intrastate	23 144 134 916	26 072 169 880	26 278 184 886	27 418 186 016	28 336 197 254	30 220 205 421	32 969 228 976
Total Northbound	158 060	195 9 52	211 164	213 434	225 590	235 641	261 945
Southbound From Qld. Newcastle to Vic. SA	18 900	22 238	22 836	23 336	25 055	25 764	27 230
Total Interstate Intrastate	23 915 114 223	27 966 162 994	28 521 176 194	28 769 180 129	30 130 189 149	31 262 192 733	33 595 216 693
Total Southbound	138 138	190 960	204 715	208 898	219 279	223 995	250 288
TOTAL TRUCKS	296 198	386 912	415 879	422 332	444 869	459 636	512 233

TABLE III.1-TRUCKS[®] PASSING THROUGH NSW TRUCK CHECKING STATIONS: CARRYING CAPACITY OVER FOUR TONNES

a. Includes empty trucks.b. At Berowra interstate trucks are not dissected by size. Only a small number of interstate trucks have a carrying capacity of less than 4 tonnes.

TABLE III.2-TRUCKS^a PASSING THROUGH NSW TRUCK CHECKING STATIONS: CARRYING CAPACITY OF FOUR TONNES OR LESS

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
		M	ARULAN				
Northbound							
From Vic.	na	na	na	na	na	na	na
From SA, WA	na	na	na	na	na	na	na
Total							
Interstate	11 004	14 075	12 999	16 161	15 761	13 557	13 088 ^b
Intrastate	13 445	16 991	16 269	19 323	18 073	15 801	14 850
Total							
Northbound	24 449	31 066	29 268	35 484	33 834	29 358	27 938 ^b
Southbound							
To Vic.	na	na	na	na	na	na	na
To SA, WA	na	na	na	na	na	na	na
Total							
Interstate	10 135	13 257	12 533	16 161	13 716	11 960	11 690 ^b
Intrastate	12 989	15 665	16 048	17 665	16 594	15 424	14 379 ^b
Total							
Southbound	23 124	28 922	28,581	33 826	30 310	27 384	26 069 ^b
TOTAL TRUCK	S 47 573	59 988	57 849	69 310	64 144	56 742	54 007 ^b
		BE	ROWRA∘				
Northbound							
To Qld.	па	na	na	na	na	na	na
Vic., SA to							
Newcastle	na	na	na	na	na	na	na
Total							
Interstate	na	na	na	na	na	na	na
Intrastate	50 357	52 550	58 055	55 578	52 565	52 932	52 881
Total							
Northbound	na	na	na	na	na	na	na
Southbound							
From Qld.	na	па	na	na	na	na	na
Newcastle to	D 2	na	na	na		na	na
VIC., SA	Ia						
Total					_		
Interstate	na 62 306	58 000	na 59 702	na 54 614	52 976	na 54 720	na 51 405
	02 300		30 192	04 014	52 010		JI 420
10tal Southbound	50	n 0			n 0	n -	n -
	IIa	ila				118	
TOTAL TRUCKS	s na	na	na	na	na	na	na

a. Includes empty trucks.

b. Last two months' movements estimated by BTE.
c. At Berowra interstate trucks are not dissected by size. Only a small number of interstate trucks have a carrying capacity of less than 4 tonnes.

na Not available.

REFERENCES

Australian Bureau of Statistics (1974). *Transport and communication 1971–72*, Bulletin No 63, Canberra.

_____(1978a). Survey of motor vehicle usage: twelve months ended 30 September 1976, Canberra.

____(1978b). Australian Capital Territory statistical summary 1978, Canberra.

____(1979). Year book Australia 1979, No 63, Canberra.

Bureau of Transport Economics (1975). Estimates of freight passing through Marulan and Berowra truck weighing stations, 1972-73 and 1973-74, Information Paper, Canberra.

____(1976a). Estimates of freight passing through Marulan and Berowra truck weighing stations, 1974-75, Information Paper, Canberra.

____(1976b). Estimates of freight passing through Marulan and Berowra truck weighing stations, 1975-76, Information Paper, Canberra.

____(1976c). Estimates of Australian interregional freight movements, 1971-72, Information Bulletin, AGPS, Canberra.

____(1978a). Estimates of Australian interregional freight movements, 1975-76, Information Bulletin, AGPS, Canberra.

____(1978b). Road freight carried to and from Sydney sub-regions, 1976-77, Information Paper, Canberra.

_____(1978c). Estimates of freight passing through Marulan and Berowra truck weighing station, 1976-77, Information Paper, Canberra.

____(1979). The long distance road haulage industry, AGPS, Canberra.

Department of Main Roads (1976). The roadmakers, Sydney.

____(1980). Annual report 1979-80, Sydney.

Department of Motor Transport (1973). Annual report 1972-73, Sydney.

____(1978). Annual Report 1977-78, Sydney.

____(1980). Annual Report 1978-79, Sydney.

Joy, S. (1964). Unregulated road haulage: the Australian experience in Webb and McMaster (eds). *Australian Transport Economics: A Reader, ANZ Book Company, Sydney.*

Kish, L. (1965). Survey sampling, John Wiley & Sons Inc., New York.

Public Transport Commission of New South Wales (1974), Annual report 1973-74, Sydney.

____(1976). Annual report 1975-76, Sydney.

____(1979). Annual report 1977-78, Sydney.

Rimmer, P. (1970). Freight forwarding in Australia, ANU, Canberra.